

699 This Week in *Science*

Editorial

701 World Competition in Biotechnology

Letters

705 College Calculus: How Should It Be Taught?: M. M. GRELLER; A. RALSTON ■
The 3 K Microwave Background and Olbers' Paradox: P. MARMET
■ Biology Teaching: S. L. WEINBERG

News & Comment

710 Europe Seeks Strategy for Biology ■ Focus on the Genome
712 Field Test Data Inadequate, OTA Says
713 Science Budget Squeeze and the Zero Sum Game
714 Anti-Acne Drug Poses Dilemma for FDA
715 Fresh Look at Acid Rain
716 Toxic Waste R&D Effort Stalled
OECD Sets Guidelines for Cooperation
717 NAS Elects New Members
718 Animals of Invention

Research News

719 Obstacles to an AIDS Vaccine
721 Mathematics at 100
722 Exploiting the Insights from Protein Structure
724 A New Tool Maker in the Hominid Record? ■ One Species . . . One Tool

Articles

740 Segregation of Form, Color, Movement, and Depth: Anatomy, Physiology, and Perception: M. LIVINGSTONE AND D. HUBEL
750 Supernova 1987A!: S. E. WOOSLEY AND M. M. PHILLIPS
760 The Design of Molecular Hosts, Guests, and Their Complexes: D. J. CRAM

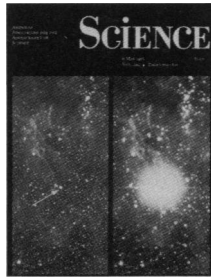
Research Articles

768 Visualizing Gene Expression in Time and Space in the Filamentous Bacterium *Streptomyces coelicolor*: A. SCHAUER, M. RANES, R. SANTAMARIA J. GUIJARRO, E. LAWLOR, C. MENDEZ, K. CHATER, R. LOSICK

Reports

777 Direct Observation of the Femtosecond Excited-State *cis-trans* Isomerization in Bacteriorhodopsin: R. A. MATHIES, C. H. B. CRUZ, W. T. POLLARD, C. V. SHANK
779 The Nature of the Interior of Uranus Based on Studies of Planetary Ices at High Dynamic Pressure: W. J. NELLIS, D. C. HAMILTON, N. C. HOLMES, H. B. RADOUSKY, F. H. REE, A. C. MITCHELL, M. NICOL

- **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** © 1988 by the American Association for the Advancement of Science. 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.
- 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 Supernova 1987A—an exploding star. On 23 February 1987, light and neutrinos reached Earth from the brightest supernova in almost 400 years. “Before (left) and after (right)” photos show the star that exploded and the supernova shortly after outburst. Photographs were taken using the 3.9-meter Anglo-Australian Telescope in New South Wales, Australia. See page 750. [Courtesy of David Malin, copyright 1987, the Anglo-Australian Telescope Board]

- 781 Hand of *Paranthropus robustus* from Member 1, Swartkrans: Fossil Evidence for Tool Behavior: R. L. SUSMAN
- 784 Insulin-Resistant Diabetes Due to a Point Mutation That Prevents Insulin Proreceptor Processing: Y. YOSHIMASA, S. SEINO, J. WHITTAKER, T. KAKEHI, A. KOSAKI, H. KUZUYA, H. IMURA, G. I. BELL, D. F. STEINER
- 787 Two Mutant Alleles of the Insulin Receptor Gene in a Patient with Extreme Insulin Resistance: T. KADOWAKI, C. L. BEVINS, A. CAMA, K. OJAMAA, B. MARCUS-SAMUELS, H. KADOWAKI, L. BEITZ, C. MCKEON, S. I. TAYLOR
- 790 Translocation and Rearrangement of Myeloperoxidase Gene in Acute Promyelocytic Leukemia: S. C. WEIL, G. L. ROSNER, M. S. REID, R. L. CHISHOLM, R. S. LEMONS, M. S. SWANSON, J. J. CARRINO *et al.*
- 793 Changing the Identity of a tRNA by Introducing a G-U Wobble Pair Near the 3' Acceptor End: W. H. MCCLAIN AND K. FOSS
- 796 Middle Mississippian Blastoid Extinction Event: W. I. AUSICH, D. L. MEYER, J. A. WATERS
- 798 Directional Selection and the Evolution of Breeding Date in Birds: T. PRICE, M. KIRKPATRICK, S. J. ARNOLD
- 800 Proteasome-Lipopeptide Vaccines: Enhancement of Immunogenicity for Malaria CS Peptides: G. H. LOWELL, W. R. BALLOU, L. F. SMITH, R. A. WIRTZ, W. D. ZOLLINGER, W. T. HOCKMEYER

Technical Comments

- 803 New Zealand Marine Terraces: Uplift Rates: C. M. WARD; W. B. BULL AND A. F. COOPER ■ Guanylate Cyclase and the Adrenal Natriuretic Factor Receptor: S. A. WALDMAN, D. C. LEITMAN, J. ANDRESEN, F. MURAD; R. K. SHARMA

AAAS News

- 807 AAAS-African Programs Under Way: A. A. WILSON AND LISBETH A. LEVEY ■ Forum to Focus on Science Teaching ■ Pacific Division Meets in Corvallis, 18 to 22 June ■ Call for Nominations ■ Reminder for Members ■ Regional Seminar Focuses on Caribbean Science and Technology ■ Obituaries ■ AAAS Council Meeting, 1988: M. WHITE ■ AAAS Members Elected as Fellows on 15 February 1988

Book Reviews

- 817 Hospital Structure and Performance, *reviewed by* M. L. FENNEL ■ Pottery Analysis, R. L. RANDS ■ Sedimentation in the African Rifts, R. G. COLEMAN ■ Geology and Geochemistry of Abyssal Plains, D. E. BUCKLEY ■ Books Received

Software Reviews

- 824 PC Software for Artificial Intelligence Applications: H. EPP, M. KALIN, D. MILLER

Products & Materials

- 832 Automated Sample Handling ■ Microcentrifuge Tube ■ Inverted Microscope ■ Graphics Supercomputer ■ Fast 3-D Graphics on PCs ■ X-ray Fluorescence Analyzer ■ Literature

Board of Directors

Sheila E. Widnall
*Retiring President,
Chairman*

Walter E. Massey
President

Richard C. Atkinson
President-elect

Floyd E. Bloom
Mary E. Clutter
Eugene H. Cota-Robles
Mildred S. Dresselhaus
Beatrix A. Hamburg
Donald N. Langenberg
William T. Golden
Treasurer

Alvin W. Trivelpiece
Executive Officer

Editorial Board

Elizabeth E. Bailey
David Baltimore
William F. Brinkman
E. Margaret Burbidge
Philip E. Converse
Joseph L. Goldstein
F. Clark Howell
James D. Idol, Jr.
Leon Knopoff
Oliver E. Nelson
Helen M. Ranney
David M. Raup
Howard A. Schneiderman
Larry L. Smarr
Robert M. Solow
James D. Watson

Board of Reviewing Editors

John Abelson
Qais Al-Awqati
Don L. Anderson
Stephen J. Benkovic
Floyd E. Bloom
James J. Bull
Charles R. Cantor
Ralph J. Cicerone
John M. Coffin
Bruce F. Eldridge
Paul T. Englund
Theodore H. Geballe
Roger I. M. Glass
Stephen P. Goff
Robert B. Goldberg

Corey S. Goodman
Jack Gorski
Stephen J. Gould
Richard M. Held
Gloria Heppner
Eric F. Johnson
Konrad B. Krauskopf
Charles S. Levings III
Richard Losick
Karl L. Magleby
Philippa Marrack
Joseph B. Martin
John C. McGiff
Mortimer Mishkin
Jiri Novotny
Gordon H. Orians
Carl O. Pabo

John S. Pearce
Yeshayau Pocker
Jean Paul Revel
Russell Ross
James E. Rothman
Daniel V. Santi
Thomas C. Schelling
Ronald H. Schwartz
Otto T. Solbrig
Robert T. N. Tjian
Virginia Trimble
Geerat V. Vermeij
Harold Weintraub
Irving L. Weissman
George M. Whitesides
Owen N. Witte
William B. Wood

Science

240 (4853)

Science **240** (4853), 699-832.

ARTICLE TOOLS

<http://science.sciencemag.org/content/240/4853>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science* is a registered trademark of AAAS.

Copyright © 1988 The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works.