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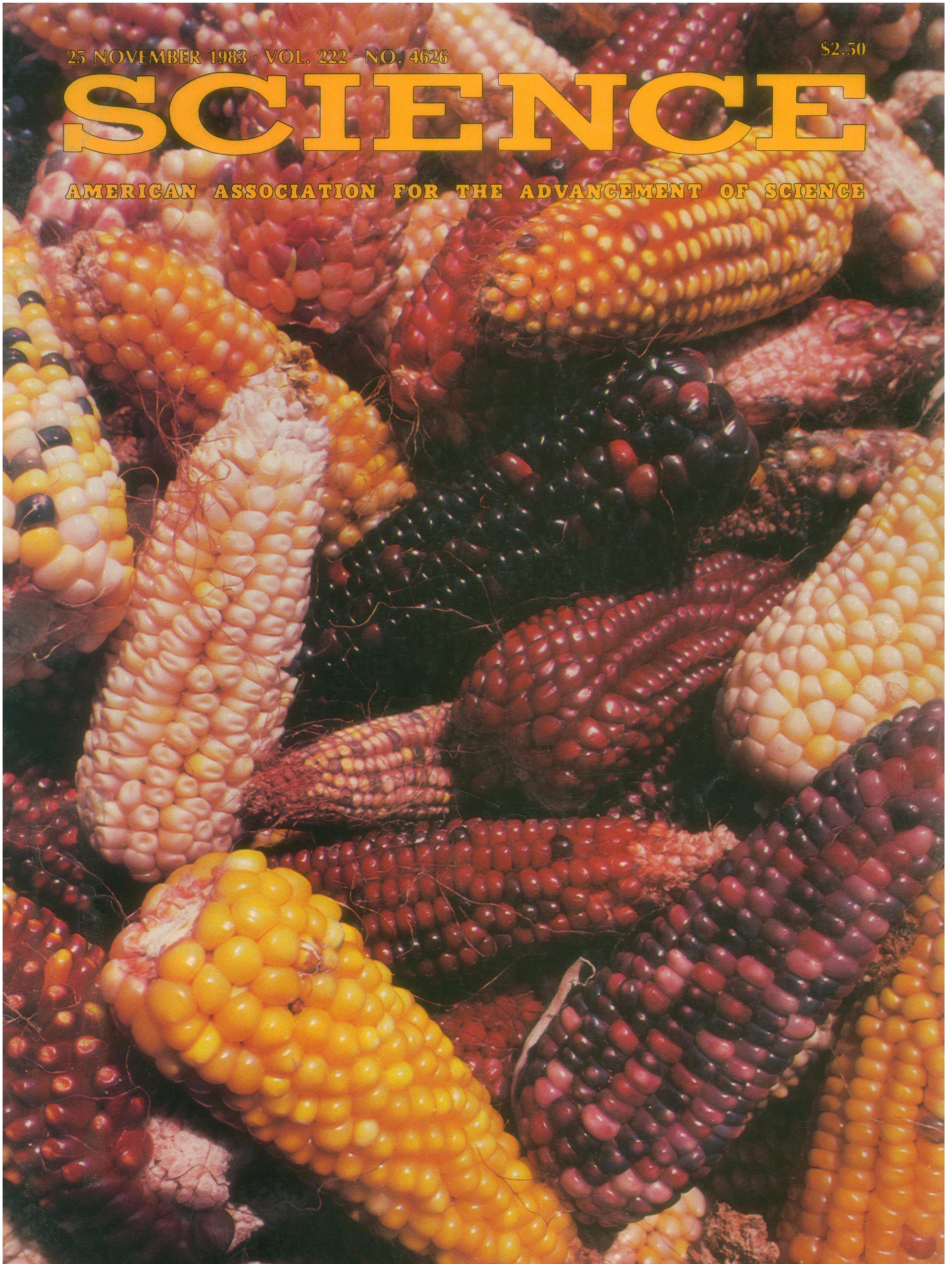

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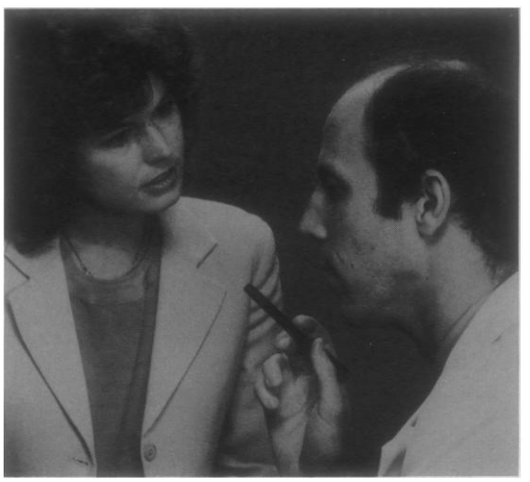

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COVER

Freshly harvested maize (*Zea mays* ssp. *mays*) of race Conico, a cultivar with highly condensed ears, from one field near Santiago del Monte, 35 kilometers west of Toluca, Estado de Mexico. Typical of the Mexican Plateau, Conico hybridizes locally (but not here) with teosinte (*Zea mays mexicana*), which may account for its astonishingly great variability. See page 886. [Hugh H. Iltis, Department of Botany, University of Wisconsin, Madison 53706]

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LETTERS

TMI Public Health Fund

Eliot Marshall (News and Comment, 14 Oct., p. 142) reports criticism of the management of the Three Mile Island Public Health Fund.

The fund is under the supervision of the U.S. district court in Harrisburg, Pennsylvania, not the Berger law firm. The law firm makes recommendations to the court. Marshall reports a suggestion of possible impropriety in the management of the fund. Any impropriety would require the complicity of the court, a circumstance that seems highly unlikely. It would also require that the lawyers of the opposition, in this instance the insurance companies and general public utilities, stand silent. That, too, seems improbable.

The supervision provided by the court is meticulous. It requires equally meticulous preparation; it also requires public notice and time for response. Errors of substance, uncertainties, misjudgments, and errors of procedure all have the potential for further litigation and delay. The process is slow by nature. It is, nonetheless, wholesome, public, and well scrutinized.

The fund's missions have been defined in detail by the settlement agreement, as outlined by Marshall. The topics are complex and contentious. To ensure that the full range of possibilities is considered, David Berger has assembled an advisory committee on which I serve. The committee provides one level of scholarly review, asserted by Marshall to be absent. The committee has, with the explicit authorization of the court, commissioned various reviews, now available; has held various meetings, including special interviews with citizens of Harrisburg and vicinity; and has advertised for specific proposals to fill further gaps in knowledge. One of the meetings was a 3-day "Forum on Nuclear Power" held in Middletown on 28, 29, and 30 March 1983. All of the lawyers, members of the advisory committee, and various additional scholars from around the world made themselves available to the public during those meetings. Abundant time was reserved for comments from the public; all questions posed were addressed. The nature of the fund and the program being developed was explained in detail by Berger himself. Is this series of procedures consistent with the suggestion that the normal processes of discussion and review are not being followed?

The TMI Public Health Fund is small in proportion to potential demands. The fund is important because it offers an unusual opportunity to develop from the TMI accident specific data and insight necessary to future management of nuclear power. The program being developed will serve not only the citizens near TMI, but all. Marshall's article misses that point in its emphasis on criticism from those who are unfamiliar with the fund or in disagreement with the objectives established in the settlement agreement.

G. M. WOODWELL
Marine Biological Laboratory, Woods Hole, Massachusetts 02543

I read with interest the recent account by Marshall concerning "Carving up TMI's class action fund" and commend him for his clear and concise statement of the problem. There are many questions that need to be addressed; in fact, there are many more questions than answers at present. I find it distressing that the "advocate" of the class action has such limited communication with the "class" being represented. This was one of the primary reasons why I became involved with the health issues committee that was organized by members of other local groups who were addressing problems resulting from the TMI accident and nuclear energy in general, and who were trying to interact on a professional basis with the Berger law firm. I thought that, as a scientific professional, I might obtain more direct answers concerning the scientific issues in question. I was wrong. The Berger firm has shown no more interest in communicating with me than with other members of the local populace.

I asked the Berger firm about their plans to use funds allocated to the "public health fund" and got nowhere. The office of grants and contracts at our local university also put in a request for information concerning the funding of scientific projects and received a polite letter stating that the inquiry would be filed and "kept in mind." No other information was forthcoming.

The research in which I am involved is not related in any way to radiation safety, so I would not personally benefit from an award from this fund. I therefore resent being categorized as a "disgruntled proposer" by the Berger firm. I acted in two capacities in my recent endeavor: (i) as a scientist interested in helping the local community deal with a difficult problem and (ii) as a scientist interested in promoting scientific research at an institution capable of providing much expertise to help solve a highly technical and difficult problem.

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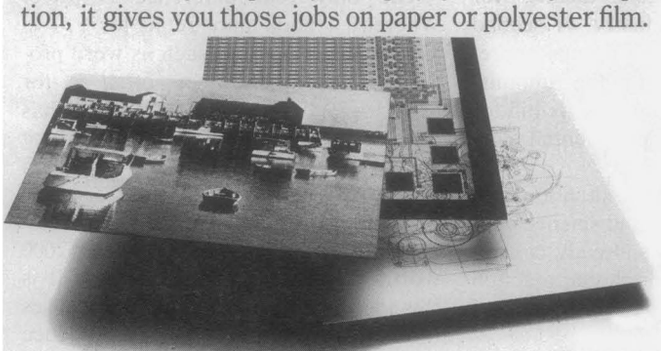

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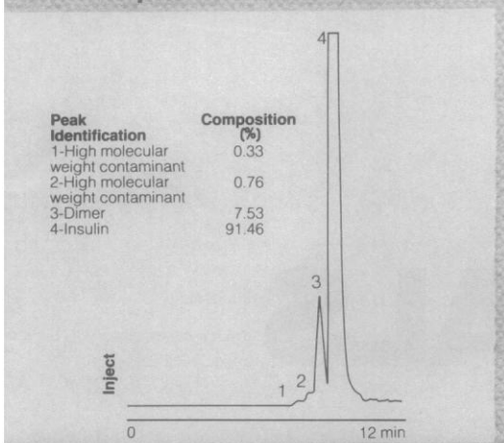

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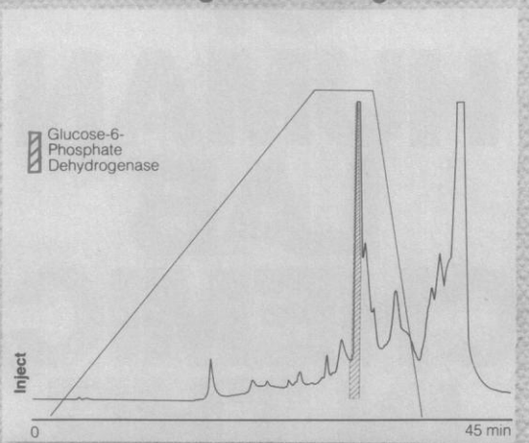
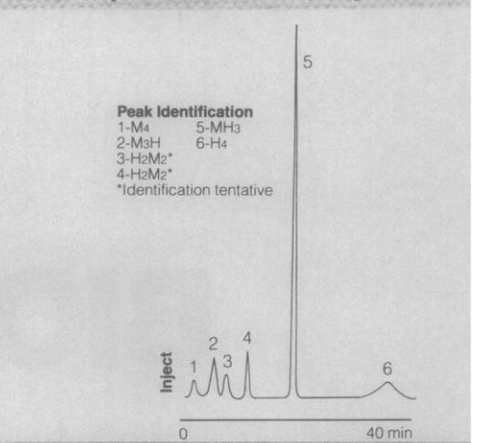


High resolution hydrophobic ion exchange separation of isoenzymes.



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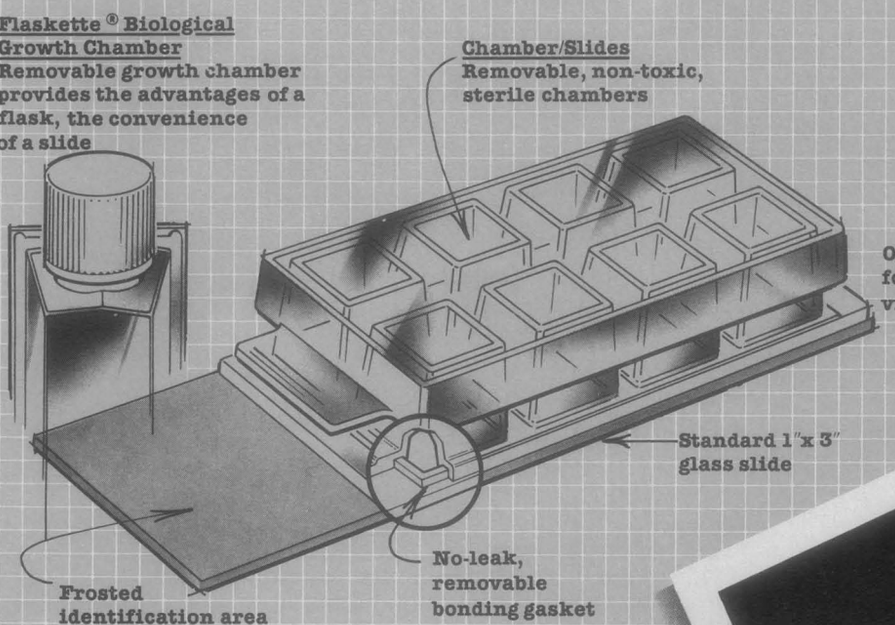

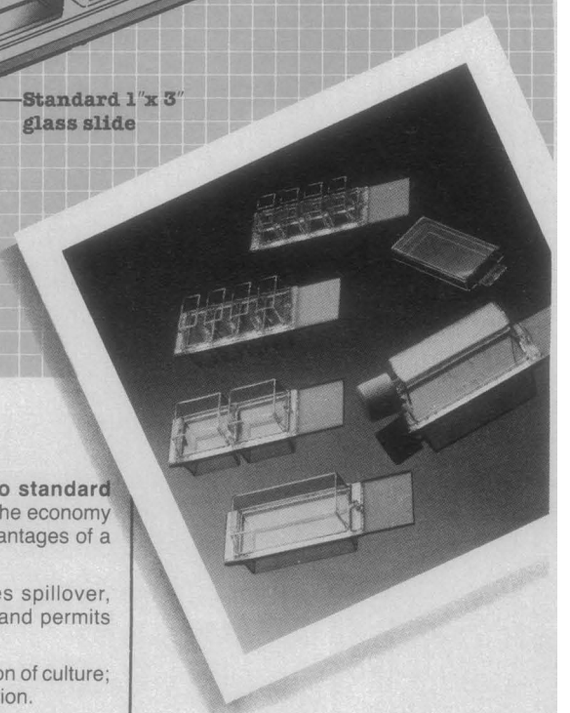

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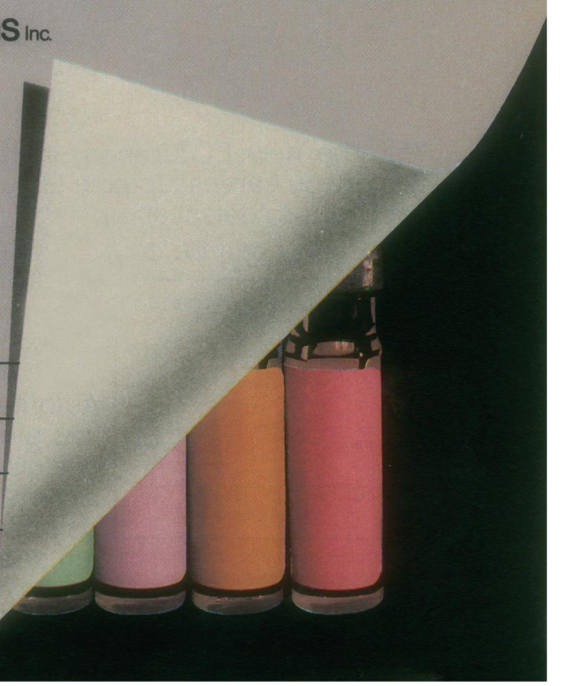

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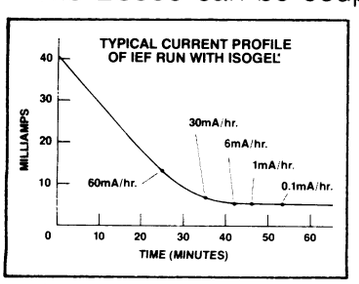

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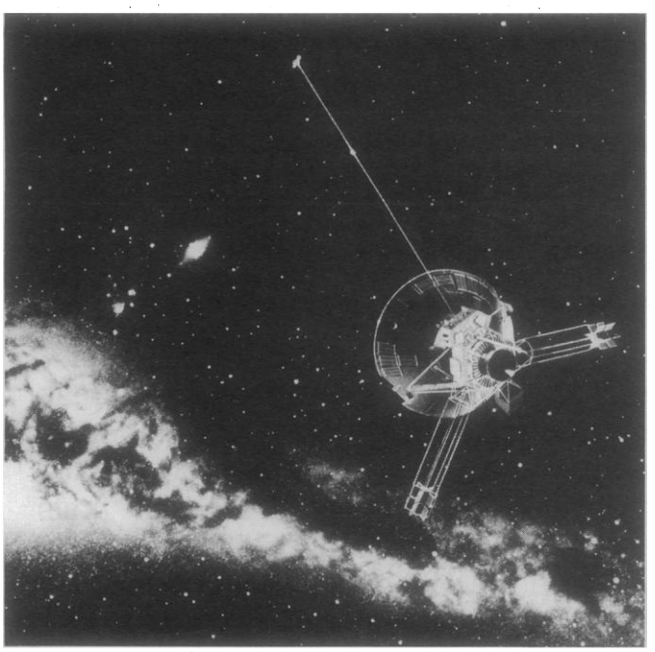

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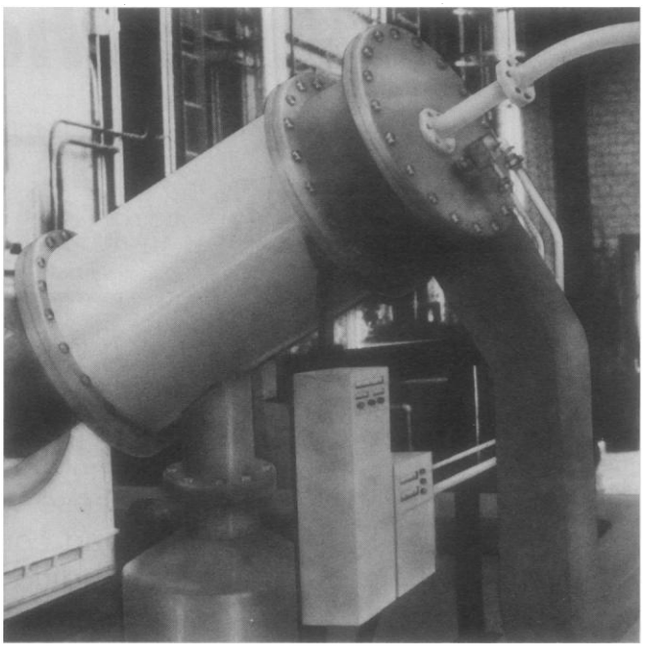

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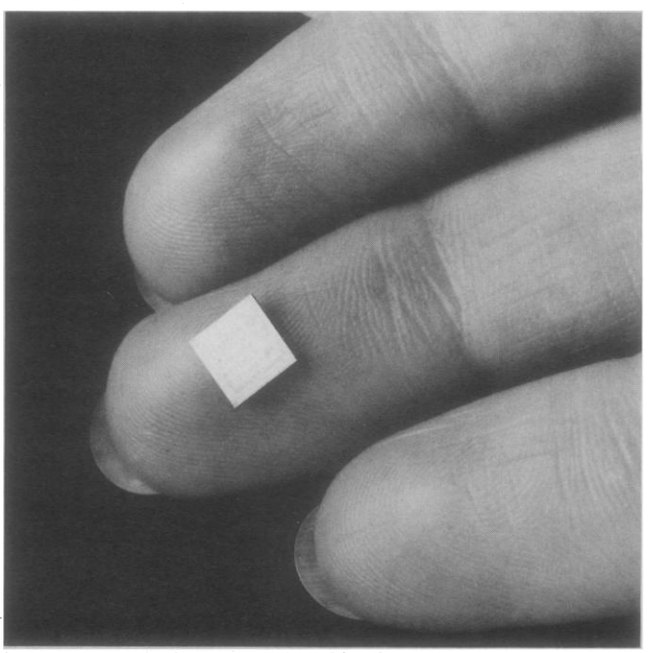

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25 November 1983, Volume 222, Number 4626 **SCIENCE**

Carbon Dioxide Emissions

Two recent reports have dealt with the climatic effects of increasing amounts of atmospheric CO_2. The tone of the reports is less panicky than that of earlier statements. This is particularly true of the study conducted under the auspices of the National Research Council (NRC).* Earlier predictions were based on the then current rate of increase in combustion of fossil fuels. This amounted to 4.3 percent per year and would have led to a doubling of the concentration of atmospheric CO_2 in about 57 years, with an estimated rise in global temperature of 3.0°C. Estimates of average annual rates of increase in CO_2 emissions to 2030 range from 1 to 3.5 percent. Using a rate of 2.0 percent gives an estimated doubling time of 88 years. Perhaps more important are some considerations about possible societal impacts. The NRC report pointed out that human societies are flexible in dealing with new situations provided sufficient time is available. As an example, the great changes that have occurred in this century were cited.

The NRC report was careful to outline uncertainties in the predictions. The possible temperature rise is based on model studies which may or may not be valid. The projected rise is necessarily to be superimposed on unpredictable natural climatic trends. More controllable, but still unpredictable, is the rate of burning of fossil fuels. For nearly two decades ending in 1973, consumption expanded at a compound rate of 4.3 percent per year. During the past decade the rate of burning has been static. If present trends continue, the doubling time for CO_2 will be 220 years.

Whatever the rate of increase of CO_2 content and corresponding change in temperature, ultimate melting of a large Antarctic ice mass seems highly probable. This would lead to an estimated rise in sea level of 5 to 6 meters and to flooding of highly populated areas. Can such an event be delayed or even forestalled? The answer is that it probably can. Continued effort to increase the efficiency of energy use could lessen demand. A number of measures could be employed to slow the rate of increase of CO_2. One method for decreasing net emission of CO_2 is close to commercial feasibility. It has the potential advantage of curtailing the emission both of CO_2 and of gases responsible for acid rain. In an electric power plant now being built at Cool Water, California, coal is gasified and impurities such as sulfur are captured. Following the combustion of fuel gases, the CO_2, being present in high concentration, could be easily removed. Later it would have a market value for injection underground to promote tertiary recovery of oil.

A transition to greater dependence on renewable energy would also be helpful. It is useful to be reminded that energy consumption by humans amounts to only 0.1 percent of the solar energy falling on the earth. Recent progress in tapping some of this energy by improving the increased production of biomass is large. With good management and superior choice of vegetation, CO_2 fixation might be increased fivefold or more. The product would be sufficient to sustain a prosperous civilization. Any surplus fixed carbon could be stored. Correspondingly, the amount of CO_2 in the atmosphere would be reduced.

The advent of fusion energy would change energy usage drastically. It would reduce demand for fossil fuels to produce electricity. It would make possible a hydrogen economy that would require no net use of carbon. Some of the fusion energy could be used to capture CO_2 from the atmosphere for injection into geological formations. Alternatively, the energy could be used to convert CO_2 into solid carbon.

When the environment is altered on a global scale, major problems can arise. Careful monitoring and study of the trends in CO_2 is desirable, together with efforts to develop contingency alternatives. The process of providing adequate energy need not lead to catastrophic consequences.

—PHILIP H. ABELSON

**Changing Climate*, Report of the Carbon Dioxide Assessment Committee, National Research Council Board on Atmospheric Sciences and Climate (National Academy Press, Washington, D.C., 1983).

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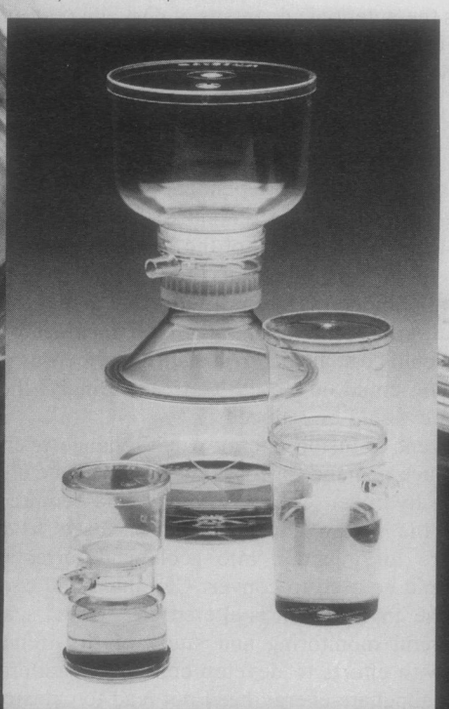

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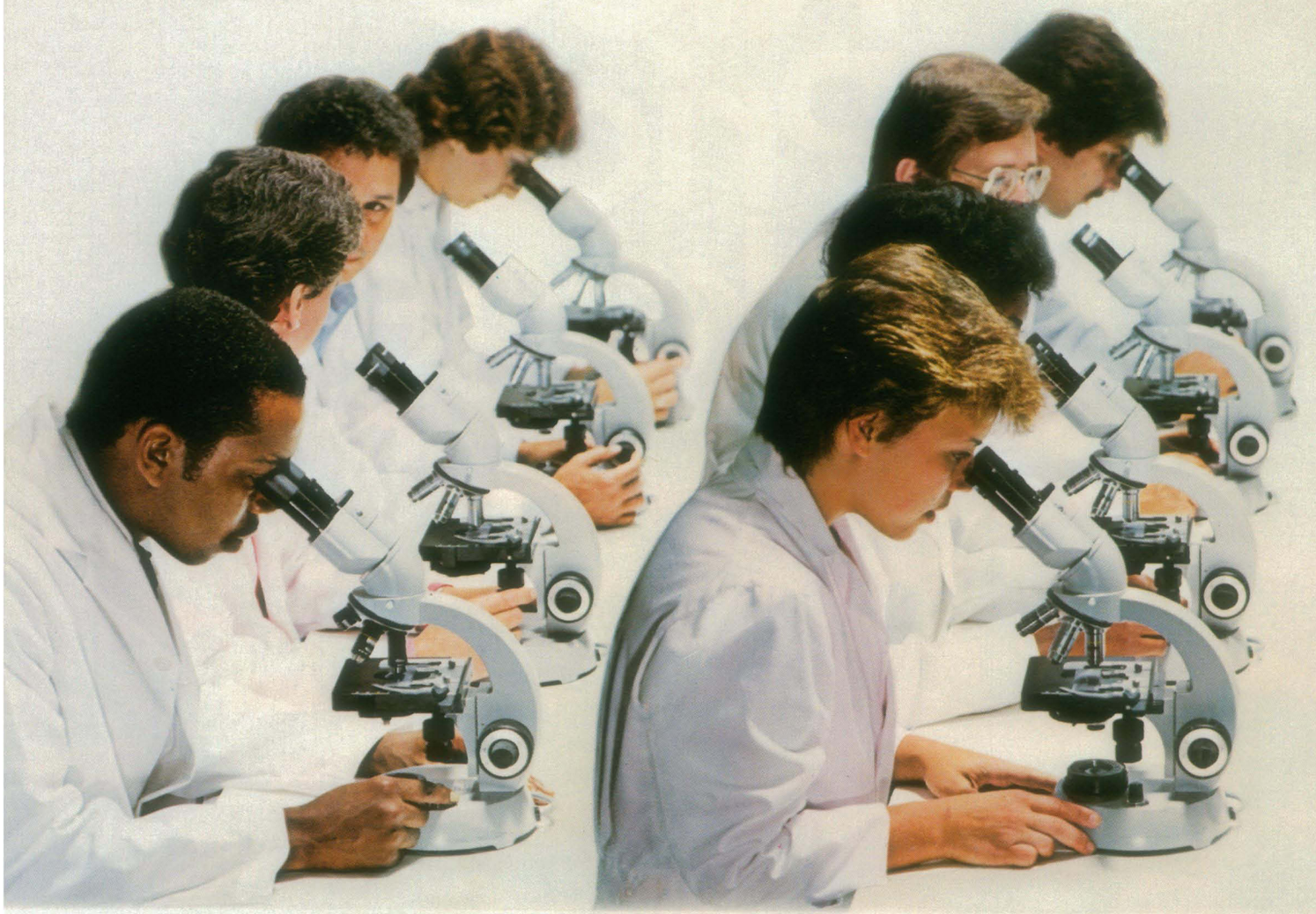

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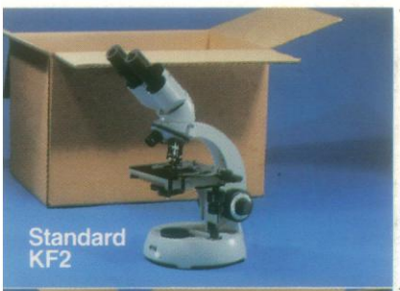
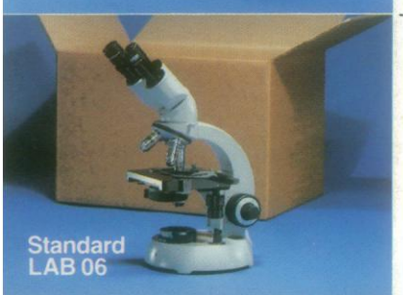
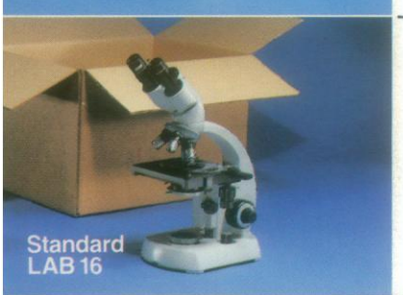
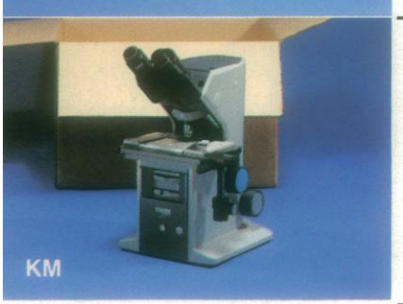
 Standard KF2	Achromat 10/0.22 Achromat 40/0.65 Achromat 100/1.25 oil (2) Widefield eyepieces CPL 10x **Less than $850**	F-Achromat 2.5/0.08 Achromat 10/0.22 Achromat 40/0.65 (2) Widefield eyepieces CPL 10x **Less than $875**	Achromat 10/0.22 Achromat 40/0.65 Ph2 Achromat 100/1.25 oil Ph2 Phase attachment Ph2 (2) Widefield eyepieces CPL 10x **Less than $1,150**
 Standard LAB 06	Achromat 10/0.22 Achromat 40/0.65 F-Achromat 100/1.25 oil (2) Widefield eyepieces CPL 10x **Less than $1,200**	F-Achromat 2.5/0.08 F-Achromat 10/0.25 F-Achromat 40/0.65 (2) Widefield eyepieces KPL 10x **Less than $1,150**	F-Achromat 10/0.25 F-Achromat 40/0.65 Ph2 F-Achromat 100/1.25 oil Ph3 Phase ring Ph3 (2) Widefield eyepieces KPL 10x **Less than $1,600**
 Standard LAB 16	F-Achromat 10/0.25 F-Achromat 40/0.65 F-Achromat 100/1.25 oil (2) Widefield eyepieces KPL 10x **Less than $1,800**	Planachromat 2.5/0.08 Planachromat 10/0.22 Planachromat 40/0.65 (2) Widefield eyepieces KPL 10x **Less than $1,900**	F-Achromat 10/0.25 F-Achromat 40/0.65 Ph2 Achromat 100/1.25 oil Ph2 Carrier with phase ring Ph2 (2) Widefield eyepieces KPL 10x **Less than $1,900**
 KM	F-Achromat 10/0.25 F-Achromat 40/0.65 F-Achromat 100/1.25 oil Super widefield eyepiece KPL 10x Super widefield focusing eye-piece KPL 10x **Less than $2,200**	F-Achromat 2.5/0.08 F-Achromat 10/0.25 F-Achromat 40/0.65 Super widefield eyepiece KPL 10x Super widefield focusing eye-piece KPL 10x **Less than $1,750**	F-Achromat 10/0.25 F-Achromat 40/0.65 Ph2 F-Achromat 100/1.25 oil Ph3 Slider for phase rings Phase ring Ph2 • Phase ring Ph3 Super widefield eyepiece KPL 10x Super widefield focusing eye-piece KPL 10x **Less than $2,600**

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Although it is too late to submit suggestions for symposia for this Annual Meeting, contributed papers can be sent in up to 20 January 1984. Instructions for abstracts are given below and a sample is shown.

The contributed paper sessions are of the POSTER type. In such sessions each contributor will have a bulletin board on which to place text and graphic material (of an oversized nature) for an extended period of time so that the work can be discussed with all interested parties.

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