American Association for the Advancement of Science

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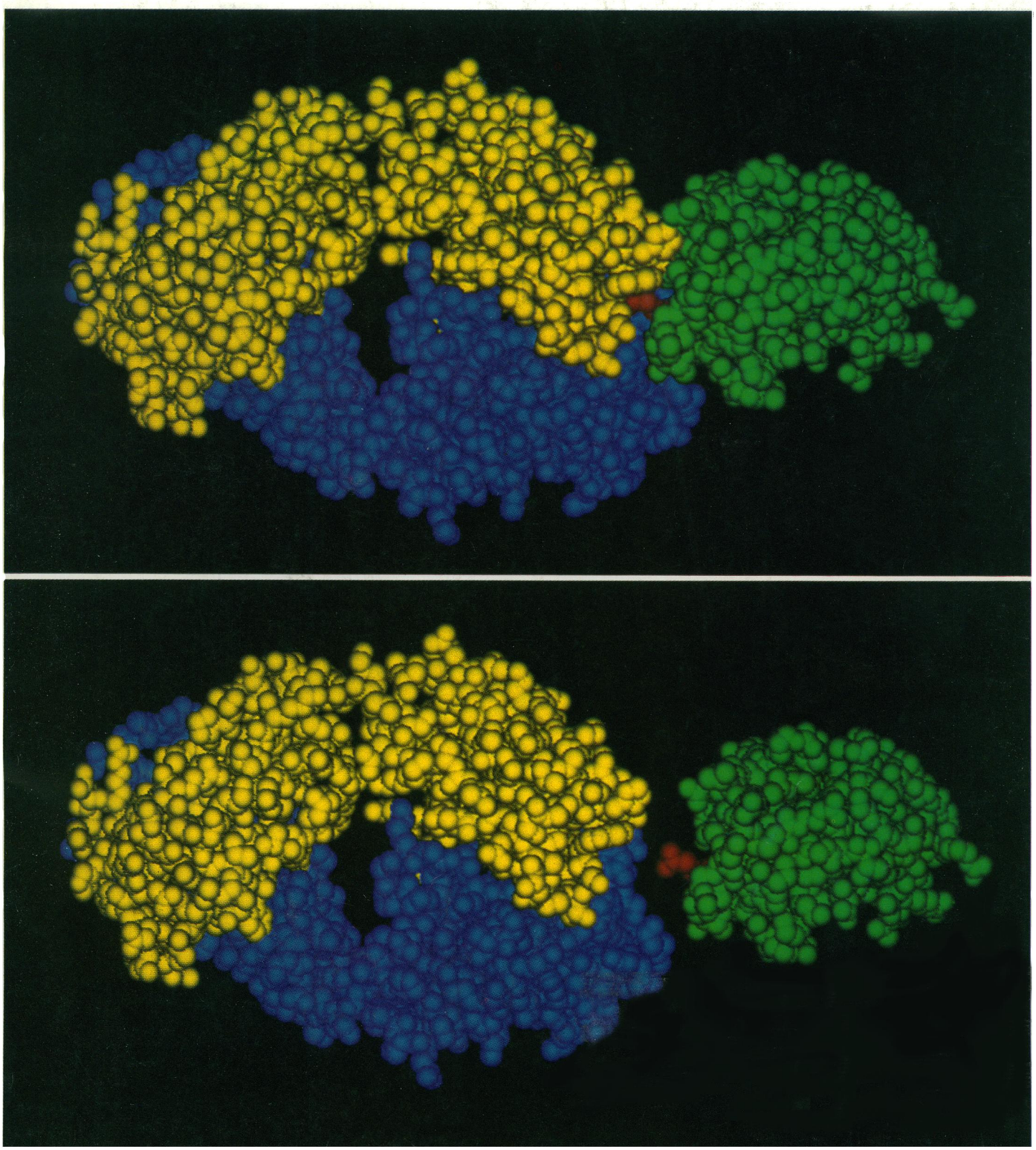

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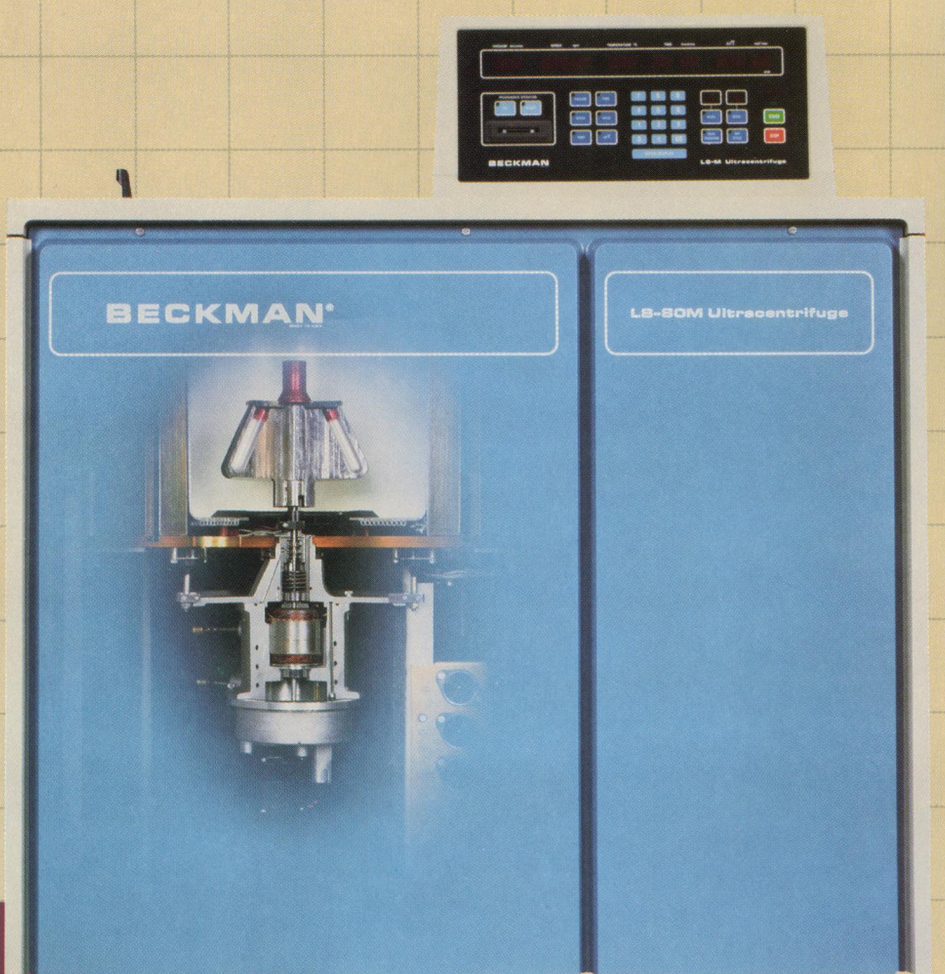

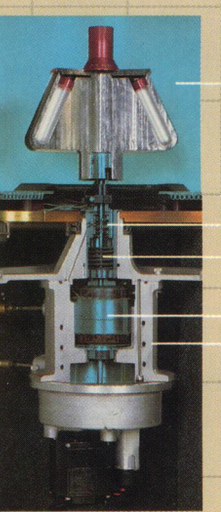

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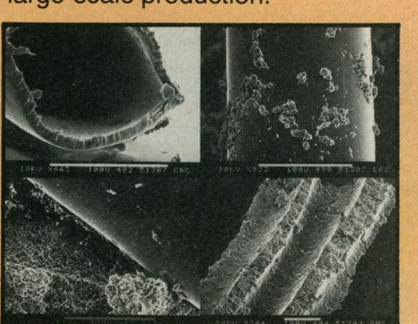

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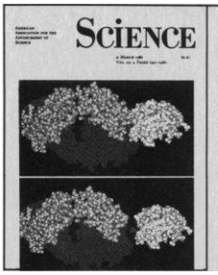

COVER (Upper) Three-dimensional structure of an antigen-antibody complex. The antigen is lyzozyme (green, with a protruding residue, glutamine-121 in red). (Lower) The antigen and the antibody have been pulled apart to reveal their complementary contacting surfaces. See pages 747 and 755. [A. G. Amit *et al.*, Institut Pasteur, Paris, France]

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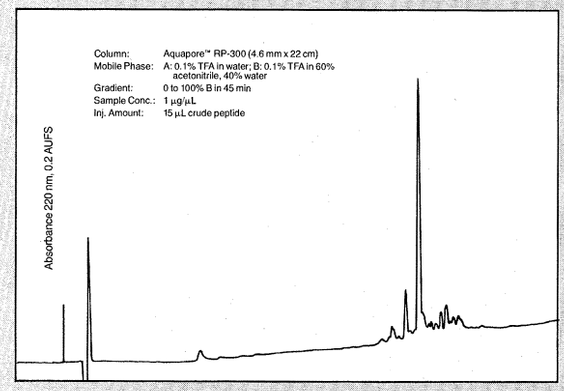
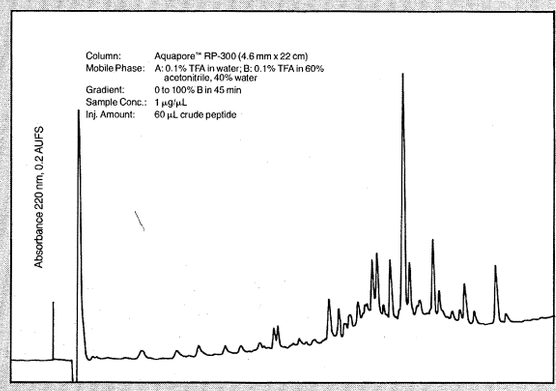


With PAM resin: Yield 58%; Purity 37%



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*4-(oxymethyl)-Phenylacetamidomethyl
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[1]Mitchell, A., et al., *J. Am. Chem. Soc. 98*, 7357 (1976)
[2]Mitchell, A., et al., *J. Org. Chem. 43*, 2845 (1978)
[3]Kent, S., et al., *Proc. Natl. Acad. Sci. USA 76*, 2189 (1979)
[4]Kent, S., in Peptides: structure and function, *Proc. 8th Amer. Peptide Symp.* 99–102 (1983)

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This Week in
SCIENCE

Embryonic development of vertebrate neurons

NERVE growth is directed in the developing vertebrate embryo much as it is in the developing insect: neuronal growth cones (amoeboid motile extensions at the tips of growing axons) appear to receive specific directional cues from cell surfaces during their growth along the spinal column (page 740). "Pioneer" and "follower" growth cones are aided by nonneuronal and neuronal cells, respectively, during pathfinding; when the cue-givers are killed with a laser, growth along the spinal cord is arrested. Kuwada chose a fish system in which to study the early stages of growth and positioning of nerves because the transparent embryos have relatively few yet distinctive neuronal cells. By filling cells with dyes, axon growth into predictable locations could be followed for individual neurons by light and electron microscopy. Although these fish are among the simplest vertebrates, it is likely that their axonal growth mechanisms are similar to those of complex vertebrates during establishment of neuronal networks.

Antigen in the antibody binding site

THE lock-and-key analogy for protein-ligand interactions (formulated in the late 1800's) remains apt for describing the relation of antigen with the binding site of its specific antibody even after x-ray crystallographic resolution of such a complex at 2.8 angstroms (page 747). Amit *et al.* studied a well-characterized antigen, lysozyme, in the binding site of a specific monoclonal antibody (cover). The interacting regions of antigen and antibody binding sites are large (33 amino acids in all) and include amino acids from distant parts of the molecules. Because the crystal structure of the antibody's binding region by itself is similar to its structure when antigen is bound, it appears that major conformational changes do not take place in the site when it forms a complex. Chothia *et al.* discuss how accurately three-dimensional relations of this sort can be predicted from known antibody structural data and conformational energy calculations (page 755). Huber describes the significance of these landmark structural studies and places them in a historic perspective (page 702).

Ancient terrain

SOME Cambrian (570-million-year-old) or older flat-topped ridges, mesas, and terraces still exist in central Australia; they are the most ancient persisting landforms identified to date (page 758). Their staying power is attributed to a combination of tectonic stability of the region, stable parent materials, and minimal weathering and erosion (the region is inland and at low elevation). More than 1 billion years ago, rocks folded in the Davenport province and then were planed down by erosion. The flat Ashburton surface that formed then domed, and valleys were carved in the less resistant rocks by rivers flowing in a radial pattern. The valleys filled with Cambrian sediments from which terraces and mesas subsequently formed. Stewart *et al.* propose this sequence of events from observations of the topography and from analyses of fossils in sediments at the margin of the province. Before this report, Cretaceous (65- to 136-million-year-old) structures were the oldest known extant landforms.

Newtian motion

DEPENDING on where it is trying to go, the migratory salamander *Notophthalmus viridescens* will orient itself using either the horizontal polarity of the earth's magnetic field or its slope or inclination (page 765). Phillips studied the movement of these newts in tanks exposed to the earth's ambient field or to an artificially generated magnetic field. When the newts were trying to navigate homeward (a behavior induced in the tanks through shifts in water temperature), they homed by sensing the horizontal polarity of the magnetic field, and motion was unaffected by inversion of the vertical component of the field. In contrast, when the traveling was not for homing purposes, they responded to the inclination of the magnetic field and reversed their direction when the field was reversed. This "axial" sensitivity (responding to the *y* axis of the field) is used by other pond-dwelling vertebrates and migratory birds. Anatomic structures involved in picking up the magnetic field signals have yet to be identified.

Transplantation in utero

A fetus-to-fetus transplant of hematopoietic stem cells (precursors of blood and lymphoid cells) might, in the future, be an effective way to correct cellular abnormalities in fetuses identified on prenatal diagnosis as having sickle cell anemia, thalassemia, or other hematopoietic disease (page 776). Flake *et al.* transplanted stem cells into fetal lambs at a developmental stage corresponding to that of a human fetus of 18 to 20 weeks. The cells, taken from fetal livers, appear to have seeded appropriate organs, and the recipient's bone marrow and blood were subsequently populated with both donor and recipient cells. Because the transplanted cells, though normal, were immature and lacked immunologic competence at the time of grafting, they did not react against host tissue (a graft versus host reaction); and because the recipient was immature, a host versus graft reaction did not take place. Immunosuppression, which creates additional problems during transplantation, was thus not required for a successful in utero graft. Although the mortality rate and other perioperative complications were high in this first study (only two of eight animals were successful chimeras 6 months postpartum), many of the technical difficulties are likely to be solved. This is a technique likely to have important clinical implications for a number of congenital human diseases.

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SCIENCE

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The United States and the IIASA Connection

Two years ago Secretary of State George Shultz signaled government agencies that the Reagan administration would countenance the funding of acceptable research projects with the International Institute of Applied Systems Analysis (IIASA) in Laxenburg, Austria. It appeared then that officialdom had thought better of its 1981 cutoff of funding for that multinational research center, whose principal original supporters had been the United States and the Soviet Union.

Taking the secretary's message as read, the Appropriations committees of the House and Senate, in their November 1985 Conference Report on 1986 appropriations for the National Science Foundation, agreed on programmatic support for IIASA of up to $500,000. In January 1986 NSF provided this amount for a package of IIASA initiatives in demography, environment, and systems theory. The Department of Energy and the Environmental Protection Agency followed suit with additional research funds totaling almost $200,000 for acid rain and environmental monitoring. All this money is now stalled in the National Security Council. The credibility of the United States as a partner in the 16-nation IIASA consortium is at its lowest point ever, paralleling the more general worldwide dismay at the American failure to put up funds for some of the collaborative long-term research programs interrupted by this country's walkout from Unesco. It is no wonder that our friendliest allies, let alone the Eastern countries, have second thoughts as to our reliability when we profess interest in long-term cost-sharing for large scientific projects that exceed current budgetary resources.

The case of IIASA is one to baffle most observers. It is not as if Soviet and American scientists were pooling their skills on advanced technologies related to national security and technology transfer concerns. What preoccupies the IIASA systems analysts in their model-building exercises are global problems such as energy supply and consumption, climatic and atmospheric phenomena, demographic probabilities and their effects on life support systems and social institutions, and global food problems. The work is interdisciplinary, unclassified, and projective. The Institute's computer facilities are generations behind the state of the art. No national interests are threatened. Indeed, after interagency review of the NSF grant it was concluded that there would be neither an intelligence loss nor foreign policy disadvantages. On the contrary, the working premise of IIASA as an institution is precisely what it was when it came into being in the early 1970's: whatever the tensions between West and East, it makes sense for scientists from both sectors to work with each other and with scientists from a variety of other countries on long-term global problems that are disassociated from political and ideological rivalries.

Although the U.S. government unilaterally stopped paying dues to IIASA several years ago, the Soviets continue to meet their financial commitments and support the original understanding that the full-time director of IIASA should be an American. Meanwhile, the American Academy of Arts and Sciences has assumed the difficult burden of the U.S. national membership and has been searching for resources to pay the current and past dues owed by our side. In 1984 AAAS joined the American Academy in this effort. Although now in reduced straits, the Institute carries on good work under the leadership of its able American director. The Shultz message and the follow-on action by Congress have renewed hopes for restoring real vitality in IIASA. The Reagan-Gorbachev exchanges in the direction of accommodation and scientific cooperation have fortified these hopes. But the resistance from the bureaucracy is fast reaching a point of no return, and the clock is ticking down on continued American influence in IIASA.

A rejuvenated IIASA will not be enough to rescue East-West political relations. But what we have is a structure in place that provides novel opportunities for diplomacy-through-science. Viewing the shape that the East-West political relations are now in, and given the Geneva handshake on resumption of cultural and scientific exchanges, what possible downside can there be to normalizing a modest U.S. role in IIASA? We should get on with it.—WILLIAM D. CAREY

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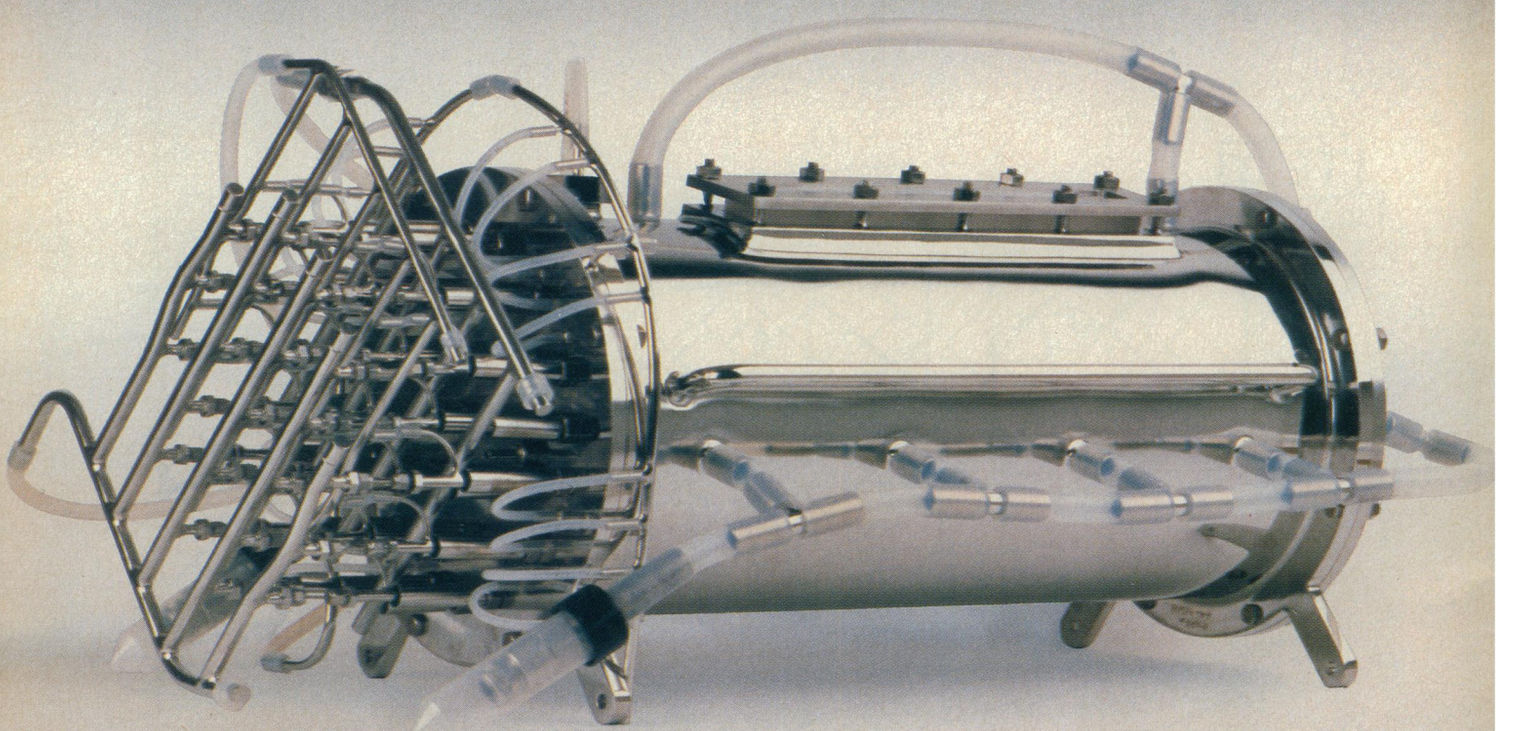

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the honest dissemination of information.

The scientific public is well aware of the almost legendary unwillingness to communicate and compromise that describes the technological cognoscente, but faced with the unfortunately obvious failures of modern technology—the space shuttle, Chernobyl, Bhopal, leaking underground storage tanks, DDT, acid rain, Three Mile Island, ozone damage, and so forth, the nonscientific public has been made aware that they must abandon their blind trust in technocrats and play an active role in ensuring the survival of the species. The technological community will have to satisfy legitimately the demands of an increasingly informed public, and if they cannot successfully convince the public that their ideas are safe and useful, they will have to withdraw. It is the hallmark of a democratic society that an informed public pursues its own self-interest. Secrecy and bribery, Koshland's "cure" for the nuclear waste problem, can only heighten the public's repugnance for nuclear power.

PAUL WILSON
Department of Chemistry, University of North Carolina, Chapel Hill, NC 27514

Koshland's tongue-in-cheek editorial on using political and economic tactics to overcome local opposition to a nuclear waste storage facility contains the seed of a fruitful idea, but a more serious approach may be more productive. In particular, several interesting connections exist between siting the waste facility at Yucca Mountain on the Nevada Test Site (the best location on the combined grounds of geology, hydrology, low population, government control, and existing radioactive contamination) and ending the testing of nuclear weapons there.

The main hazard of nuclear waste storage, of course, is the accidental release of radioactivity. But since weapons testing involves the same hazard to a far greater degree, by trading storage for testing the people of southern Nevada and southwestern Utah would actually *reduce* their risk of radioactive exposure.

In addition, the economic benefits of the waste storage facility are real, so the "pork barrel" incentives Koshland suggests are probably unnecessary. Such a facility would provide about 1000 permanent jobs, thus substantially compensating for the loss of about 3000 similar jobs at the Test Site. And while a museum lit by Čerenkov radiation may be a joke, the storage facility really could include an off-site visitor center to explain to passing tourists how it operates. Perhaps Koshland's venture capital group should consider setting up a souvenir shop next door.

In fact, the waste storage facility should be a source of pride for the local residents. They would be helping to solve the serious long-term problem of nuclear waste, and for this they would deserve the thanks of our generation and its descendants. This contrasts sharply with weapons testing—while a few persons strain to find moral and technical justification for this activity, most understand that the likely end of the arms race it perpetuates will be our generation's having no descendants.

KENT ANDERSON
34 Panoramic Way, Berkeley, CA 94704

Erratum: In the briefing "AIDS case dismissed on legal technicality" by Deborah M. Barnes (News & Comment, 25 July, p. 414), the date when Robert Gallo and his associates were awarded a patent for developing a test to detect antibodies in blood samples of people contaminated with the AIDS virus was incorrect. It should have been May 1985, not May 1984.

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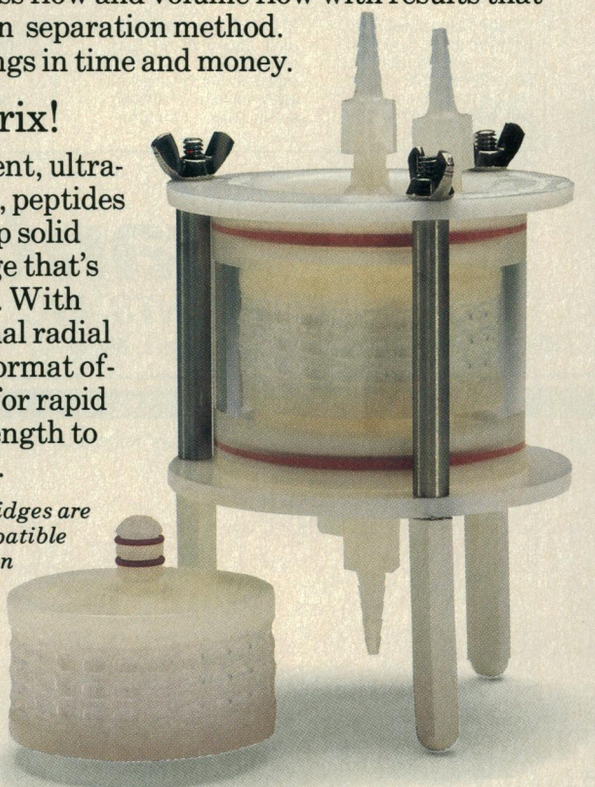

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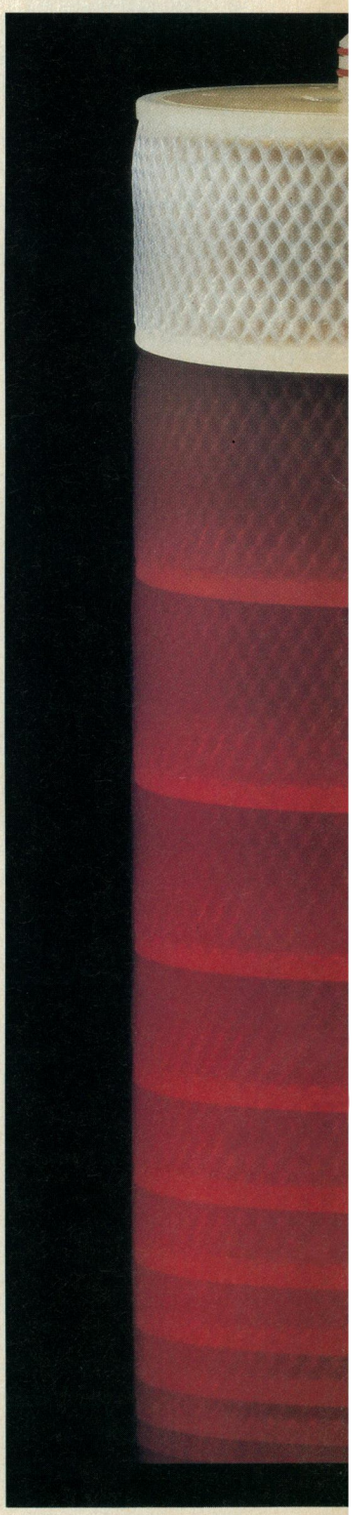

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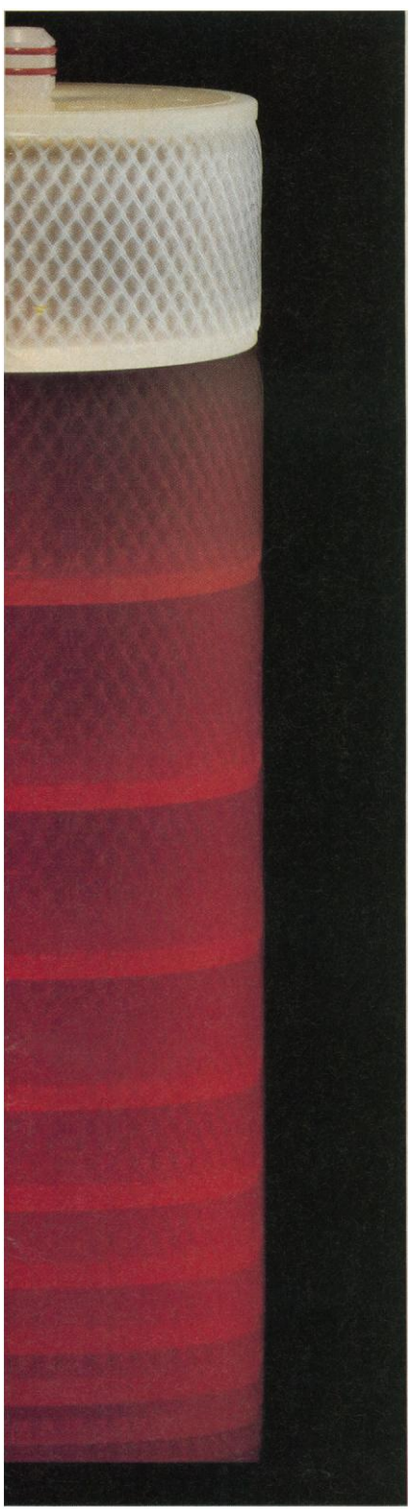

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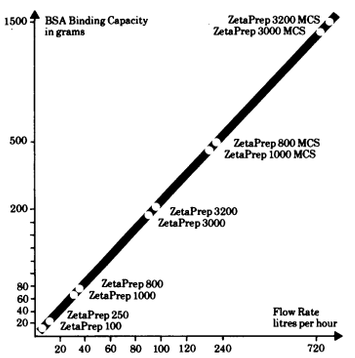

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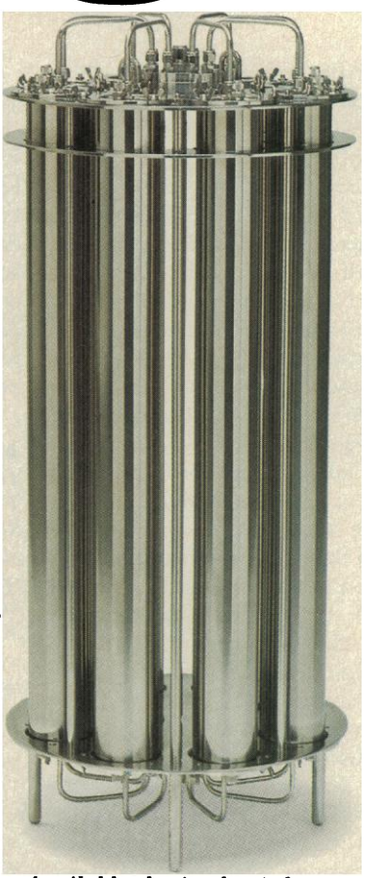

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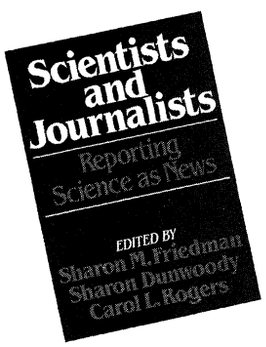

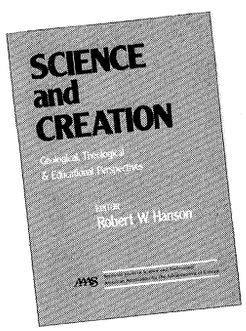

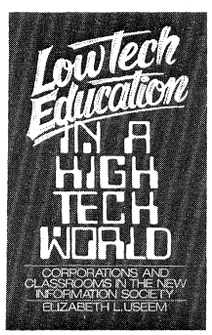

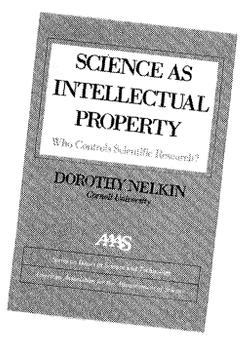

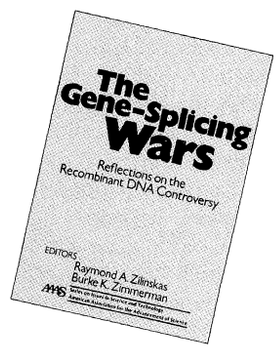

Scientists and Journalists: Reporting Science as News

Edited by Sharon M. Friedman, Sharon Dunwoody, and Carol L. Rogers

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Science and Creation: Geological, Theological, and Educational Perspectives

Edited by Robert W. Hanson

The creation/evolution controversy is examined by scientists, theologians, educators, and historians. These authors view the controversy as a false dichotomy and as an attempt to force a choice between two ideas that are not mutually exclusive. Includes case studies from several states.

1986, 240 pp., hardcover; $24.95, AAAS members $19.95

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Elizabeth L. Useem

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Who controls research? A growing number of legal and administrative disputes raise critical issues of professional sovereignty, scientific secrecy, and proprietary rights. Nelkin offers cases illustrating the dilemmas that arise as the interests of scientists, the rights of citizens, and the security needs of government and industry come into increasing conflict.

1984, 130 pp., softcover; $10.00, AAAS members $8.00

The Gene-Splicing Wars: Reflections on the Recombinant DNA Controversy

Edited by Raymond A. Zilinskas and Burke K. Zimmerman

Questions of safety and ethics about recombinant DNA techniques continue to surface. This book takes a look at historical, political, industrial, scientific, and international aspects of these issues. The authors show how lessons learned from the experience can be used to cope with similar issues in the future.

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Deadline: 10 October 1986

Plan to attend the next Annual Meeting of the AAAS in Chicago, IL, 14–19 February 1987 at the Hyatt Regency Hotel. Although it is too late to propose symposia for the 1987 Annual Meeting, contributed paper abstracts can be submitted up to 10 October 1986.

The privilege of submitting a contributed paper for a presentation at the Annual Meeting is open **only** to AAAS members and fellows. Although the member/fellow need not be one of the authors, their endorsement (indicated by his or her signature on the original abstract) is required.

There are two types of presentation formats—poster and slide:

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$$R_{\mu\nu} = \frac{\partial \Gamma^{\lambda}_{\mu\lambda}}{\partial x^{\nu}} - \frac{\partial \Gamma^{\lambda}_{\mu\nu}}{\partial x^{\lambda}} + \Gamma^{\sigma}_{\mu\lambda}\Gamma^{\lambda}_{\nu\sigma} - \Gamma^{\sigma}_{\mu\nu}\Gamma^{\lambda}_{\lambda\sigma}$$

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