

371 This Week in *Science*

Editorial

373 Frontiers in Chemistry: J. I. BRAUMAN

Letters

375 DNA Databases Monitored: D. SOLL, R. L. KIRSCHSTEIN, L. PHILIPSON,
H. UCHIDA ■ Baltimore's "Fiery Blast": J. H. CILLEY, SR. ■ "Lost" Sex Survey:
A. D. KLASSEN

News & Comment

383 Sverdlovski: Anthrax Capital ■ AIDS in the U.S.S.R.
385 Science Focuses on the Next Presidency
386 Whistle-Blowers Air Cases at House Hearings
388 *Briefing*: Academy Opens Center in California ■ More NSF Fellowships ■ British
and French Get Research Prescriptions ■ EPA Will Keep Old SO₂ Rules ■ What's
in an Acronym?

Research News

390 Cloud over Parkinson's Therapy ■ Ethical Issues Raised
393 No Longer Willful, Gaia Becomes Respectable ■ A Loop Between Plant and
Cloud
396 On the Advantage of Being Different

Articles

Frontiers in Chemistry

415 Voltammetry with Microscopic Electrodes in New Domains: R. M. WIGHTMAN
420 Stereoselective Organic Reactions: Catalysts for Carbonyl Addition Processes:
D. A. EVANS
426 The Interplay Between Chemistry and Biology in the Design of Enzymatic
Catalysts: P. G. SCHULTZ
433 Probing Structure-Function Relations in Heme-Containing Oxygenases and
Peroxidases: J. H. DAWSON
440 Intramolecular Long-Distance Electron Transfer in Organic Molecules:
G. L. CLOSS AND J. R. MILLER
447 The Vibrational Spectroscopy and Dynamics of Weakly Bound Neutral Complexes:
R. E. MILLER
453 Theoretical Studies of the Energetics and Dynamics of Chemical Reactions:
T. H. DUNNING, JR., L. B. HARDING, A. F. WAGNER, G. C. SCHATZ,
J. M. BOWMAN
460 Chemical Waves: J. ROSS, S. C. MÜLLER, C. VIDAL

- 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*® Copyright © 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 The singular properties of the core region and the rotation center of the spiral wave in the Belousov-Zhabotinsky reaction are shown in three-dimensional perspective. The image was obtained by an overlay of a large number of single snapshots of spiral rotation covering three full revolutions. It presents the upper envelope of the concentration variation, that is the maximum level of oxidation of the catalyst ferroin reached at each point in space. The envelope is shown in arbitrary pseudo colors. See page 460. [S. C. Müller, Th. Plesser, and B. Hess, Max-Planck-Institut für Ernährungsphysiologie, D-4600 Dortmund, Federal Republic of Germany]

Reports

- 493 Fabrics in Polar Ice Sheets: Development and Prediction: R. B. ALLEY
- 495 Superconducting and Magnetic Behavior in $\text{La}_{2-x}\text{Na}_x\text{CuO}_4$: M. A. SUBRAMANIAN, J. GOPALAKRISHNAN, C. C. TORARDI, T. R. ASKEW, R. B. FLIPPEN, A. W. SLEIGHT, J. J. LIN, S. J. POON
- 497 Subsidence in the Northeastern Nile Delta: Rapid Rates, Possible Causes, and Consequences: D. J. STANLEY
- 501 Single-Stranded DNA Binding Protein Encoded by the *virE* Locus of *Agrobacterium tumefaciens*: V. CITOVSKY, G. DE VOS, P. ZAMBRYSKI
- 504 Cleaving DNA at Any Predetermined Site with Adapter-Primers and Class-IIIS Restriction Enzymes: S. C. KIM, A. J. PODHAJSKA, W. SZYBALSKI
- 506 Stimulation of RNA and Protein Synthesis by Intracellular Insulin: D. S. MILLER
- 509 Phosphatidylinositol-Glycan Anchors of Membrane Proteins: Potential Precursors of Insulin Mediators: G. ROMERO, L. LUTTRELL, A. ROGOL, K. ZELLER, E. HEWLETT, J. LARNER
- 512 A "Selfish" B Chromosome That Enhances Its Transmission by Eliminating the Paternal Genome: U. NUR, J. H. WERREN, D. G. EICKBUSH, W. D. BURKE, T. H. EICKBUSH
- 514 Scanning Tunneling Microscopy of *recA*-DNA Complexes Coated with a Conducting Film: M. AMREIN, A. STASIAK, H. GROSS, E. STOLL, G. TRAVAGLINI
- 516 Interferon- γ : The Major Mediator of Resistance Against *Taxoplasma gondii*: Y. SUZUKI, M. A. ORELLANA, R. D. SCHREIBER, J. S. REMINGTON
- 518 Guanosine Triphosphatase Activating Protein (GAP) Interacts with the p21 *ras* Effector Binding Domain: H. ADARI, D. R. LOWY, B. M. WILLUMSEN, C. J. DER, F. MCCORMICK
- 521 Evidence from Cassette Mutagenesis for a Structure-Function Motif in a Protein of Unknown Structure: N. D. CLARKE, D. C. LIEN, P. SCHIMMEL
- 524 Independent Molecular Pathways in Initiation and Loss of Hormone Responsiveness of Breast Carcinomas: S. SUKUMAR, W. G. CARNEY, M. BARBACID

Book Reviews

- 547 Soviet Agriculture, reviewed by K. M. BROOKS ■ Production and Exchange of Stone Tools, K. G. HIRTH ■ Neurotrophic Activity of GABA During Development, J. L. BARKER ■ Seed Dispersal, D. L. VENABLE ■ Books Received

Products & Materials

- 553 Chemical Database ■ Bis-Acrylamide Solution ■ X-ray Fluorescence Spectroscopy ■ Diode Array Detector ■ Analytical Scanning Electron Microscope ■ Double-Staining Kit ■ FTIR Spectrometer ■ 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
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 J. Vermeij
Harold Weintraub
Irving L. Weissman
George M. Whitesides
Owen N. Witte
William B. Wood

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: Alvin W. Trivelpiece

Editor: Daniel E. Koshland, Jr.

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

EDITORIAL STAFF

Managing Editor: Patricia A. Morgan

Assistant Managing Editor: Nancy J. Hartnagle

Senior Editors: Eleanore Butz, Ruth Kulstad

Associate Editors: Martha Coleman, R. Brooks Hanson, Barbara Jasny, Katrina L. Kelner, Edith Meyers, Phillip D. Szurumi, David F. Voss

Letters Editor: Christine Gilbert

Book Reviews: Katherine Livingston, *editor*; Deborah F. Washburn

This Week in Science: Ruth Levy Guyer

Contributing Editor: Lawrence I. Grossman

Chief Production Editor: Ellen E. Murphy

Editing Department: Lois Schmitt, *head*; Mary McDaniel, Patricia L. Moe, Barbara E. Patterson

Copy Desk: Joi S. Granger, Beverly Shields, Anna Victoreen, Barbara Wittig

Production Manager: Karen Schools

Assistant Production Manager: James Landry

Graphics and Production: Holly Bishop, James J. Olivari

Covers Editor: Grayce Finger

Manuscript Systems Analyst: William Carter

NEWS STAFF

News Editor: Barbara J. Culliton

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

Research News: Roger Lewin, *deputy editor*; Deborah M. Barnes, Richard A. Kerr, Jean L. Marx, Leslie Roberts, M. Mitchell Waldrop

European Correspondent: David Dickson

BUSINESS STAFF

Business Staff Manager: Deborah Rivera-Wienhold

Classified Advertising Supervisor: Karen Morgenstern

Membership Recruitment: Gwendolyn Huddle

Member and Subscription Records: Ann Ragland

Guide to Biotechnology Products and Instruments:

Shauna S. Roberts

ADVERTISING REPRESENTATIVES

Director: Earl J. Scherago

Traffic Manager: Donna Rivera

Traffic Manager (Recruitment): Gwen Canter

Advertising Sales Manager: Richard L. Charles

Employment Sales Manager: Edward C. Keller

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); San Jose, CA 95112: Bob Brindley, 310 S. 16 St. (408-988-4690); Dorset, VT 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581); Damascus, MD 20872: Rick Sommer, 24806 Shrubbery Hill Ct. (301-972-9270); U.K., Europe: Nick Jones, +44(0647)52918; Telex 42513; FAX (0392) 31645.

Information for contributors appears on page XI of the 25 March 1988 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 or WU Telex 968082 SCHERAGO.

Frontiers in Chemistry

Chemistry, the most central of scientific disciplines, continues to show the promise, excitement, and possibilities set out 2 years ago in *Opportunities in Chemistry*, the Pimentel Report. Much of this promise is already being realized: better understanding of chemical properties and reactions, improved instrumentation, increased computational ability, advances in theory, and novel experimental approaches to synthetic challenges are all having serious consequences for the field. Readers will recognize from individual articles in previous issues of *Science* that significant advances in this field are continually occurring—creating new intellectual opportunities as well as solidifying earlier ones.

In this issue are highlighted a few of the exciting developments in chemistry, chosen to expose some of the breadth and depth of the field. As is usually the case in these field-organized issues with only a limited number of papers, it is not possible to cover the entire area; readers will continue to see other important and interesting work in future issues.

Many of the advances in modern chemistry have come from superior methods of analysis, improved both in sensitivity and specificity. Wightman describes some extraordinary developments in microelectrodes that give microsecond time resolution and micrometer spatial resolution. Potential applications in many areas, including brain chemistry, are pointed out.

Synthetic chemistry lies at the heart of chemical science. New molecules and new ways of making them are critical. Evans describes new advances in stereoselective synthesis, which involves the rational construction of molecules whose complex structures involve the specific geometrical relations of ring connections and functional groups. Schultz describes the design and construction of efficient highly selective catalysts that are catalytic antibodies and hybrid enzymes. In this work we see major breakthroughs in the modification of naturally occurring molecules to perform new and different chemistries.

An understanding of naturally occurring complex chemical systems is crucial to understanding life itself as well as in designing new chemistry. Dawson describes structure and function in the bioinorganic chemistry of heme-containing oxidases and peroxidases. This important work depends significantly on synthetic models that are capable of doing much of the chemistry of the natural systems. Closs and Miller describe studies of long-distance intramolecular electron transfer, an extremely fundamental and key chemical process. Invention and synthesis of models and studies of their chemistry provide critical insight and tests of theories.

Some of the most interesting and important chemical interactions occur when molecules interact only very weakly. Sophisticated measurements and interpretation of spectra allow us to understand how molecules behave in this limit. Miller describes some of the insights obtained from near-infrared studies of van der Waals and hydrogen-bonded molecules.

Dunning and his coauthors describe theoretical studies of the dynamics of chemical reactions. These illustrate some of the important advances in computational chemistry and its applicability to solutions of real problems.

As our understanding progresses, it is becoming possible to deal with complex systems that contain many exciting possibilities for nonlinear behavior seen in living as well as in other real-world systems. Ross, Müller, and Vidal describe chemical waves, an example of spatial structures that can occur in nonlinear systems far from equilibrium.

The plate of chemistry is a full one; the menu is extremely rich and varied. We expect to see continuing insights, imaginative breakthroughs, and useful applications. The combination of understanding, insight, and technological power makes it clear that much is yet to come. The promise of the Pimentel Report is indeed being realized.—JOHN I. BRAUMAN, *Department of Chemistry, Stanford University, Stanford, CA 94305*