

1711 This Week in *Science*

Editorial

1713 World Gas Conference

Letters

1715 Zombification: W. DAVIS; W. BOOTH ■ Translation of Einstein Papers:
P. HAVAS ■ Gaia Modified: P. CLOUD

News & Comment

1720 A Bitter Battle Over Error ■ NIH to Review Disputed Data
1723 IOM Elects New Members
1724 Tighter Ozone Standard Urged by Scientists
1725 Superfund Program Under Fire
1726 Congress Probes Drug Probe at Livermore Lab
1727 Nevada May Lose Nuclear Waste Funds ■ Acid Aerosols Called Health Hazard
1728 Go-Ahead for Gene Sequencing Venture ■ Cosmos Club Drops Ban on Women
■ Mass Retirement in the Leadership of the Soviet Academy ■ Senate Passes
Genome Bill

Research News

1729 Drugs: Running the Numbers ■ New Rules for Drug Dependence
1732 Zipping Up DNA Binding Proteins ■ Stress Proteins Are Links in Disease
1733 Einstein's Impossible Ring: Found
1734 Geophysics: The Slower Side of the Sciences: A Layer Cake Continent Beneath
the Midwest ■ Relax, the Sun Is Brightening Again ■ How Long Does It Take to
Build a Mountain? ■ The Mantle's Structure—Having It Both Ways

Random Samples

1736 Softball Science ■ The Winter of '42 ■ The Winner Was . . .

Articles

1737 Paleocyanography of Coral Reefs in the Hawaiian-Emperor Chain: R. W. GRIGG
1743 Mixing in Stars: G. WALLERSTEIN

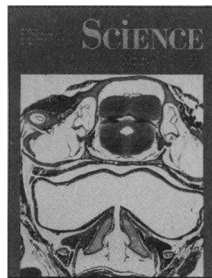
Research Articles

1751 A Specific Amino Binding Site Composed of RNA: M. YARUS
1759 The Leucine Zipper: A Hypothetical Structure Common to a New Class of DNA
Binding Proteins: W. H. LANDSCHULZ, P. F. JOHNSON, S. L. MCKNIGHT

Reports

1765 Spectrum Line Intensity as a Surrogate for Solar Irradiance Variations:
W. C. LIVINGSTON, L. WALLACE, O. R. WHITE
1767 Deuterium on Mars: The Abundance of HDO and the Value of D/H: T. OWEN,
J. P. MAILLARD, C. DE BERGH, B. L. LUTZ

- **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): \$70. Domestic institutional subscription (51 issues): \$110. Foreign postage extra: Canada \$32, other (surface mail) \$32, air-surface via Amsterdam \$85. 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 A section through the head of a cricket frog shows the eighth cranial nerve piercing the skull between the inner ear and brain case. The amphibian papilla, an auditory organ, lies in the chamber above the nerve. Below, the larynx opens into the mouth. The auditory and vocal systems coevolve to match call frequency with tuning of the ear. See page 1786. [Histology and photograph by Blinda McClelland and Walter Wilczynski, Department of Psychology, University of Texas, Austin 78712]

- 1770 Anomalous Upstream Retroflexion in the Agulhas Current: J. R. E. LUTJEHARMS AND R. C. VAN BALLEGOOYEN
- 1772 Regeneration of Sensory Hair Cells After Acoustic Trauma: J. T. CORWIN AND D. A. COTANCHE
- 1774 Hair Cell Regeneration After Acoustic Trauma in Adult *Coturnix* Quail: B. M. RYALS AND E. W. RUBEL
- 1776 A Point Mutation in the *c-myc* Locus of a Burkitt Lymphoma Abolishes Binding of a Nuclear Protein: M. ZAJAC-KAYE, E. P. GELMANN, D. LEVENS
- 1780 Restricted Lateral Diffusion of PH-20, a PI-Anchored Sperm Membrane Protein: B. M. PHELPS, P. PRIMAKOFF, D. E. KOPPEL, M. G. LOW, D. G. MYLES
- 1782 The α Subunit of the GTP Binding Protein Activates Muscarinic Potassium Channels of the Atrium: E. CERBAI, U. KLÖCKNER, G. ISENBERG
- 1784 Astrocyte Mitogen Inhibitor Related to Epidermal Growth Factor Receptor: M. NIETO-SAMPEDE
- 1786 Coevolution of Sender and Receiver: Effect on Local Mate Preference in Cricket Frogs: M. J. RYAN AND W. WILCZYNSKI
- 1788 Production of Stable Rabbit-Mouse Hybridomas That Secrete Rabbit mAb of Defined Specificity: T. J. G. RAYBOULD AND M. TAKAHASHI
- 1790 A New Specimen of *Archaeopteryx*: P. WELLNHOFER
- 1792 Neuroregulatory and Neuropathological Actions of the Ether-Phospholipid Platelet-Activating Factor: E. KORNECKI AND Y. H. EHRlich

Technical Comments

- 1795 Amplification of *c-erbB-2* and Aggressive Human Breast Tumors?: I. U. ALI, G. CAMPBELL, R. LIDEREAU, R. CALLAHAN; D. J. SLAMON AND G. M. CLARK

AAAS Meetings

- 1800 1989 AAAS Annual Meeting: Call for Papers

Book Reviews

- 1801 Toward a New Philosophy of Biology, reviewed by F. J. AYALA ■ Neural Darwinism, W. H. CALVIN ■ Sociology and Scientism, B. LASLETT ■ Books Received

Products & Materials

- 1806 Electrophoresis Power Supply ■ Molecular Modeling and Graphics Software ■ Reaction Calorimeter ■ Cryogenic Labware ■ Autoradiographic Image Intensifier ■ Laser Scanning Microscope ■ Protein Purification System ■ Literature

*Author Index to Volume 240 is found on pages I-X
Information for Contributors is found on pages XI-XII*

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
Michael I. Posner
Jean Paul Revel
Russell Ross
James E. Rothman
Daniel V. Santi
Thomas C. Schelling
Ronald H. Schwartz
Vernon L. Smith
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. Hartnagel

Senior Editors: Eleanore Butz, Ruth Kulstad

Associate Editors: Martha Coleman, R. Brooks Hanson,

Barbara Jasny, Katrina L. Kelner, Edith Meyers, Linda J.

Miller, Phillip D. Szurmi, David F. Voss

Letters Editor: Christine Gilbert

Book Reviews: Katherine Livingston, *editor*; Deborah Field 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,

Yolanda M. Rook

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, Gregory Byrne, 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, Robert Pool, 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 Broad-

way (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-

998-4690); Dorset, VT 05251: Fred W. Dieffenbach, Kent Hill

Rd. (802-867-5581); Damascus, MD 20872: Rick Sommer,

24808 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 24 June 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.

World Gas Conference

The International Gas Union held its triennial meeting in Washington, D.C., 5 to 9 June. Talks by high-level participants among those present from 46 member countries provided a view of the increasing role of natural gas in the world's energy economy. Of special interest were presentations by speakers from Western Europe and the Soviet Union. West Germany, France, and Italy are major importers of hydrocarbons, and the Soviet Union has the world's largest total fossil energy reserves.

From the tenor of the talks, it was clear that the people of Western Europe are intent on maximizing the security of energy supplies. Thus six nations, including France and West Germany, have entered into a 27-year contract to obtain part of their natural gas from the Norwegian-controlled giant Troll field located in the North Sea. This source will supplement gas currently being obtained from the Soviet Union, the Netherlands, Algeria, and Libya. Western Europe as a consumer is in the agreeable position of being in the midst of a huge and enduring gas glut. The use of this fuel is expanding, replacing fuel oil and some coal in boilers and being employed increasingly in home heating. The change is not rapid, but it progresses and additional countries, including Spain and Greece, will be served.

The most significant talk at the conference was delivered by V. S. Chernomyrdin, Minister of the Gas Industry in the Soviet Union. He told of Soviet plans for production and use of his country's enormous proven reserves of hydrocarbons. Proven reserves change with price, technology, and exploration, but the probabilities are that the Soviet Union will retain a huge margin over the United States. The Soviets have a large unexplored continental shelf, and their technology is evolving and improving.

About 60 percent of that country's gas is located in northern Siberia, above the Arctic Circle, much of it near the mouth of the River Ob. Conditions there are extreme. For 3 months of the year, winds blow with hurricane force. The mean annual temperature is -10°C . The permafrost is deep and heterogeneous, including pockets of brine. Nevertheless, the construction of production platforms, pipelines, and pumping stations is proceeding. Large segments of the production platforms, weighing 1000 metric tons or more, are fabricated in factories 1500 kilometers south of the gas fields. During the summer thaw, they are floated on pontoons northward on the River Ob. In the winter, they are conveyed on special trucks to the fields. From each platform about 20 wells are drilled employing controlled directional drilling. In addition to methane, the wells will produce substantial amounts of gas liquids. To bring the gas west from fields on the Yamal Peninsula, it is planned by 1996 to lay six pipelines, 1420 millimeters in diameter, operating at pressures of 75 atmospheres. The pipelines will pass through the Gulf of Baidarak, which for most of the year is covered with drift ice.

This year the Soviet Union will produce about 26 trillion cubic feet (tcf) of natural gas (about 50 percent more than the U.S. production). In succeeding years, production will increase steadily, exceeding 35.3 tcf in the 1990s, with growth to continue beyond the year 2000. In 1987 the share of gas in energy use in the Soviet Union amounted to 36 percent with a projected share of 40 percent in 1990. Environmental considerations and the Chernobyl incident have spurred use in the generation of electric power. From 1984 to 1987, consumption for that purpose increased about 37 percent. Future substantial markets lie in home heating and in the application of gas condensate for petrochemicals. The Russians are moving toward the use of compressed natural gas in motor vehicles. Already 250 automobile gas-filling compressor stations are functioning. In 1990 the number of trucks operating on compressed natural gas will exceed 500,000. Prospects are that transportation applications will increase further in scale and number. Chernomyrdin stated, "The development of compressed and liquefied gas stations will allow us to decrease the consumption of petrol and diesel fuel."

The energy content of world reserves of natural gas is now nearly equal to that of petroleum, and prospects are that gas energy content will continue to grow much faster than that of oil. With increasing exploitation of gas reserves and broadened applications, gas is likely to serve for some time as an impediment to drastic increases in the price of petroleum.—PHILIP H. ABELSON