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LETTERS	The Pentagon's Computers: <i>H. Dickinson</i> ; Peanut Butter Test: <i>J. Kassel</i> and <i>D. Weinberger</i> ; Peer Review: An Experiment: <i>S. Harnad</i> ; Sakharov and Whistle-Blowing: <i>C. H. Fox</i> ; Whale Meat in the Japanese Diet: <i>R. L. Brownell, Jr.</i> , and <i>H. Omura</i>	974
EDITORIAL	United States-Soviet Scientific Exchanges: <i>V. F. Weisskopf</i> and <i>R. R. Wilson</i>	977
ARTICLES	Solar Wind Control of the Earth's Electric Field: <i>R. Markson</i> and <i>M. Muir</i>	979
	Biopolyester Membranes of Plants: Cutin and Suberin: <i>P. E. Kolattukudy</i>	990
	Contribution of the Ocean Sector to the United States Economy: <i>G. Pontecorvo</i> et al.	1000
NEWS AND COMMENT	Congress Challenges MX Basing Plan	1007
	Roll with Coal	1008
	Gus Speth, Planning the "Conserver Society"	1009
	Bern Dibner: Science Bibliophile	1012
	<i>Briefing</i> : NRC Skirts Safety Issues in Export Approval; CIA Charter Proposals Die in Congress; Proposals to Study Veterans Criticized	1014
	Nerve Gas in Afghanistan?	1016
	Experts Endorse Biomass Energy	1018
RESEARCH NEWS	New Ways to Make Microcircuits Smaller	1019
BOOK REVIEWS	Managerial Hierarchies, reviewed by <i>L. Galambos</i> ; The Triumph of Evolution, <i>S. Cohen</i> ; La Matière Mal Condensée, <i>R. G. Palmer</i> ; Relativistic Particle Physics, <i>C. Quigg</i> ; Books Received	1023

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REPORTS	Acid Precipitation and Sulfate Deposition in Florida: <i>P. L. Brezonik, E. S. Edgerton, C. D. Hendry</i>	1027
	Nickel Carbonyl: Decomposition in Air and Related Kinetic Studies: <i>D. H. Stedman</i> et al.	1029
	Aryl Hydrocarbon Hydroxylase Is Inhibited by Antibody to Rat Liver Cytochrome P-450: <i>K. Robie-Suh</i> et al.	1031
	Insertion of a New Gene of Viral Origin into Bone Marrow Cells of Mice: <i>K. E. Mercola</i> et al.	1033
	Synthesis of Human Plasminogen by the Liver: <i>D. Raum</i> et al.	1036
	Progesterone Administration in vivo Stimulates Release of Luteinizing Hormone-Releasing Hormone in vitro: <i>V. D. Ramirez, D. Dluzen, D. Lin</i> . . .	1037
	Red Cochineal Dye (Carminic Acid): Its Role in Nature: <i>T. Eisner</i> et al.	1039
	Regional Assignment of Genes for Human Esterase D and Retinoblastoma to Chromosome Band 13q14: <i>R. S. Sparkes</i> et al.	1042
	Pro-Adrenocorticotropin/Endorphin-Derived Peptides: Coordinate Action on Adrenal Steroidogenesis: <i>R. C. Pederson, A. C. Brownie, N. Ling</i>	1044
	Evolutionary Conservation of Repetitive Sequence Expression in Sea Urchin Egg RNA's: <i>G. P. Moore</i> et al.	1046
	Simian Virus 40 Crystals: <i>E. E. Lattman</i>	1048
	Interaction of Laminae of the Cingulate Cortex with the Anteroventral Thalamus During Behavioral Learning: <i>M. Gabriel, K. Foster, E. Orona</i>	1050
	Interaction Between Posture, Color, and the Radiative Heat Load in Birds: <i>S. Lustick, M. Adam, A. Hinko</i>	1052
	Picrotoxin Convulsions Involve Synaptic and Nonsynaptic Mechanisms on Cultured Mouse Spinal Neurons: <i>J. L. Barker and J. F. MacDonald</i>	1054
	Choline Acetyltransferase-Containing Neurons in Rodent Brain Demonstrated by Immunohistochemistry: <i>H. Kimura</i> et al.	1057
	<i>Technical Comments: M Statistics and Morphometric Divergence: W. R. Atchley; J. G. Kunkel</i> et al.; Anomalous Water in the Deep Ocean Suggests Lateral Advection-Stirring: <i>L. Armi; A. F. Amos</i> and <i>R. D. Gerard</i> ; Large Doses of Ecdysterone May Inhibit Mosquito Behavior Nonspecifically: <i>M. J. Klowden; R. Beach</i>	1059
PRODUCTS AND MATERIALS	Vertical Slab Electrophoresis; Stirrer; Thermogravimetric Analysis; Universal Counter; Ion Gun; Spectrometers; Microhardness Tester; Literature	1064

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COVER

Turret in thunderstorm top (taken from a U-2 airplane at 14.6 kilometers over Kansas). Such turrets can penetrate 1 or 2 kilometers above the flat cloud tops (anvils) which form near the tropopause. The electric currents between thunderstorms and the ionosphere which maintain the earth's fair-weather electric field may flow predominantly over such turrets. See page 979. [D. R. Fitzgerald, Air Force Geophysics Laboratory, Hanscom Field, Bedford, Massachusetts]

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RESEARCH AND DEVELOPMENT: AAAS REPORT V, by Willis H. Shapley, Albert H. Teich, Gail J. Breslow, and Charles V. Kidd, will be provided to Colloquium registrants. The *Report* covers R&D in the federal budget and other topics relating to R&D and public policy. Registrants will also receive the published proceedings of the conference.

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LETTERS

The Pentagon's Computers

The article "Computers and the U.S. military don't mix," by William J. Broad (News and Comment, 14 Mar., p. 1183) contains significant errors. For example, Broad states that the National Military Command Center in the Pentagon is totally dependent on commercial sources of power. This is not true. Diesel emergency generators for the command center are on hand and are regularly exercised. In addition to backup generators, uninterrupted power supplies, that is, floating batteries, prevent disturbance to key systems. Broad also states that the computers at NORAD "go down whenever nearby commercial power lines are struck by lightning." Again, this is wrong. NORAD has backup generators in a protected location and has excellent protection against outside disturbances such as lightning. These two instances are only examples of a multitude of errors, misunderstandings, and misinterpretations in the article.

The World Wide Military Command and Control System (WWMCCS) is often confused with a small portion of that system, the automatic data processing equipment that supports certain parts of the system. Further, the automatic data processing equipment is composed of subsystems, one of which, WWMCCS ADP, has a subsystem, the WWMCCS Intercomputer Network (WIN). The article begins with a lurid description of an alleged "computer-generated crisis" involving our missile warning system on 9 November. WIN is not used in any way in that system.

Broad quotes the General Accounting Office as saying that, at many bases, "a separate . . . computer was used for each security level of data being processed" and that "multilevel security within the single . . . system" is one answer, but that the "Honeywell computers cannot do this." No computer or system available today, nor any way now known in which our government has confidence, can provide multilevel security. We are hopeful that research under the Defense Advanced Research Projects Agency may lead to such capability, but it is now beyond the state-of-the-art of all computers, including Honeywell's.

Such errors in a respected publication may result in an unwarranted decrease in public confidence in our national defense capabilities.

HILLMAN DICKINSON
C3 Systems, Joint Chiefs of Staff,
Washington, D.C. 20301

Peanut Butter Test

McCullam's letter (2 May, p. 446) suggesting that peanut butter is a solvent for *Science* ink prompted us to search out the responsible agent(s). We tested the ingredients in one brand of commercial chunky peanut butter to determine the speed with which it removes ink from the pages of *Science*.

Agent	Time (sec)
Peanuts (dry roasted)	53.6
Dextrose*	15.2
Partially hydrogenated vegetable oil	58.4
Salt†	7.5
Sugar‡	10.3
Peanut butter	17.9
Peanut butter with oil removed‡	9.1

*Since dextrose was not handy, we substituted fudge. †Aqueous solution. ‡Oil extracted with acetone.

Contrary to McCullam's observations, it appears that any of several ingredients other than grease is the root of the problem. A weak saline solution is even speedier than peanut butter, obliterating McCullam's own letter in 4.6 seconds.

JEFFREY KASSEL

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Peer Review: An Experiment

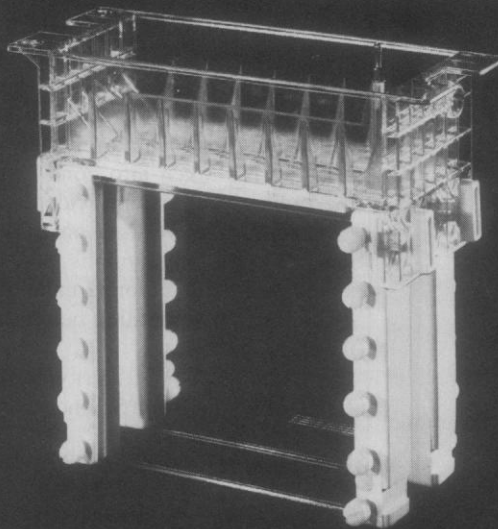
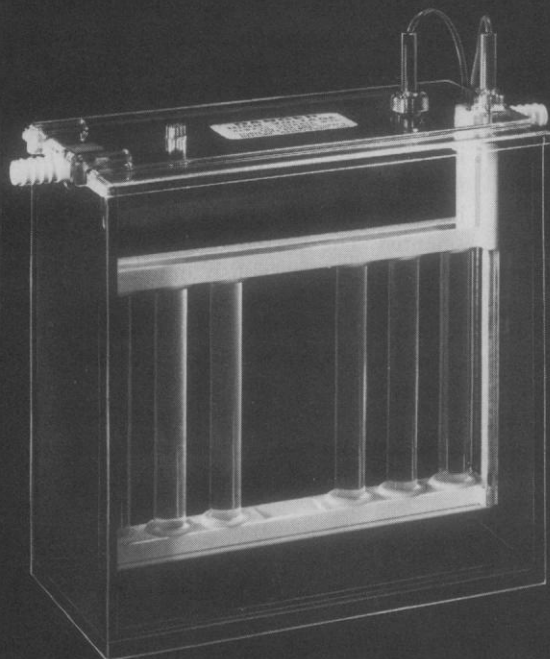
Walter Stumpf (Letters, 22 Feb., p. 822) asks: "Why do scientists provide and accept anonymous reviews of grant applications and journal manuscripts? In an *open review system*, merits and weaknesses would be assessed more thoughtfully and criticisms would be made more responsibly."

A unique opportunity to compare the merits of anonymous peer review and open peer commentary has been provided by a scientific communication project, *The Behavioral and Brain Sciences*. *BBS* [modeled after *Current Anthropology* (1)] uses anonymous peer review to assess acceptability for publication and then publishes with the articles open peer commentary from 20 or more investigators (including the referees).

This project allows the process of "creative disagreement" in science to be directly examined. The indications so far are that anonymous peer review and open peer commentary can be complementary mechanisms, rather than substitutes for one another (2). In re-

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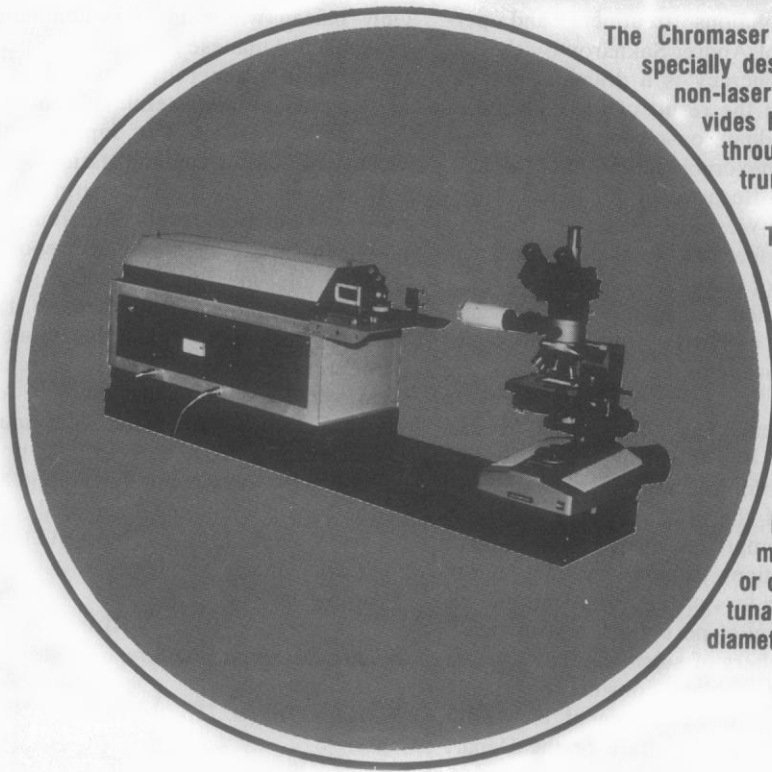


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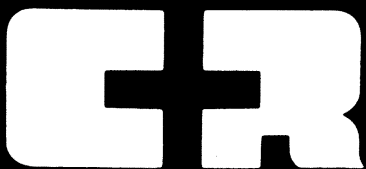
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viewing, anonymity must be an available option "for much the same reason that voting is done anonymously: to assure that judgements can be made freely and without fear of incurring prejudice or ill will" (2, p. 18). Moreover, the review process is never completely anonymous, because the editor or grant officer knows the reviewers' identities. More research should certainly be devoted to developing fairer and more objective methods of selecting reviewers (and perhaps also editors and grant officers), and authors' and grant applicants' rebuttals should certainly be taken into consideration in the review process. Individuals and organizations are working on these problems (3). But anonymous peer review should not be abandoned unless there is evidence that something better can take its place.

STEVEN HARNAD

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Sakharov and Whistle-Blowing

The invidious treatment and persecution of Andrei Sakharov by the Soviet bureaucracy is a dramatic demonstration of the result of the collision of the individual conscience of a scientist with the inexorable intention of "policy-makers." Because of the tensions between the West and the Soviet Union at present, I fear that we shall overlook the principle of Sakharov's torment.

The principle, I believe, is that scientists are employees of bureaucracies and, according to the administrators, are employed to solve problems, not to create them. The concepts of free inquiry and that scientists may have consciences do not always penetrate the depths of the administrative mind; instead attempts are made to "deal" with the situation, usually resulting in dismissal, or loss of tenure, or internal exile. I know of no countries with significant numbers of scientists that have escaped the problem: consider the whistle-blowers at the Department of Health, Education, and Welfare or the Department of Defense.

I hope my colleagues continue to pro-

test Sakharov's victimization, but with the understanding that it can happen in the United States, and does. Perhaps the National Academy of Sciences, in conjunction with the appropriate international organizations, could examine this dilemma in an effort to orient the scientist's role in society.

It seems essential to clarify, if not codify, the ethical and moral obligations of scientists to officialdom, since they may be different from those of the non-scientist. The Sakharov case is justification enough to establish an international organization (analogous to Amnesty International) to publicize the plight of scientists who have fallen afoul of officialdom because of their beliefs.

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Whale Meat in the Japanese Diet

Junghans (Letters, 4 Apr., p. 6) points out several errors in Beary's letter (14 Dec. 1979, p. 1260) regarding the high concentrations of mercury in whale meat eaten by the Japanese. We would like to call attention to some additional errors in Beary's letter.

Junghans is correct in stating that whale meat is now only an occasional source of protein in the Japanese diet. Furthermore, almost all of this meat is from baleen whales, not sperm whales. Only baleen whale meat is commonly available in Japanese food stores. Sperm whale meat is generally regarded as of low quality and distasteful. It is eaten in only a few local areas of Japan, in the vicinity of coastal whaling stations.

It is well known that sperm whale meat contains high levels of mercury (1, p. 44). In 1974, Nagakura *et al.* reported that the total mercury content of sperm whale meat ranged from 0.92 to 1.67 parts per million (ppm) and that about 70 percent of this was methyl mercury. However, they found that mercury levels in baleen whale meat were much lower, ranging from 0.01 to 0.07 ppm. Methyl mercury was not detected in any of the baleen whale meat sampled.

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United States–Soviet Scientific Exchanges

Our scientific relations with the Soviet Union are rapidly deteriorating. We have almost reached the point of the cold war situation 25 years ago. The reasons are clear enough: the persistent violations by the Soviet government of the human rights of scientists such as Orlov, Shcharansky, and many others, the persecution of Sakharov, and now the invasion of Afghanistan.

Many scientists in this country and elsewhere, aghast at these outrages, have resorted to one of the measures available to them: refusing to attend conferences and to participate in collaborative scientific projects. It is assumed that the Soviet leaders are so strongly interested in scientific contacts with the West that they will change their policy. We fear that it will not work that way. Most of the contacts took place in the fundamental sciences or in applied fields removed from weapons technology. These areas are not important enough to Soviet leaders to make them yield to external pressures. The primary victims are our colleagues in the U.S.S.R., for they lose a precious window on the world that was opened to them—and to us. Another victim is scientific progress, since we lose the personal contacts that are so important, particularly in those fields in which one side has more results than the other.

But there are deeper arguments against a boycott of scientific relations. Science is supranational and supraideological—the concern of humankind as a whole. It should stand above political turmoil and serve, as it has in the past, as a bridge for mutual understanding and peace in a divided world. Directly and indirectly, scientific contacts have led to actual disarmament measures—the test ban, for example, or the arms control talks.

We should not lose contact with some of the best elements of Soviet society, a group that basically agrees with our value scale and may have a significant influence on future developments in the Soviet Union. If, as we hope, the present situation will not lead to a catastrophe, there is a chance that, sooner or later, the character of the Soviet regime may change again for the better. We should leave our bridges intact for this eventuality.

Unavoidably, scientific contacts will be weakened in the near future because of the understandable reactions of many U.S. scientists against the recent happenings. However, the U.S. National Academy of Sciences' official suspension of bilateral agreements is a step in the wrong direction. Restrictions on scientific communication are not the right answer to the restrictions the Soviet government has imposed on some of their scientists. Repressive actions usually incite hostility, which often leads to misunderstandings, dislike, and retaliation. Not all of the Soviet scientists will understand the reasons for our actions when we no longer go there and talk to them openly and vigorously, as many of us have done in the past. We may have done the cause of human rights in the U.S.S.R. more of a disservice than a service.

The only appropriate way for the scientific community to deal with any kind of problem, scientific or human, is through reason and discussion: one scientist speaks or writes to another or addresses a meeting of scientists, be it an official one or one organized by refuseniks. Collaborative experiments offer unique opportunities for reaching a mutual understanding, especially through personal contacts during the hours of relaxation. In times of political tensions, we should extend collaborations—not cut them back.

The real problem is the danger of nuclear war. If we cannot learn how to rationalize our differences, how to resolve them by argument rather than by threats and by cutting off relations, then we are really lost. The least we scientists can do is show the power of reasoning. Despite its frustrations, only by reason will both human rights and peace flourish on this small planet.—VICTOR F. WEISSKOPF, *Department of Physics, Massachusetts Institute of Technology, Cambridge 02139*, and ROBERT R. WILSON, *Department of Physics, Columbia University, New York 10027*



Timely topic for our 100th birthday.

Photography is wonderful. Press the button and make time stop. By and large, that's why so many buttons have been pressed over the century. Make an instant last.

How long? Cheerful folk don't ask. That's no way to stay cheerful. Nevertheless, here are a few thoughts for resolutely objective minds that insist on grappling with the question:

- All dyes change in time. Even if Kodachrome film had been available, the people in charge of King Tut's funeral made a better choice in that gold mask.

Filamentary silver in the absence of oxidants does well, too. The stuff it's suspended in to constitute a black-and-white photograph tends to go, though, as time starts rolling by.* Extreme care in processing and in control of temperature, light, humidity, and ambient pollutants during storage makes a big difference.

*At least we suppose so. Insufficient real time has rolled by to speak from experience.

- The recently issued Kodak Publication F-30, "Preservation of Photographs," shown above, can be ordered from photographic dealers and booksellers.

- To rejuvenate images from antique black-and-white plates and films, some professional photographers offer a service based on Kodak professional direct duplicating film, type SO-015.

- To give a color image of extraordinary historic or artistic value the archival longevity of a black-and-white image, it can be stored as a set of separation negatives.

- Without going to this extreme, a fine color photograph can delight the eye for many years of daily encounter. There has been much progress on image dye stability in the 40 years since color photography opened up to all.

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