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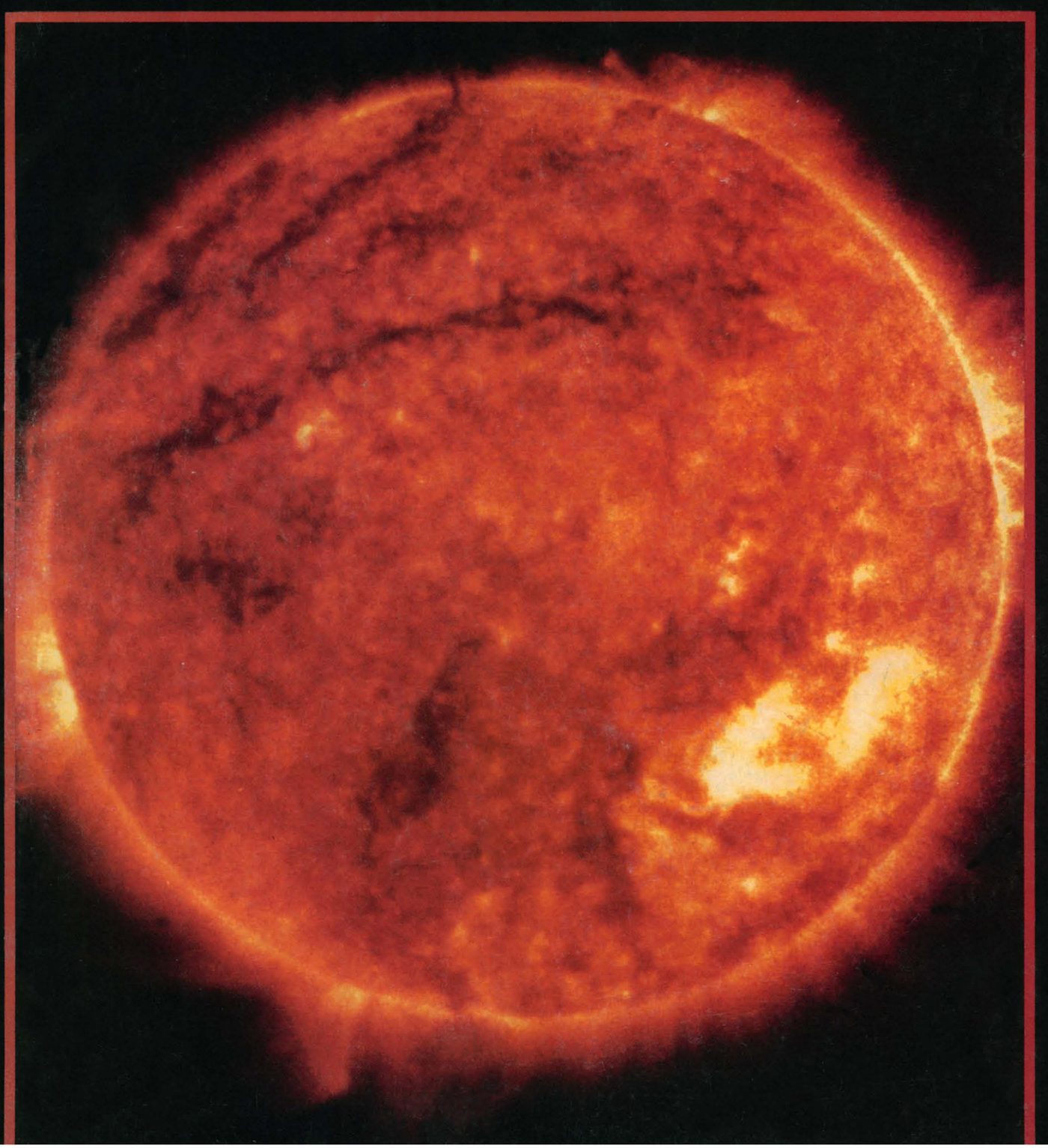

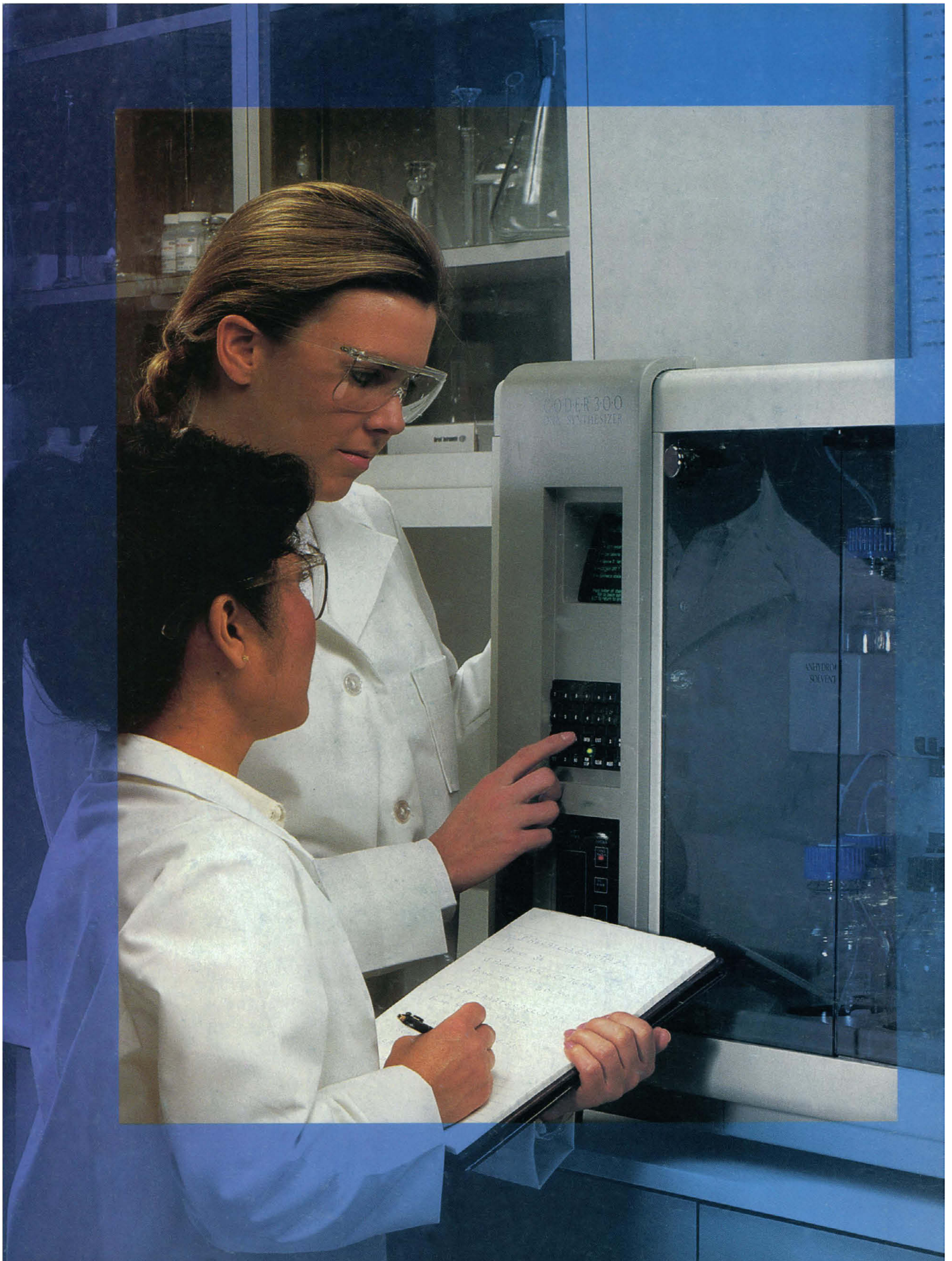
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COVER The solar corona at 1,000,000 K photographed (23 October 1987) by a multilayer Cassegrain x-ray telescope on the Stanford/MSFC Rocket X-ray Spectroheliograph. This telescope provides images of solar emission between 171 and 175 Å which is dominated by Fe IX and Fe X emission lines. See page 1781. [Center for Space Science and Astrophysics, Stanford University, Stanford, CA 94305; NASA Marshall Space Flight Center, Huntsville, AL 35812; and Lawrence Livermore National Laboratory, Berkeley, CA 94550]

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Lobster body language

WHEN two lobsters are put together in a tank they become aggressive, lock claws, push and shove, and engage in other "fighting" behaviors until one of the two (the larger one) emerges as dominant. This individual remains dominant as long as they are together or until one of them molts. The "standing tall" posture of the dominant lobster—it moves on the tips of its walking legs with claws open in front and abdomen tucked downward—can be elicited by injecting a freely moving lobster with the hormone serotonin; the crouching posture of the subordinate lobster can be induced by injecting the hormone octopamine. These amines appear to prime the lobster's nervous system, bringing it from one stable state to a second one that can respond quickly when an appropriate stimulus comes along. What is known of where and how these hormones act in the nervous system to influence behavior in the lobster model and also in other invertebrate and vertebrate models are the subjects of Kravitz's review (page 1775).

Solar corona

IN the solar corona there are magnetically confined loops of hot plasma, polar holes devoid of closed magnetic structures in which hot plasma might be confined, loops of cool dense gas embedded in hotter coronal gas, plumes and streamers marking the interface with the solar wind, and other interesting substructures. Some of these features of the corona, described by Walker *et al.*, were captured in images obtained with a normal-incidence Cassegrain multilayer telescope (page 1781). Evaluated in conjunction with observations made in other spectral regions, these images illustrate how the structure of the plasma varies with temperature and how magnetic fields help to shape the plasma. The telescope flew on a sounding rocket launched in 1987. Recordings were made in a narrow band in the soft x-ray to extreme ultraviolet region of the spectrum, one that corresponds to solar emissions at temperatures of 0.8×10^6 to 1.4×10^6 K. The multilayer optics provided images that were of both high spatial resolution (expected in the near future to achieve 0.1 arc second) and high spectral resolution (the surfaces are reflective only in a certain bandpass and therefore can isolate a particular emission line); such images could not be made with earlier x-ray telescope designs.

Atomic resolution in multilayer structures

THE precise locations of heavy atoms in ultrathin layered structures called Langmuir-Blodgett trilayer films, the spacing between the layers, and the widths of individual layers have been determined at the subangstrom level with a new x-ray technique (page 1788). Bedzyk *et al.* explain how the long-period x-ray standing waves are generated with x-ray beams, how the fluorescence of heavy atoms—in this case cadmium and zinc—is monitored as the standing wave passes through the material, and how precise information on the position of the atoms in the layers is obtained from the raw fluorescence data. When the temperature of the layer was changed, the atomic structure of the multilayer underwent a corresponding change that could be mapped with the x-ray technique. Langmuir-Blodgett films have served in a number of previous studies as proxies of biologic membranes; they are expected to have many direct applications in electronics, optics, biosensing, energy conservation, and other fields.

Neurologic disease of beef cattle

THE biochemical basis of a fatal disease of Poll Hereford calves has been determined (page 1807). Cattle that have inherited congenital myoclonus are hypersensitive to tactile, visual, and auditory stimuli; in response to such stimuli, or even without stimulation, they show uncontrolled jerking, muscle spasms, and convulsions; thus, they cannot stand or eat and consequently do not survive very long. Gundlach *et al.* show that the spinal cord membranes of affected animals lack or have defects in receptors for the amino acid glycine. The receptors normally take up glycine, and when this occurs neurotransmission is damped. In the affected animals, neurotransmission goes on unchecked because glycine is not absorbed postsynaptically; there is, however, compensatory uptake of glycine by receptors associated with nerve axons. These cattle are in many ways similar to *spastic* mutant mice, and both should be of value in providing information on how nervous system receptors function.

Improved transplantation options

THE success of a kidney transplant or of other organ transplants depends on finding a donor organ that the recipient can tolerate. The best match is one in which the major histocompatibility complex antigens, called HLA antigens, match perfectly between donor and recipient, but, because such matches are not always available, kidneys that have "permissible mismatches" with the tissues of the host are often sought. Claas *et al.* report that among a group of patients who had received numerous blood transfusions and were sensitized as a result of the transfusions to a variety of "non-self" HLA antigens (and thus would not be able to tolerate kidneys expressing these antigens), a common permissible mismatch was one in which the kidney expressed those HLA antigens of the patient's mother that the patient had not inherited (page 1815). Eighty-five percent of such kidneys, when transplanted into a recipient, were still functional after 1 year. These results provide evidence that humans, like mice, may develop a lifelong tolerance to antigens that they are exposed to in utero or at birth. The finding should facilitate transplantation for multiply transfused patients by expanding for them the pool of acceptable grafts.

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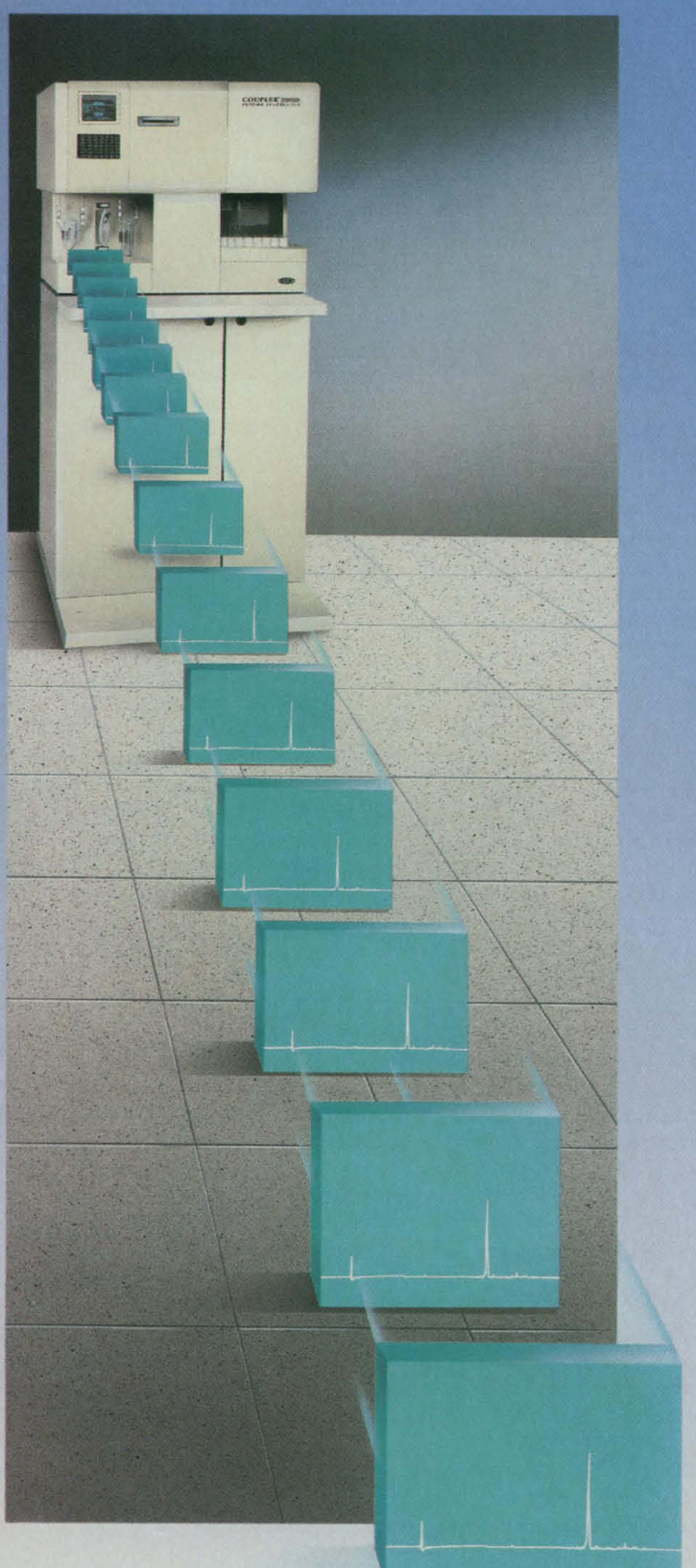

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SCIENCE

30 SEPTEMBER 1988
VOLUME 241
NUMBER 4874

Fetal Tissue in Research

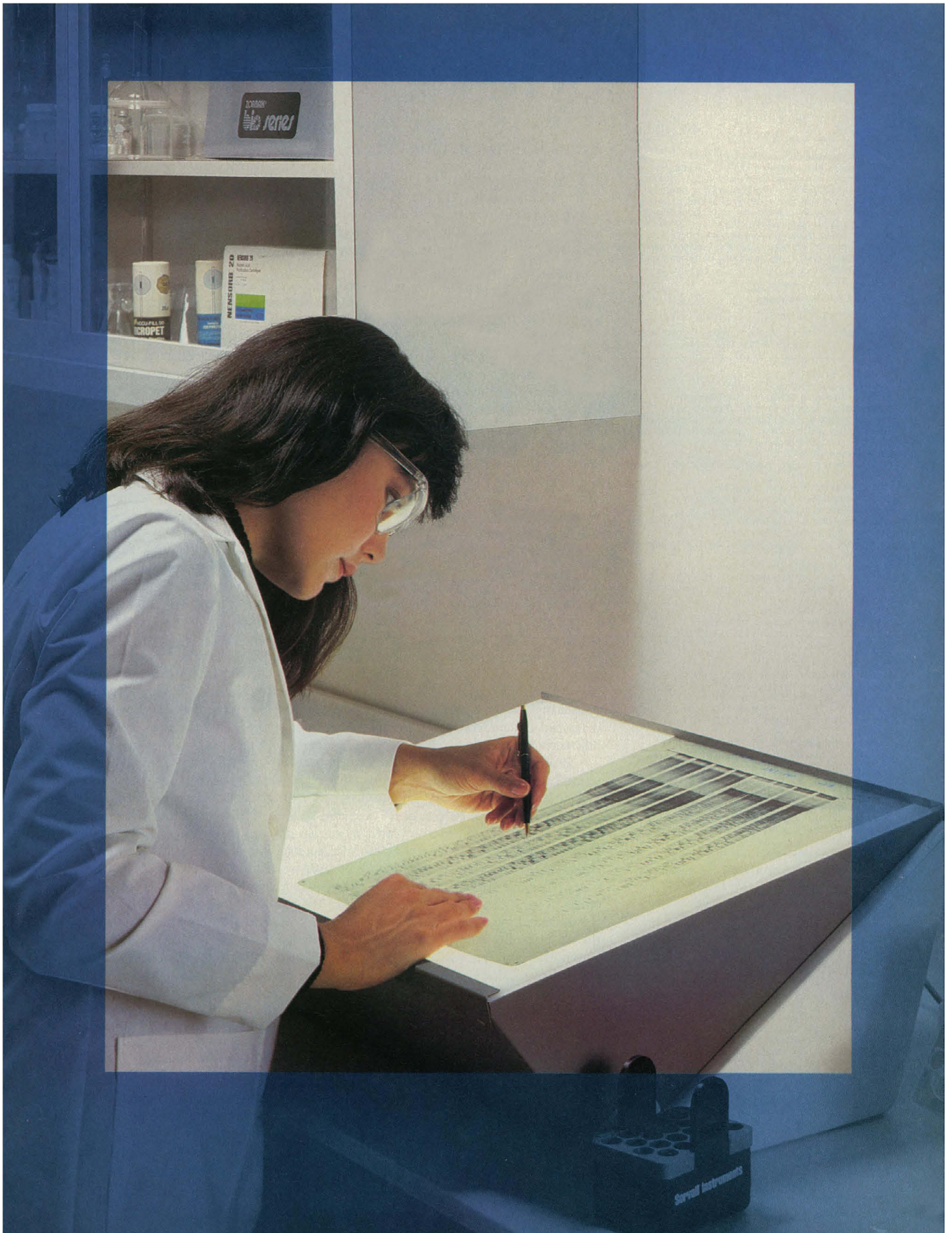
There is an element of nostalgia in many of the current attacks on research, a vague wish for a simpler era in which further scientific advances are not needed. The antivivisectionists in the 1800s said that research had gone far enough. Few take such an extreme stand now, but there is a wistful questioning. "What if we could do research without animals? What if we could do research that was never applied to weapons? What if we could do research with no toxic side products?" The list of "what if's" is endless. And scientists have their own nostalgia. What if we could be allowed to do our research without getting embroiled in moral and political issues? None of these "what if's" will be realized because each addresses part of a problem without examining it in its entirety.

The issue of fetal research was in the forefront of the news last week because it was the subject of a soul-searching debate, the focus of a possible executive order, and the source of a scientific breakthrough. To some it is a simple issue: fetal tissue is discarded tissue that cannot live on its own, cannot do the mother any good, and might provide us with research knowledge or medical therapy. Organs are donated from living people; blood is provided at request; placentas are routinely used for studies in medicine. Why should there be any particularly emotional response to discarded fetal tissue? The answer is that the most useful and appropriate fetal tissue is that from induced abortion, and the issue of induced abortion is highly controversial. Scientists, like all other citizens, have a right to political opinions on the controversy, but there is a big stake in making certain that the scientific aspects are separated from the political ones.

The importance of fetal tissue has already been demonstrated. The use of this material in therapy for certain kinds of neurological diseases has had some encouraging results in animals and some mixed results in humans. The incorporation of human fetal tissue into a mouse, reported in *Science* last week (see J. M. Mc Cune *et al.*, page 1632), offers an opportunity of untold dimension for study of the development of the human immune system and for possible therapy in specific human diseases, such as AIDS. The alternative animal model in that case involves infection of chimpanzees, primates whose use creates emotional responses also, and they are a species that is endangered. Other applications of fetal tissue are for therapy against infectious diseases and in diabetes, for patients receiving cancer chemotherapy at levels that wipe out the bone marrow, and for bone marrow transplants in preparation for other organ transplants. To the nonscientist, fetal tissue may seem like any other, but fetal cells are less developed and are more malleable and willing to grow than mature cells. Mature cells are too differentiated to be useful in many circumstances.

Prohibition of use of such a major new means to prevent and alleviate suffering seems unthinkable. And yet such a prohibition may come about if scientists are not sensitive to the inevitable consequences of such advances on moral precepts and social traditions that are centuries old. It will be crucial for scientists to make it clear that they do not intend to encourage induced abortion in order to supply material for research. Encouragement of abortion for the purpose of research is unacceptable. Scientists must take the stand that the decisions to live or die, decisions in such cases as abortion, brain-dead individuals on life support, or terminally ill individuals, are matters for decision based on political considerations in a complex society. Once the live or die decision has been made on these grounds, the decision to use tissue that would otherwise be discarded seems straightforward. Taking the kidney from a brain-dead victim of an automobile crash has not led scientists to encourage automobile accidents, and fetal tissue can be used without reference to the arguments surrounding induced abortion. There are some who will regard all such options around death as ghoulish. But to most individuals donation of organs to help others provides a touch of altruism and an intimation of immortality that mitigate the sting of death.

The nostalgia of those who long for a smaller and simpler world is romanticized to include only those features that the wisher advocates. What if we had all the advantages of modern civilization with one-tenth the people on the globe? A far better world, as long as I am one of those who survive. What if research had been stopped in the 1800s? We would have had no polyethylene or nuclear bombs or chlorinated insecticides, but we also would have had no penicillin, no vaccines, no television, and no central heating. The fetal research issue is one of many in which shouting about rights—the right to choice, the right to life, the right to do research—is not helpful. A *modus vivendi* in which progress is ensured and sensitivities are recognized is the only right way.—DANIEL E. KOSHLAND, JR.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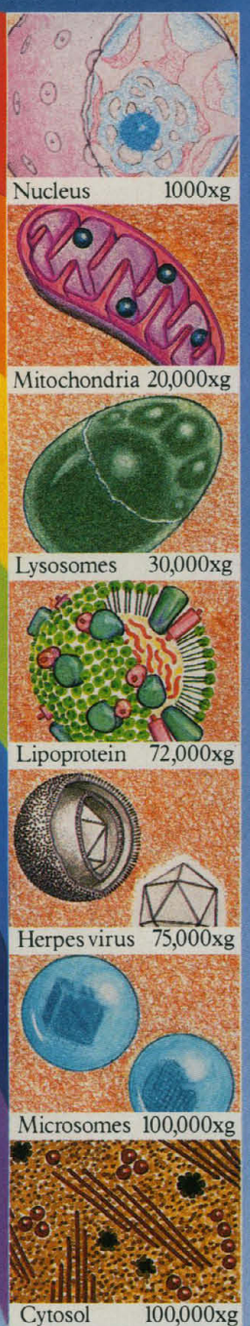

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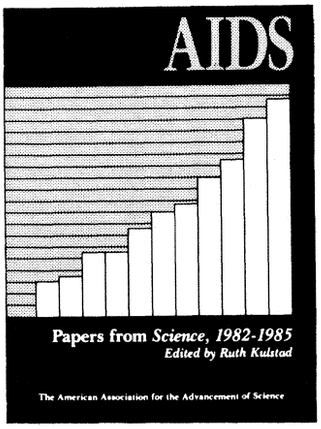

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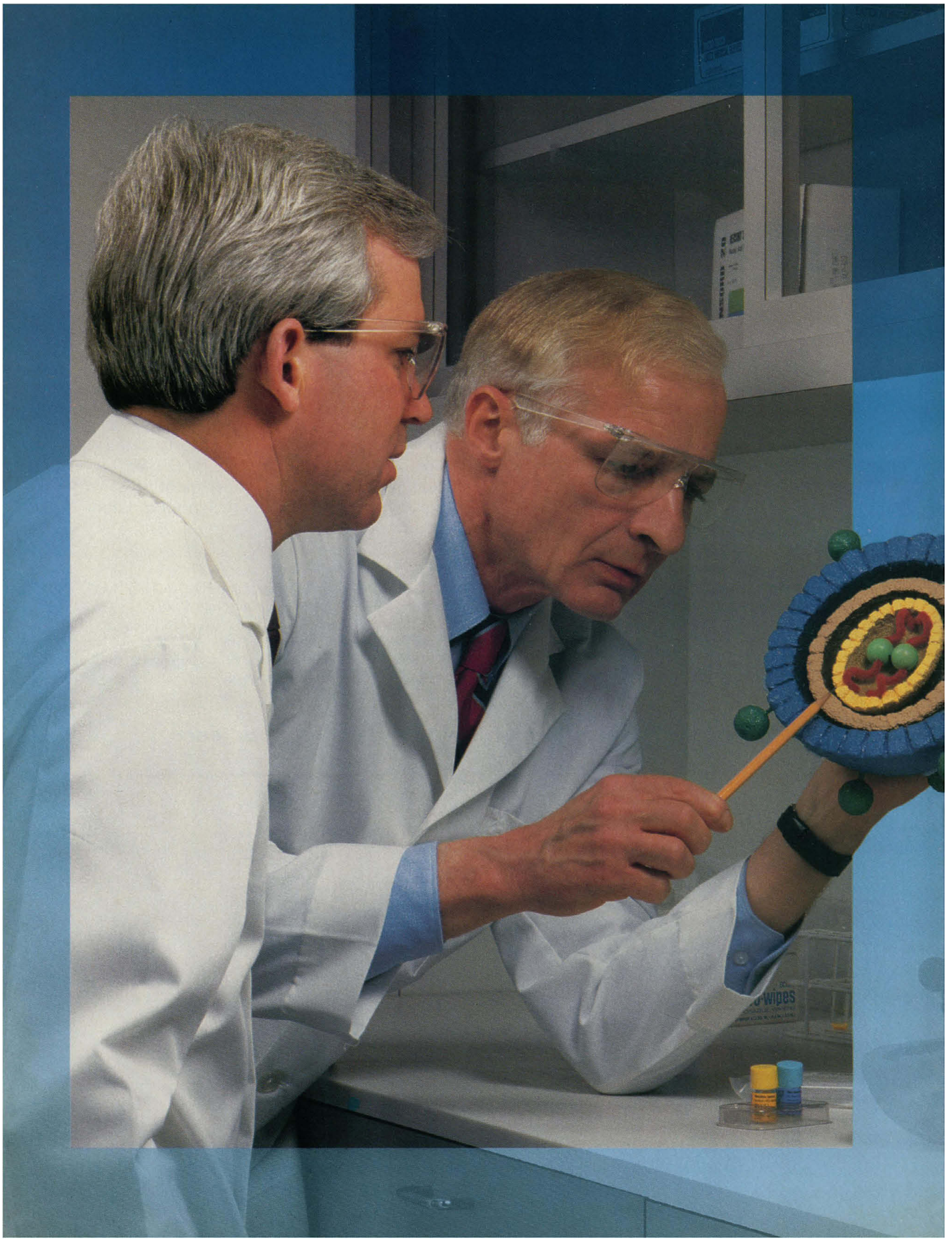

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Reports. Reports (up to 2000 words) are expected to contain important research results. They should include an abstract (no more than 100 words) and an introductory paragraph. A maximum of 30 references is suggested. Figures and tables together with their legends should occupy no more than one printed page.

Letters. Letters are selected for their pertinence to material published in *Science* or because they discuss problems of general interest to scientists. Letters pertaining to material published in *Science* may correct errors; provide support or agreement; or offer different points of view, clarifications, or additional information. Personal remarks about another author are inappropriate. Letters may be reviewed by outside consultants. Letters selected for publication are intended to reflect the range of opinions received. The author of the paper in question is usually given an opportunity to reply.

All letters are acknowledged by postcard; authors are notified if their letters are to be published. Preference is given to letters that do not exceed 250 words. Letters accepted for publication are frequently edited and shortened in consultation with the author.

Technical Comments. Technical comments (up to 500 words) may criticize articles or reports published in *Science* within the previous 6 months or may offer useful additional information. Minor issues should

be resolved by private correspondence. The authors of the original paper are asked for an opinion of the comment and are given an opportunity to reply in the same issue if the comment is published. The comments, and sometimes the reply, are subject to the usual review procedures. Priority disputes undergo extensive review and are published only when action is recommended.

Book and Software Reviews. The selection of books and software packages to be reviewed and of reviewers is made by the editors. Instructions and length specifications accompany items to be reviewed when they are sent to reviewers.

Manuscript Preparation

Typing. Use double-spacing throughout the text, tables, figure legends, and references and notes and leave margins of at least 2.5 centimeters. Put your name on each page and number the pages starting with the title page.

Titles. Titles should be short, specific, and amenable to indexing. For general articles the maximum length is 80 characters and spaces; for research articles and reports the maximum is 100 characters.

Summaries or abstracts. These should include a sentence or two explaining to the general reader why the research was undertaken and why the results should be viewed as important. The abstract should convey the main point of the paper and outline the results or conclusions.

Text. A brief introduction should indicate the broad significance of the paper. The whole text should be intelligible to readers in different disciplines. Technical terms should be defined. All tables and figures should be cited in the text in numerical order.

Symbols and abbreviations. Define all symbols, abbreviations, and acronyms.

Units of measure. Use metric units. If measurements were made in English units, give metric equivalents.

References and notes. Number references and notes in the order in which they are cited, first through the text and then through the table and figure legends. List a reference only one time. References that are *always* cited together may be grouped under a single number. Use conventional abbreviations for well-known journals; provide complete titles for other journals. For references with up to five authors provide all the names; for more than five, provide the name of the first author only. See issues of the journal for examples.

Unpublished observations. Reference to unpublished data should be given a number in the text and placed, in correct sequence, in the references and notes.

Acknowledgments. Gather all acknowledgments into a brief statement at the end of the references and notes.

Informed consent. Investigations on human subjects must include a statement indicating that informed consent was obtained after the nature and possible consequences of the studies had been fully explained.

Animal welfare. Authors using experimental animals must state that their care was in accordance with institutional guidelines. For animals subjected to invasive procedures, the anesthetic, analgesic, and tranquilizing agents used, as well as the amounts and frequency of administration, must be stated.

Figures. For each figure submit three high-quality glossy prints or original drawings of sufficient size to permit relettering but not larger than 22 by 28 centimeters (8½ by 11 inches). On the back of every figure write the first author's name and the figure number and indicate the correct orientation. *Manuscripts with oversized figures will be returned to the author without review.* Photocopies of figures are not acceptable; transparencies, slides, or negatives cannot be used because they cannot be sent to reviewers.

On acceptance of a paper, authors requesting the use of color will be asked to supply slides or negatives of the color artwork and to pay $600 for the first color figure or figure part and $300 for each additional figure or figure part as a contribution toward printing costs.

Illustrations reprinted from other publications must be credited. It is the author's responsibility to obtain permission to reprint such illustrations in *Science*.

Tables. Tables should supplement, not duplicate, the text. They should be numbered consecutively with respect to their citation in the text. Each table should be typed, with its legend (double-spaced), on a separate sheet. Give each column a heading with units of measure indicated in parentheses. Do not change the unit of measure within a column.

Equations and formulas. Use quadruple-spacing around equations and formulas that are to be set off from the text. Define all symbols.

Uncertainties and reproducibility. Evidence that the results are reproducible and the conditions under which this reproducibility (replication) was obtained should be explicitly stated. The effect of limitations in experimental conditions on generalizability of results should be discussed. Uncertainties should be stated in terms of variation expected in independent repetitions of the experiments; they should include an allowance for possible systematic error arising from inadequacies in the assumed model and other known sources of possible bias. Probabilities from statistical tests of significance should be subordinated to the reporting of results and associated uncertainties.

Printing and Publication

Proofs and reprints. One set of galley proofs is sent to the authors. An order blank for reprints accompanies the proofs.

Scheduling. Papers are scheduled for publication after *Science* has received corrected galley proofs from the authors. Papers with tables or figures that present problems in layout, or with color figures or cover pictures, or that exceed the length limits may be subject to delay.

Cover Photographs

Particularly good photographs that pertain to a paper being submitted will be considered for use on the cover. Submit prints (not slides, negatives, or transparencies) with the manuscript.