

751 This Week in *Science*

Editorial

753 The Confusion Profusion

Letters

755 Alar in Apples: E. GROTH III ■ Pesticides, Risk, and Applesauce: B. N. AMES AND L. S. GOLD

News & Comment

761 HDTV: The Technology *du Jour* ■ Without Standards, U.S. HDTV Lacks Definition

764 A Fast Track For High-Risk Science

765 Whose Notes Are They? ■ It's Not Over Yet

766 British Biologists Learn Small Is Not Beautiful

767 Space Council Backs Landsat
Fire Devastates Jackson Lab

768 Lewin Wins Awards
Bone Marrow Transplants Approved

Research News

769 Do Mathematicians Still Do Math? ■ The Sorcerer's Apprentice

771 SLAC Feels the Thrill of the Chase

773 Can You Help the Mets by Watching on TV?

774 Cold Fusion: Bait and Switch?

Articles

776 Air Pollution and Forest Decline in a Spruce (*Picea abies*) Forest: E.-D. SCHULZE

783 RNA-Protein Interactions in 30S Ribosomal Subunits: Folding and Function of 16S rRNA: S. STERN, T. POWERS, L.-M. CHANGCHIEN, H. F. NOLLER

Research Articles

790 G_{olf} : An Olfactory Neuron Specific-G Protein Involved in Odorant Signal Transduction: D. T. JONES AND R. R. REED

Reports

796 Identification of a Neuropeptide Hormone That Regulates Sex Pheromone Production in Female Moths: A. K. RAINA, H. JAFFE, T. G. KEMPE, P. KEIM, R. W. BLACHER, H. M. FALES, C. T. RILEY, J. A. KLUN, R. L. RIDGWAY *et al.*

798 The Role of Excitatory Amino Acids and NMDA Receptors in Traumatic Brain Injury: A. I. FADEN, P. DEMEDIUK, S. S. PANTER, R. VINK

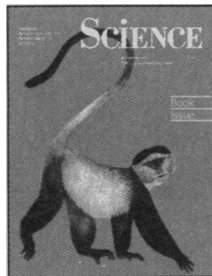
800 Regulation of Calcium Release Is Gated by Calcium Current, Not Gating Charge, in Cardiac Myocytes: M. NÄBAUER, G. CALLEWAERT, L. CLEEMANN, M. MORAD

803 Induction of Mesoderm by a Viral Oncogene in Early *Xenopus* Embryos: M. WHITMAN AND D. A. MELTON

806 Global Sea Level Rise and the Greenhouse Effect: Might They Be Connected? W. R. PELTIER AND A. M. TUSHINGHAM

■ 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* © 1989 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): \$75. Domestic institutional subscription (51 issues): \$120. Foreign postage extra: Canada \$46, other (surface mail) \$46, air mail via Amsterdam \$85. First class, airmail, school-year, and student rates on request. Single copy sales: Current issue, \$3.50; back issues, \$5.00; Biotechnology issue, \$6.00 (for postage and handling, add per copy \$0.50 U.S., \$1.00 all foreign); Guide to Biotechnology Products and Instruments, \$18 (for postage and handling add per copy \$1.00 U.S., \$1.50 Canada, \$2.00 other foreign). Bulk rates on request. Change of address: allow 6 weeks, giving old and new addresses and 11-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, P.O. Box 1722, Riverton, NJ 08077. 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 golden monkey *Cercopithecus mitis kandti*, a guenon of a rare subspecies that inhabits high-altitude forest in the area around the Virunga volcanoes of east central Africa. Its distribution coincides with that of the endangered mountain gorilla. The survival of both primates depends on the conservation of this relictual habitat. [Jonathan Kingdon; from *A Primate Radiation: Evolutionary Biology of the African Guenons*, reviewed on page 860]

- 811 $V\beta$ -Specific Stimulation of Human T Cells by Staphylococcal Toxins: J. KAPPLER, B. KOTZIN, L. HERRON, E. W. GELFAND, R. D. BIGLER, A. BOYLSTON, S. CARREL, D. N. POSNETT, Y. CHOI, P. MARRACK
- 813 Transmembrane Channels Based on Tartaric Acid-Gramicidin A Hybrids: C. J. STANKOVIC, S. H. HEINEMANN, J. M. DELFINO, F. J. SIGWORTH, S. L. SCHREIBER
- 817 Class II MHC Molecules Are Specific Receptors for Staphylococcus Enterotoxin A: J. A. MOLLIK, R. G. COOK, R. R. RICH
- 820 Control of Experimental Autoimmune Encephalomyelitis by T Cells Responding to Activated T Cells: A. W. LOHSE, F. MOR, N. KARIN, I. R. COHEN

Book Reviews

- 830 The Taming of Invention: G. WISE; other reviews by P. J. PAULY, B. SINCLAIR, W. L. O'NEILL
- 835 Ethical Dissent in a New Mode: J. M. BEYER; other review by C. MORRILL
- 837 Trends in the Job Arena: G. FARKAS; other reviews by M. H. STROBER, G. J. STIGLER
- 840 An Industrial Research Program: J. P. SWANN; other review by V. Y. SUSLOW
- 843 Science Brought to Mothering: N. ROGERS; other review by G. C. ANDERSON
- 845 Adoption Studies Continued: R. J. ROSE
- 847 Igor Kurchatov: D. HOLLOWAY; other review by K. G. RAMANATHAN
- 849 The Solar System: Records from $t \geq 0$: D. LAL; other reviews by M. B. KUNDU, C. R. CANIZARES
- 852 A Life in Biochemistry: E. KENNEDY; other review by I. MELLMAN
- 854 Conservation Needs Close to Home: L. F. HUENNEKE
- 855 A Cladisticization: E. N. ARNOLD; other reviews by D. L. CLARK, W. A. CALDER
- 858 Misdeeds in Anthropology: M. CARTMILL; other reviews by P. A. ERICKSON, R. L. SUSMAN, C. P. GROVES
- 861 The Archeology of Capitalism: E. ZUBROW; other reviews by D. FREIDEL, G. E. STUART, S. KRECH III

Products & Materials

- 873 Heat Measurement ■ Importing On-Line References ■ *Angewandte Chemie* On-Line ■ Absolute Reflectance Measurements ■ Electrotransfection Apparatus ■ Chromatography Data Acquisition System ■ Antibodies ■ Literature

Technical Comments

- 823 The Myeloperoxidase Gene in Acute Promyelocytic Leukemia: C. W. MILLER, G. ROVERA, D. VENTURELLI, K. F. HUEBNER, P. VAN TUINEN *et al.*; E. DONTI, M. MONTANUCCI, L. LONGO, A. MENCARELLI, P. PANDOLFI *et al.*; S. C. WEIL, M. S. REID, L. A. NILLES, R. L. CHISHOLM, G. L. ROSNER *et al.* ■ Relation of the Amyloid β Protein Precursor to Heparan Sulfate Proteoglycans: D. C. GOWDA, R. K. MARGOLIS, B. FRANGIONE, J. GHISO, M. LARRONDO-LILLO, R. U. MARGOLIS; D. SCHUBERT

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The Confusion Profusion

The exciting prospect of cold fusion seems to be diminishing from a hurricane to an April shower. The results are certainly not all in yet, but the early promise of untold energy is disappearing amid the relentless detail of careful electrochemical experiments and heat balances. The cold fusion incident has been unfortunate in many respects, but it has yielded some valuable lessons that suggest that the dark cloud may have a palladium lining.

The first lesson is that the merit in the established scientific procedure of exposing one's findings to peer review before publicizing results is reaffirmed. Peer review has merit for authors, who get good feedback; it has merit for other scientists, who get a screening of the research most likely to be valuable to them; and it has merit for the press and the public, who cannot be expected to have complex scientific expertise. The volumes of newsprint devoted to the cold fusion incident and the wasted effort of scientists who tried to duplicate experiments for which there were no details demonstrate why scientists are skeptical of results that first appear in the general press rather than in scholarly journals.

Before scientists become too critical about press coverage, however, it is important to recognize that discoveries with major implications for societal change are difficult to suppress. The open atmosphere of academia inevitably means that graduate students, postdoctoral fellows, colleagues, and visitors will learn of experiments in progress, and if these have important implications, the gossip circuit and the computer network will spread news of the work that the scientists might well prefer to confine temporarily to the laboratory. This does not excuse premature press releases or incomplete experiments, because the more important the conclusion the more careful should be the experiment. But it does explain that leaks occur and that once the genie gets out of the bottle the bottle openers will lose control.

Another lesson from the cold fusion flap should give insight to those embroiled in the controversy between scientists and legislators about scientific fraud. No question of fraud has arisen in the fusion experiments, but the rush of other scientists to duplicate them is illustrative of what happens in any major discovery—correct, incorrect, cutting edge, premature, or fraudulent. The argument of most scientists, that fraud is not widespread in science, represents faith in a law that is illustrated by the fusion confusion. The law might be stated simply as, "The bigger the result the more quickly it is going to be checked." The process of science itself ensures that every major discovery, or claim to a discovery, will be checked in a very short period of time. When scientists oppose the advocacy of large bureaucracies to investigate fraud, they do so not because they are indifferent to fraud or want to suppress bad publicity, but because their experience has engendered trust that there is a correlation between the importance of a finding and the rapidity of its verification or falsification. Some minor incorrect results may escape detection for a time, but major ones will not. The reality of that process is illustrated by the rush to challenge the cold fusion results. The "establishment" cannot suppress a revolutionary concept, and the revolutionaries cannot escape the detailed scrutiny of their colleagues.

Authors have a responsibility to be their own devil's advocates and do appropriate control experiments. Peer review is a screening system to prevent the wasted effort and exaggerated expectations that can be generated by poor scholarship on a seductively important problem. When these procedures are bypassed they lead to delays and wasted effort, but inevitably scientists by instinct and obligation will do the experiments to challenge any new or unexpected finding. And if it turns out that there was great sloppiness and premature publicity, the fallout will and should be severe for those responsible for the unfulfilled expectations.

The high visibility of this event may perhaps enhance public understanding that the procedures are designed to hasten arrival at the truth. That truth will eventually emerge from the profusion of stories and opinion on cold fusion in the standard scientific way: it will not come through an edict by an august figure such as the President's science adviser or the presidents of the American Physical Society or of the American Chemical Society. It will not be produced by interminable legal actions leading to the Supreme Court. It will be manifested by scientists all over the world, devising increasingly clever experiments to check the propositions that have been advanced. It is the quality of those experiments that will finally determine whether cold fusion is a reality.—DANIEL E. KOSHLAND, JR.