11 OCTOBER 1985 · VOL. 230 · NO. 4722

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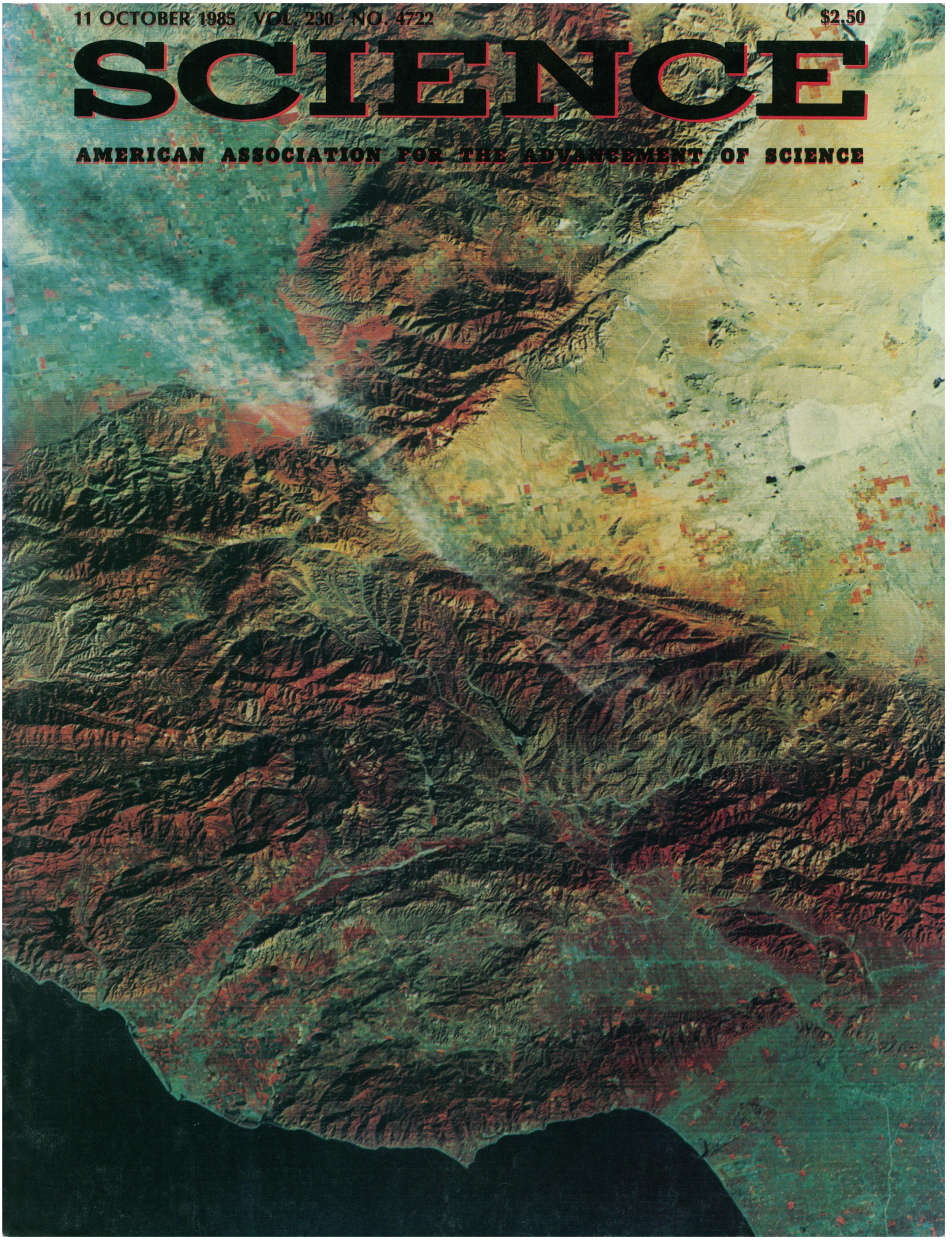

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SCIENCE

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COVER

Landsat false-color image of southern Sierra Nevada Batholith, California. The San Andreas Fault strikes across the frame from left to right; the Garlock Fault joins the San Andreas in the left-center of the image. The deflected "tail" of the Sierra Nevada is bounded to the right by the Garlock Fault. The large tan triangular area in the right-center is the Mojave Desert. The blue-green areas to the south denote the San Fernando Valley and metropolitan Los Angeles. See page 172. [EROS Data Center, Sioux Falls, South Dakota]

Engineered bacteria for making vitamin C

Approximately 30 million kilograms of vitamin C are used worldwide each year, and now a genetically engineered bacterium has been constructed that greatly streamlines the process by which the vitamin can be made (page 144). Most vitamin C (ascorbic acid) is made by multistep chemical synthesis coupled with microbial fermentation. It has also been made by a cofermentation process in which two dissimilar species of bacteria carry out in tandem the requisite synthetic steps. Anderson *et al.* describe the construction of the "metabolically engineered" organism *Erwinia herbicola*, which carries genes cloned from a member of the *Corynebacterium* genus. The recombinant organism can convert the starting material (glucose) into the penultimate product in vitamin C synthesis; then, by a simple reaction catalyzed by an acid or a base this product can be converted into ascorbic acid.

Cretaceous "winter"

Discoveries in Denmark, New Zealand, and Spain of abundant soot and charcoal in clay samples dating back 65 million years suggest that wildfires may have contributed to the global extinction of species (thought to have been triggered by the impact of an asteroid or a meteorite) at the end of the Cretaceous period (page 167). The copious amounts of carbon found at three disparate sites suggest that a worldwide carbon layer was deposited. Wolbach, Lewis, and Anders explain how a meteorite could have ignited wildfires on distant continents, burning vegetation and fossil carbons. As much of the terrestrial biomass was consumed by fire, massive amounts of carbon and dust in the atmosphere would have blocked sunlight and inhibited photosynthesis, noxious chemicals would have harmed living creatures, and the earth could have been cooled as envisioned also in nuclear winter scenarios. These data from ancient events may be applicable to predictions about effects of a nuclear winter.

Martian dust devils

Viking Orbiter photographs show that there are dust devils on Mars (page 175). Columnar, conical, or funnel-shaped vortices of dust apparently rise into the thin Martian atmosphere as the surface is heated during summer afternoons. Dust devils were typically 1 to 2.5 kilometers high, although the tallest reached 7 km. Most were found where the terrain was smooth, and analysis of their color showed that they were composed of surface dust. Thomas and Gierasch estimate that a typical dust devil 2 km high and 200 m in diameter would contain 3×10^3 kilograms of dust. Further investigation will help determine whether this dust load plays a part in initiating major dust storms on the planet.

Toxic *Escherichia coli*

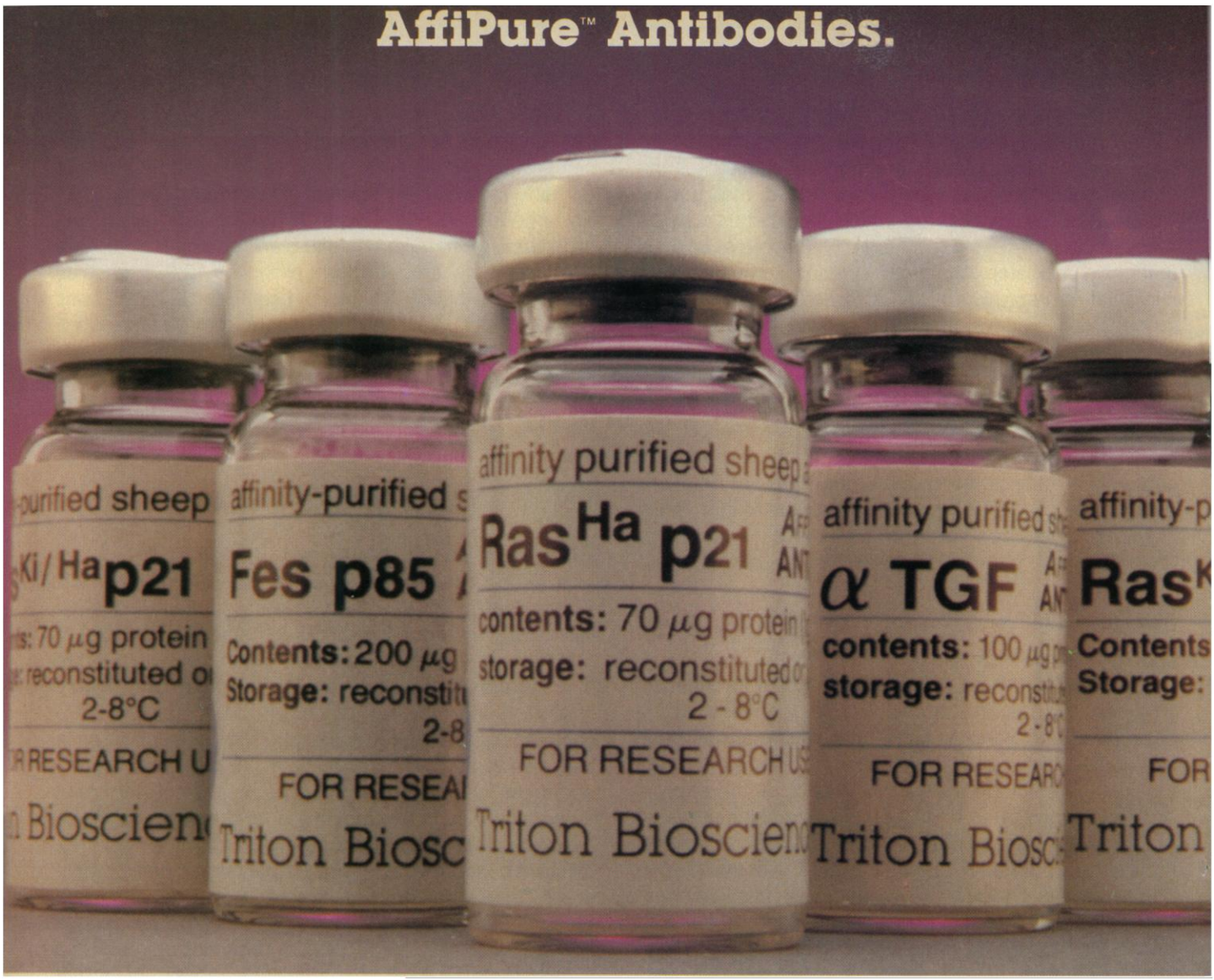
The common gut bacterium *Escherichia coli* can become a dangerous pathogen when infected by a phage (a bacterial virus) that carries a toxin gene (page 179). The phage converts normal *E. coli* to toxin-producing organisms that cause infantile diarrhea and hemorrhagic colitis. The pathogenic form produces 10,000 times as much toxin (called Shiga-like toxin or SLT) as does normal *E. coli.* Newland *et al.* found that phage strains insert a structural gene into the host *E. coli* chromosome; this gene specifies production of SLT. The gene for SLT and the toxin produced are structurally similar to the gene and toxin found in shigellae that cause dysentery.

Enzymes in the brain

The A and B monoamine oxidases—degradative enzymes that affect neurotransmitter concentrations and functioning by removing amine groups from neurotransmitters—are found in discrete regions of the primate brain (page 181). The A form was found (with highly specific monoclonal antibodies) in cells that use catecholamine as a neurotransmitter; B was found in cells that use serotonin. Because A, not B, deaminates serotonin, Westlund *et al.* suggest that the normal role of these enzymes is a protective one, deaminating extraneous amines that encounter the neuronal cells. A different destructive role may be played by the B form in some drug abusers; brain damage and parkinsonism have been associated with use of synthetic opiates contaminated with MPTP which, upon activation by the B enzyme, produces toxic cellular effects. Aberrant enzyme activities are also thought to accompany certain psychiatric and neurologic disorders for which enzyme inhibitors have been used clinically.

Biochemistry of heart throbs

A transmembrane signal protein N_i or a related molecule in a family of proteins thought to mediate a number of hormonal actions is associated with functional changes in the developing heart (page 186). The automatic beating of heart cells changes during development: it is at first stimulated by α-adrenergic catecholamines and later inhibited by them. This change is brought about by neurologic influence—innervation by sympathetic nerves in the heart—and has been observed in culture. Steinberg *et al.* found that the N_i-like protein increases as responsiveness changes and that it is involved in biochemical and pharmacologic regulation of responsiveness. The results are pertinent to normal cardiac ontogeny and perhaps to unusual circumstances—myocardial infarction and heart transplantation—in which the heart may revert to an earlier developmental state and respond differently to α-adrenergic stimulation.



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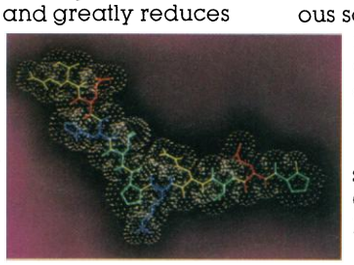

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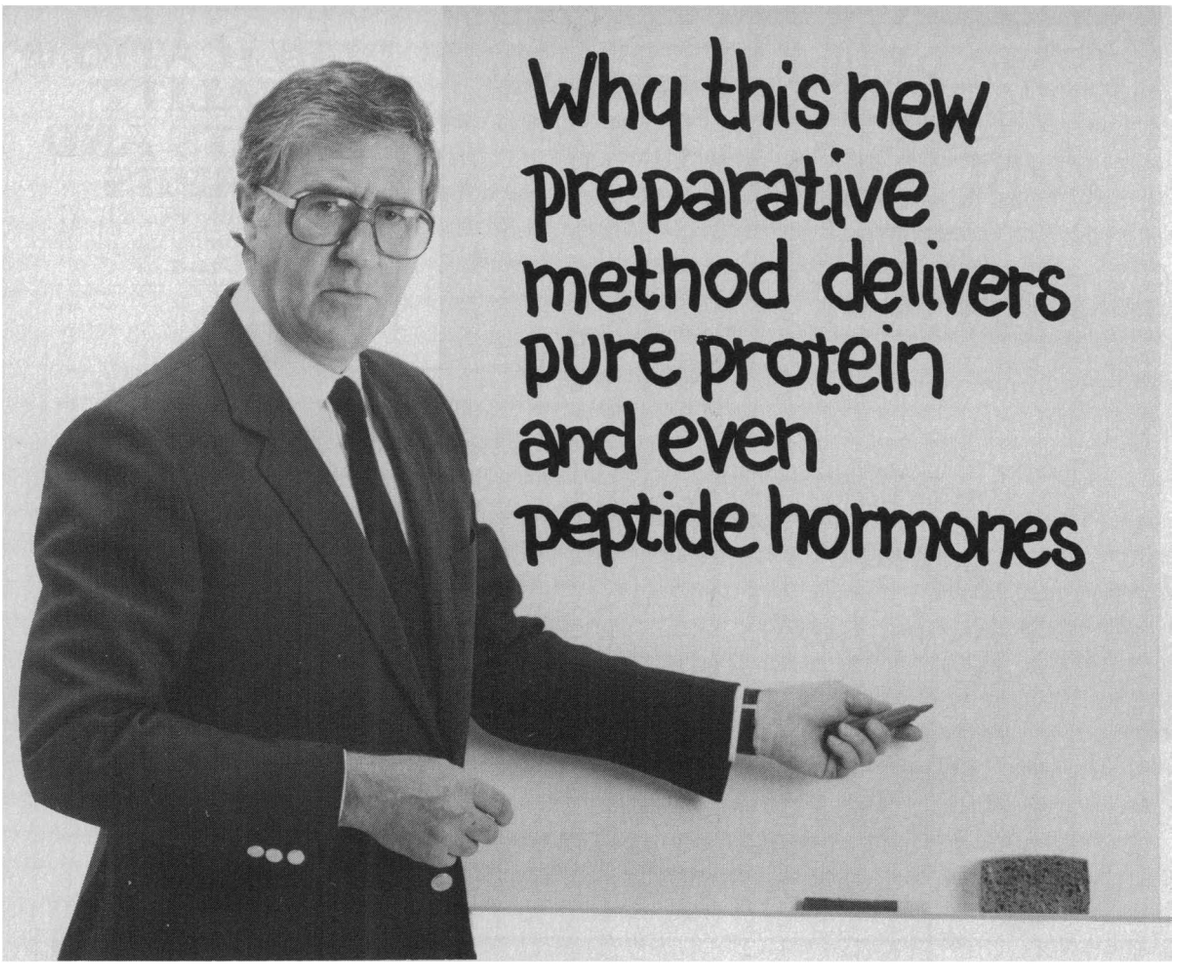

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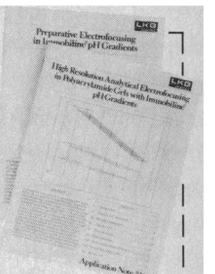

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Co-Chairmen:

Zenon Steplewski, The Wistar Institute, Philadelphia, PA • Hilary Koprowski, The Wistar Institute, Philadelphia, PA • Joseph Davie, Washington University, St. Louis, MO

Keynote Speaker: Mark Davis, Stanford University, Stanford, CA **Title:** T-cell Receptor Gene Structure and Function.

We are planning six Working Group Meetings on "Murine Monoclonal Antibodies Available for Clinical Application". These Group Meetings will be restricted to 20 participants each in the following fields:

Group A: Immunohistological Diagnosis
Leader: J. Schlom, NCI, Bethesda, MD
Repporteur: M. Nuti, Laboratorio Di Immunologia, Rome, Italy

Group B: Radioimmunoscintigraphy
Leader: J.-F. Chatal, Center Rene Gauducheau, Nantes, France
Repporteur: J. Powe, Victoria Hospital, Ontario, Canada

Group C: Antigens Shed by Tumor Cells
Leader: R. Bast, Duke University, Durham, NC
Repporteur: J.-Y. Douillard, Center Rene Gauducheau, Nantes, France

Group D: Immunotherapy of Solid Tumors
Leader: A. Houghton, Sloan Kettering Cancer Center, New York, NY
Repporteur: S. Ferrone, New York Medical College, Valhalla, NY

Group E: Immunotherapy of Leukemia and Lymphoma
Leader: J. Ritz, Dana Farber Cancer Institute, Boston, MA
Repporteur: K. Foon, University of Michigan, Ann Arbor, MI

Group F: Immunoconjugates
Leader: K. Krolick, University of Texas, San Antonio, TX
Repporteur: J. Fulton, Southwestern Medical School, Dallas, TX

It is our intent to select participants *actively* involved in the above listed research for in-depth discussion of progress made recently.
The entire day of Monday, January 27, 1986 will be available for these group discussions. The consensus reached by the groups will be presented by the Repporteurs to the whole Congress and results of these discussions will be published in Hybridoma.
Investigators interested in participating in Group Meetings should send a short summary to Dr. Ralph Reisfeld, Scripps Clinic and Research Foundation, 10666 North Torrey Pines Road, La Jolla, California 92037 by November 30, 1985.

Workshop Topics & Chairmen:

HUMAN REPERTOIRE and AUTOIMMUNE DISEASE
A. Notkins, NIH, Bethesda, MD.

GENETIC PROBES
J.D. Capra, University of Texas, Dallas, TX.

MONOCLONAL ANTIBODIES in DISSECTING NORMAL and MALIGNANT STEM CELLS
I. Bernstein, Fred Hutchinson Cancer Center, Seattle, WA.

ISOTYPE SWITCH VARIANTS IN ANALYSIS of ANTIBODY FUNCTION
M. Scharff, Albert Einstein College of Medicine, New York, NY.

Poster Sessions: TECHNOLOGICAL ADVANCES IN HYBRIDOMA RESEARCH

Participants are invited to submit abstracts for the poster sessions. These abstracts will be reviewed up until the time of the meeting; however, only those accepted by Nov. 15 will be published in the journal, Hybridoma. Contact Dr. Zenon Steplewski (215) 898-3924.

Organized by Scherago Associates, Inc., in conjunction with the journal Hybridoma.

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$ 75	STUDENT REGISTRATION – Student status must be confirmed in writing by department chairman.
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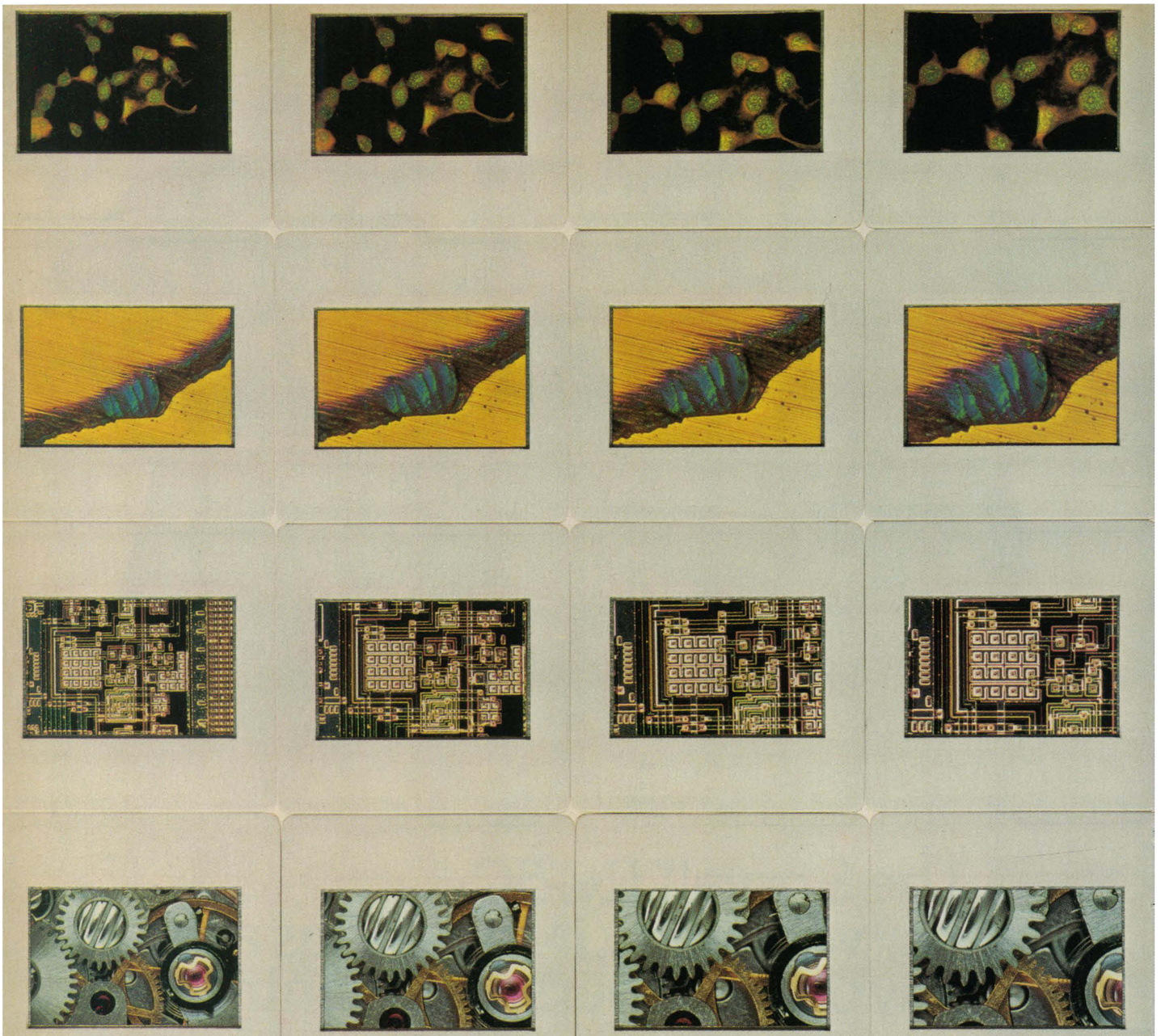

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11 October 1985, Volume 230, Number 4722 **SCIENCE**

Arms Control and Intricacy

This meditation is prompted by the recent passing of Herbert Scoville. His career, in and out of government, in pursuit of balanced national security tempered by arms control went a very long way in defining and exemplifying the idea of scientific responsibility. The best years of his life, and all of his dwindling time, went into building the case for the arms control process and elucidating the differential impacts of weapons systems on the fragile texture of what we term stability.

Much that assails the eye and the ear, relative to reining in the risk of nuclear conflict, is at the level of rhetorical jousting. Our adversary calls for a mutual moratorium on tests. We invite the adversary to observe a weapons test. Deadlock follows. But below the surface rhetoric is an intricacy that grows more complex with time and with weapons innovations, and it is here that the specialists have so critical a role.

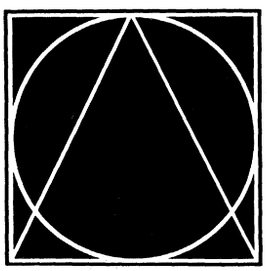
The likelihood that nuclear weapons will disappear is small. We read in Shevchenko's confessional autobiography* that Soviet policy-makers dismiss true nuclear disarmament because, in that event, the Soviet Union would cease to be a superpower. If that is to be taken on its face, the puzzle of Soviet intransigence is given a new twist, since it seems to say that in their case nuclear overkill has evolved into a nonnegotiable geopolitical asset. The burden on arms control efforts thus becomes staggering, and the focus has to be on measures for conflict avoidance and negotiations to put a cap on weapons systems competition. But with trust on both sides near the zero point, the course is all uphill.

The quality of public opinion in matters of arms control and the requirements of national security are very important to a society based upon the principles of representative government. Nowhere is this problem more troublesome than where controversy arises regarding new starts on weapons systems and confidence levels in the verifiability of arms agreements. The parade of disputes over weapons systems in the past decade alone says much about the confusion that afflicts public opinion. Each new weapons initiative has generated arguments as to need, efficacy, cost, reliability, survivability, and consistency with ratified or unratified arms control treaties. Not everyone can follow these trails without a guide, and Scoville's legacy to his fellow citizens will long survive in the educational work of the Arms Control Association.

Because intricacy besets this whole area, great oversimplifications are of no help. Thus, the AAAS thought it timely to publish this year a glossary of terms and concepts that bear on problems of verification in nuclear arms control matters. It runs to 38 pages, without counting even more pages listing key official documents, treaties in force, and "suspended arms control negotiations." It is a mouthful. "SLAR" stands for Side-Looking Airborne Radar. "Pave Paws Radar" is a phased array radar to warn of submarine-launched missiles. "Molniya" are Soviet satellites for military communication. "Exoatmospheric" refers to antiballistic missiles that operate outside the atmosphere. Thus we begin to glimpse a patch of the intricacy that suffuses the nuclear weapons culture and hampers public opinion in staying in step with the arms control debate.

Now a summit meeting is in prospect. It ought to be more than a spectacle of personalities on a world stage. It ought to bring into focus the full dimensions of the terror that holds us hostage. Whatever may be its outcomes, the genuine work of pursuing arms control will be done, as always, offstage. It will be done in the quiet zone of the cold war, and those who work honestly at it are unlikely to be singled out for peace prizes. The unfinished work of Scoville challenges us profoundly.—WILLIAM D. CAREY

*A. N. Shevchenko, *Breaking with Moscow* (Knopf, New York, 1985), p. 163.



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Call for Contributed Papers

Deadline 17 January 1986

The next Annual Meeting of the AAAS will be in Philadelphia, PA, 25–30 May 1986, at the Franklin Plaza, Bellevue Stratford, and Hershey Philadelphia hotels; plan to attend. Information about program activities, as well as housing and registration forms, will appear biweekly in *Science*, beginning with the 31 January 1986 issue.

Although it is too late to submit suggestions for symposia for the 1986 Annual Meeting, contributed papers can be sent in up to 17 January 1986. The contributed paper sessions will be either of the POSTER or SLIDE type; see below for instructions and abstract sample.

POSTER SESSION: Each contributor will have a bulletin board on which to place text and graphics (oversized for easy reading) for an extended period of time so that the work can be discussed with interested parties.

SLIDE SESSION: Each contributor will have 10 minutes to present his or her work and show 2″x2″ (35 mm) slides or overhead transparencies.

Please indicate on your abstract which type of presentation you prefer to give.

The privilege of contributing a paper is extended only to AAAS members, although the member need not be one of the authors but merely the endorser of the contribution. All presenters (member and non-member) must register at the meeting.

Instructions for Contributors

Type abstracts, using a clean (new) ribbon, on ordinary white bond paper (8.5 by 11 inches; 21.5 by 28 cm) according to the format shown on the right (the example is reduced to about one-half of the linear dimension; your abstract will be printed *directly from your copy* at about two-thirds of its linear dimensions). Indicate at the top of the page the letter of the AAAS Section which comes closest to your subject matter (a full list will be found at the bottom of the contents page of any issue of *Science*), two or three words which give the subspeciality involved, and whether you prefer a POSTER or SLIDE session.

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