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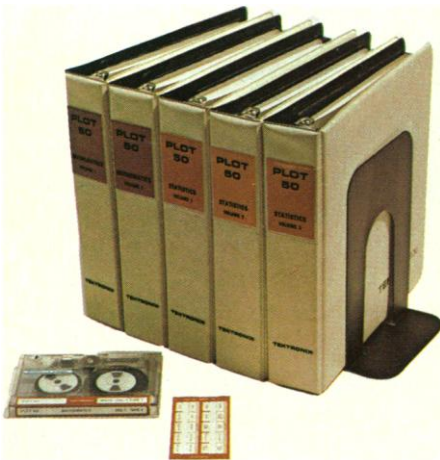
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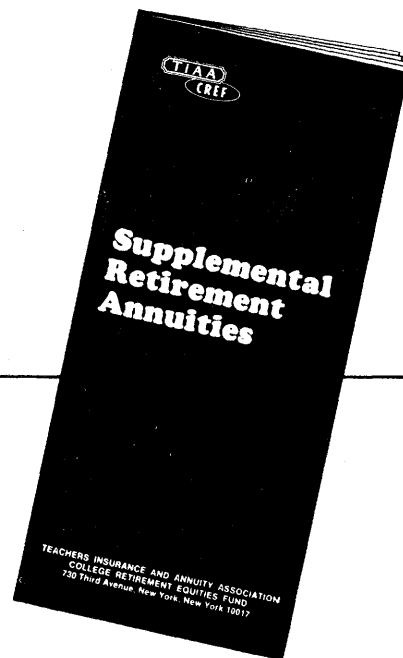
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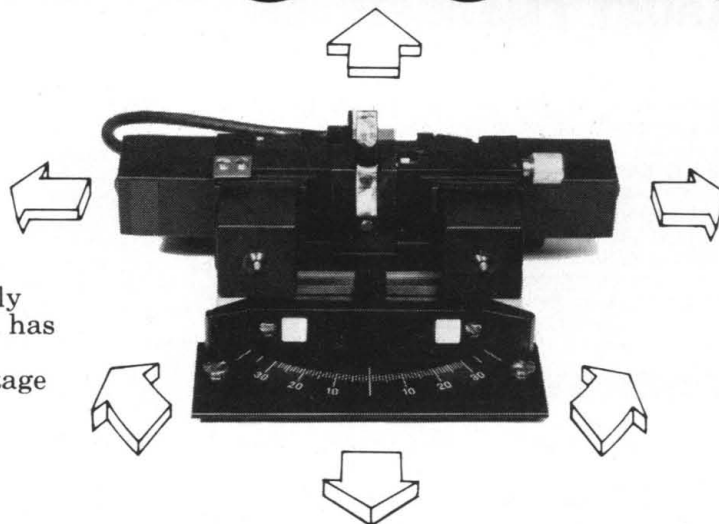
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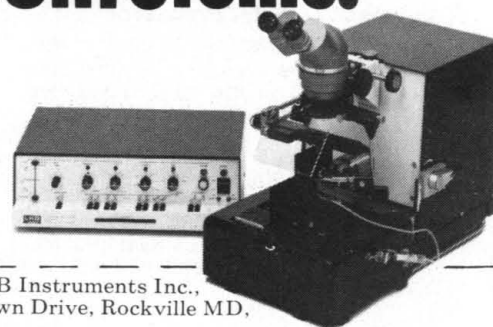
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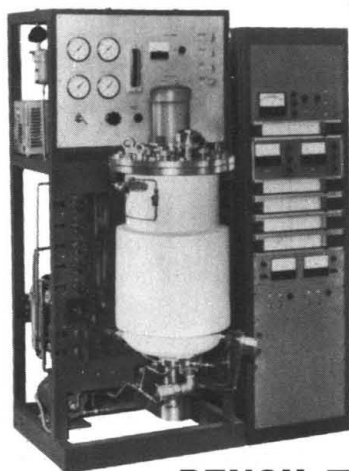
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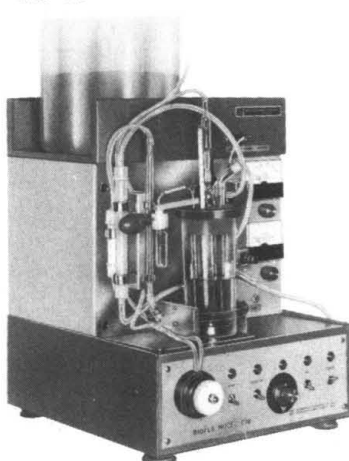


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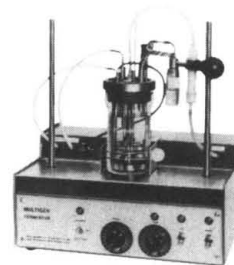
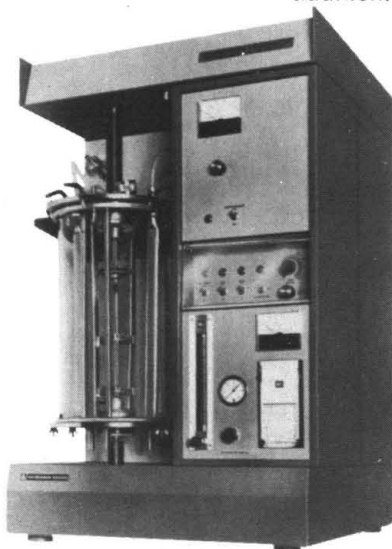
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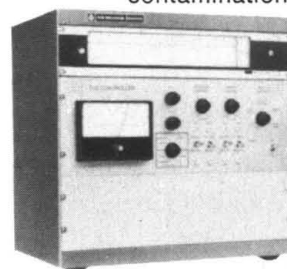
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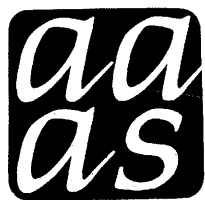


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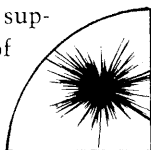
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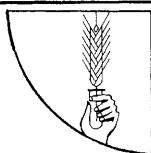
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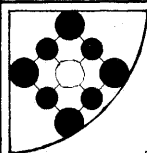
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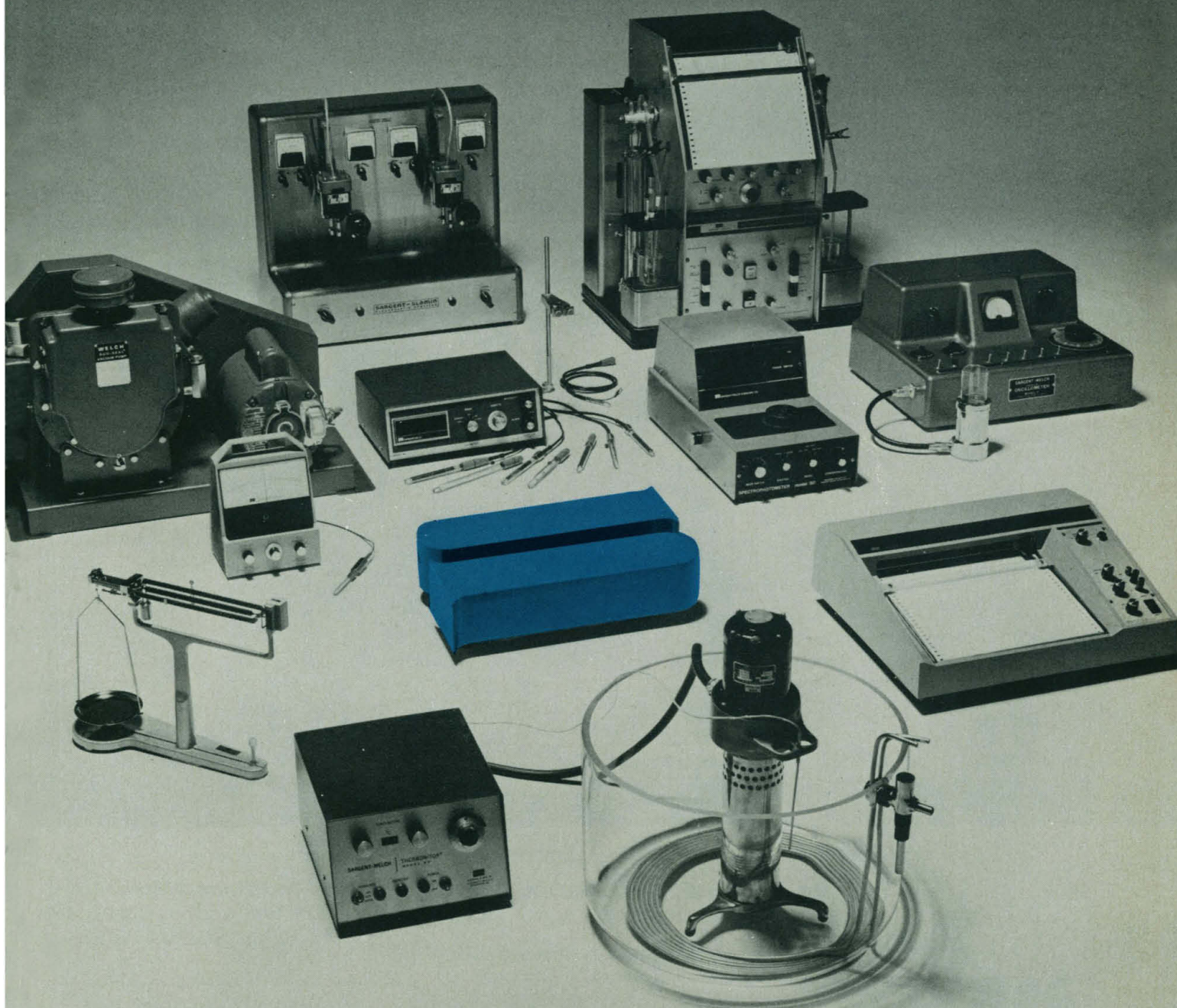
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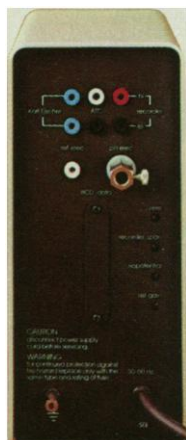
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674

LETTERS

Public Involvement in Scientific Decision-Making

Philip H. Abelson is certainly right that, "Part of the difficulty in gearing up to meet future energy needs is that few people seem to grasp the magnitude of the problem" (Editorial, 15 Oct., p. 261). I would go further and say that ignorance is the major part of the problem, especially if we include our ignorance of the magnitude of health effects from nuclear fuel reprocessing for the proposed "plutonium economy."

Three articles in the issue of 15 October (News and Comment, pp. 301, 303, and 306) serve to bring into perspective the perilous heights to which rapidly advancing science and technology have inadvertently brought our civilization. Balancing somewhat dizzily on this high place, we are trying to weigh the short-term, obvious, and proven benefits of nuclear power, Mirex pesticide for fire ants, and recombinant DNA research against the long-term suspected but unproven dangers from these to future generations. The dangers might include cancer, genetic diseases, new pathogens, and other "potentially grievous risks" that Robert Sinsheimer fears may result from genetic engineering.

Philip M. Boffey's article in the same issue (News and Comment, p. 306) describes the "Science for Citizens" program of the National Science Foundation (NSF) and points out the real issue. Just as climbers on Mount Everest must continually question their own judgment and keep in communication with their supporting camps at lower levels regarding whether or not it would be safe to continue climbing, so also we scientists, eager to keep pushing higher, should question our judgment and keep in communication with the public who support our efforts. It is they and future generations who will have to suffer the consequences if our sins of hubris (overweening pride and arrogance) result in having to pay up on the Faustian bargain. I fully agree with the letter to this effect from Philip Siekevitz (15 Oct., p. 256).

Crucial value decisions have to be made, and they should not be made only by involved scientists closeted with financially interested industrialists and governmental authorities. They should be made by unbiased and informed members of the general public after hearing all sides of the questions, with balanced input from scientists, humanists, historians, philosophers, theologians and, most of all, from ordinary citizens. For this we need the public education of the

NSF "Science for Citizens" program, and we need much more.

We need new ways of getting an informed public consensus on issues of vital importance; some methods have been suggested (1) that would be more effective and quicker than our present haphazard approaches. We also have to have checks and balances on public education programs to ensure that they are truly presenting all sides of the questions.

The "Science Court" idea is perhaps useful, as far as it goes, for establishing questions of scientific fact. But for decisions involving value judgments, we need more diversified input and a more representative and adequately informed jury. Our criminal courts utilize the trial-by-jury process whereby a group of peers, after hearing both sides, decide the fate of a man accused of a capital offense. Could some development of this process help in deciding life and death issues for society?

JOHN C. COBB

Department of Preventive Medicine
and Comprehensive Health Care,
University of Colorado Medical Center,
Denver 80262

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Mailing Labels on Science Covers

Why do you spend thousands of dollars each year to produce exciting cover photographs for *Science*, and then week after week allow your mailing department to obscure the most important parts of these photos. I like to refer these covers to students, use them on bulletin boards, or just enjoy them myself. Yet each week I find my first reaction to the current issue is anger that you have once again spoiled the current cover. Can't you put the labels on the back of the magazine or at least on the title part of the cover? Your readers certainly are intelligent enough to know that the magazine is *Science* if a portion of one of the letters is covered.

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EUGENE E. HINMAN

Department of Geology, Cornell
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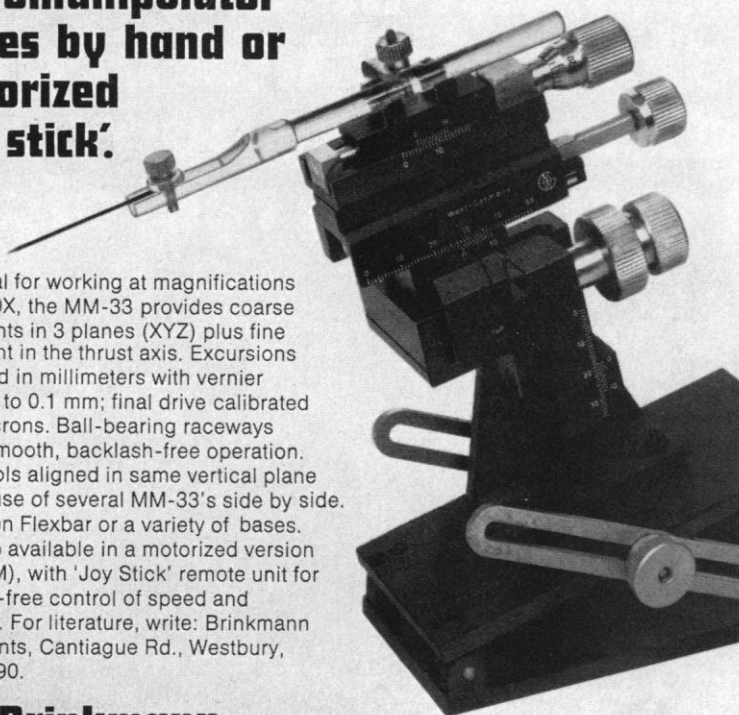
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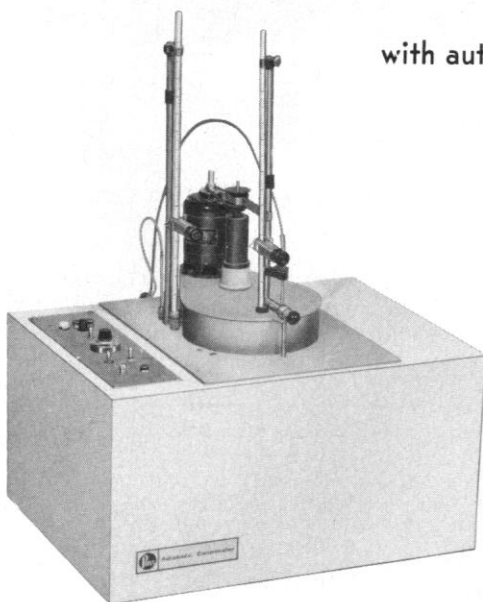
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figurations in accord with postal regulations that are intended to facilitate sorting and delivery by post office personnel.

One postal regulation tells us where to place labels: "Individually addressed, unfolded periodicals mailed in bundles without separate wrappers should have the addresses placed upside down in the lower right corner of the front cover page. An alternate position on periodicals is lengthwise along the bound edge, near the top of the publication." This regulation is not rigorously or consistently enforced by local postmasters where publications are mailed.

A second postal regulation makes weekly and more frequent second-class publications of general interest eligible for "newspaper treatment" in the Postal Service—that is, speedier handling than that given to monthlies and quarterlies, or to third-class mail such as advertising circulars. *Science*, however, has not yet achieved sufficient recognition as a weekly to obtain the same treatment accorded the national weeklies of far greater circulation. We believe we can achieve better recognition by placing our labels on the same side as the logo than we can by placing them on the back, which would tend to make *Science* indistinguishable from an advertising circular among those whose main concern is delivery to an address.

Magazines may be fed into a mailing machine lengthwise or sidewise. Labels are usually applied on the leading edge by a mailing head, which cuts the labels apart and pastes them down. Efficiency appears to be greatest when the mailing head does not have to be repositioned for different magazines and when copies are fed bound edge first. Feeding by the bound edge also helps avoid the delays that occur when a leaf of one copy catches the edge of the label on the copy beneath as the copies move along a belt, labels exposed, for zip-code sorting. If labels are put on the back, all copies must be turned over before they are fed to the mailer. This entails extra hand work (to prevent scrambles, magazines are stored face up in the printing plant) and increases the risk that a mixup among magazines will not be detected before or after the labels are pasted down.

We have considered other alternatives. We could mail *Science* in wrappers on a slower machine and at a cost of 4.5 cents per copy instead of 0.9 cent, but with every wrapper stamped "newspaper." We could avoid allowing the cover pictures to run to the fold, thus decreasing flexibility of design. We could offer reprints of cover pictures, or even loose-leaf collections of reprints. (We do send

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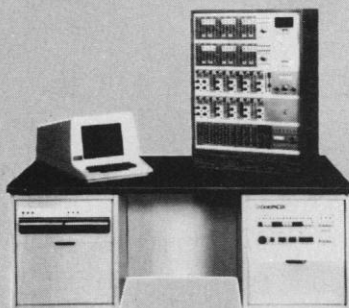
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We hope we are taking the best course that is allowed by a number of different, changing, and sometimes conflicting pressures.—EDS.

New York Bight Project

The Marine EcoSystems Analysis (MESA) Program of the National Oceanic and Atmospheric Administration is establishing a panel to designate the 20 or so most serious chemical contaminants (or classes of contaminants) in the New York Bight and to rank these contaminants, on the basis of current information, according to their existing or projected threat. Emphasis will be placed on adapting existing ranking schemes or devising a new one for coastal marine ecosystems, in general, and for the New York Bight, in particular.

Information is being sought by the panel from all possible sources to guide its study. Reports on recent work dealing with ideas or approaches, as well as applicable data, would be of great assistance. Published reports will be readily utilized. However, the panel would also appreciate knowing about unpublished work. Reports describing such work can be sent to the undersigned for transmittal to the panel.

HAROLD M. STANFORD
JOEL S. O'CONNOR

*MESA New York Bight Project,
State University of New York,
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"Petroleum Plants"

The Research News article of 1 October (p. 46) by Thomas H. Maugh II on the possibility of growing some little-known species of plants to produce a substitute for petroleum is interesting and may prove to be significant. By all means, let us explore and test new and untried methods and approaches to supplying our energy needs.

But let us not neglect or downgrade proven, economically practical paths to the same end. The existing forests of the United States can be made to produce vastly more wood than they now do. After setting aside liberal acreages for conservation, recreation, watershed, wilderness, and other forest uses and for outputs other than wood, there still remain many millions of acres of highly productive forests, from which wood, especially softwoods, can be produced

as cheaply and as permanently as anywhere in the world. In my judgment, the gap between what is and what might be is wider for timber than for any other natural resource in the United States today. In a recent report (1), the National Research Council estimated that the annual production of wood could be doubled in this country.

Direct conversion of this wood into energy is not necessary, and probably not economical. But the export market for United States wood products—notably paper and notably to the developed countries of the world—is growing rapidly and will almost surely continue to grow. Exported wood produces foreign exchange, with which we can buy oil; thus indirectly wood can supply needed energy. Everyone genuinely interested in energy supply at the least environmental cost should focus his or her attention on the potentials of our forests.

MARION CLAWSON

*Resources for the Future,
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References

1. Committee on Renewable Resources for Industrial Materials, Board of Agriculture and Renewable Resources, Commission on National Resources, *Renewable Resources for Industrial Materials* (National Academy of Sciences—National Research Council, Washington, D.C., 1976).

Maugh reports on the proposal of Melvin Calvin that plants in the genus *Euphorbia* be grown to produce a hydrocarbon substance similar to gasoline. Calvin need not look far for *Euphorbia tirucalli*. It has been grown in California for many years as an ornamental, "in any soil, irrigated or not, requiring no attention whatever" (1). Unfortunately it is common in south Florida, where it is not infrequently a cause of acute injury, especially severe keratoconjunctivitis when the sap has come into contact with an eye (2).

Both *Euphorbia tirucalli*, the pencil tree or spurge tree, and *Euphorbia lathyris*, the caper spurge, are noted for the acidity of their milky sap. Exploitation of these species as sources of energy might expose workers to serious hazards in harvesting, transporting, and crushing operations.

JULIA F. MORTON

*Morton Collectanea,
University of Miami,
Coral Gables, Florida 33124*

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1. R. S. Hoyt, *Check Lists for Ornamental Plants of Subtropical Regions* (Livingston, San Diego, Calif., 1958), p. 295.
2. J. F. Morton, *Plants Poisonous to People in Florida and Other Warm Areas* (Trend House, Tampa, Fla., 1971), pp. 70–72; J. I. Crowder and R. R. Sexton, *Arch. Ophthalmol.* 72, 476 (1964).

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Yes, but obviously not without serious hazard. To cope with a spill safely, one needs information, materials, a cool head, and skillful hands. Inevitably, the response to a spill is a hurried improvisation, sometimes skillful, sometimes not. And the necessary materials are usually just not available. Most importantly, a panic response to a chemical spill can itself often lead to injuries.

Specifically, what's wrong with the usual remedies, home or otherwise?

We've carefully analyzed the common approaches to spill control and have found many major, potentially hazardous inadequacies. Each of the usual remedies suffers from one or more of the following problems. *Acid spills:* insufficient neutralization (or none at all); no indicator; no control over amount of heat generated; no cleanup or disposal equipment. *Caustic spills:* spill absorbed, not neutralized; no cleanup or disposal equipment. *Flammable solvent spills:* solvent absorbed and still flammable; increased fire and explosion hazards by increasing amount of solvent in air; no cleanup or disposal equipment. *Mercury spills:* no provision for micro-droplet or large droplet pickup; no provision for absorbing mercury vapor. *Cyanide spills:* ineffective;

potentially very dangerous; no cleanup or disposal equipment. *Hydrofluoric acid spills:* Fluoride ion ineffectively neutralized; no cleanup or disposal equipment,

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Oil and the World's Future

During the period 1960 to 1973 oil became the principal energy source of the developed and many of the less developed countries. Unlimited amounts of inexpensive energy permitted more than a decade of unprecedented rapid annual increases in gross national products (GNP's). This era ended abruptly in 1973 and 1974 with the quadrupling of the price of oil. The world faces a long period of adjustment, including relative economic stagnation and unpleasant developments affecting the world's financial structure. Thus far the United States has been relatively unscathed and has lulled others into inactivity while preparing the way for further price increases by expanding its imports of oil.

After World War II imported oil came to have an increasing role in the energy balances of major countries. The trend accelerated after 1960. From 1960 to 1973, oil imports of many countries rose at fast exponential rates; some of the average annual increases were: France, 12.8 percent; Germany, 13.2; Italy, 12.5; Japan, 18.1; and Spain, 15.1. Between 1960 and 1972, Europe's dependence on energy imports of all kinds grew from 33 to 65 percent; Japan's from 43 to 90 percent.

Annual increases of this magnitude could not be sustained even if the oil producers were complacent. Sooner or later a sharp slowing of rate of expansion was inevitable; the arithmetic of exponentials dictated it. Given full exploitation, the maximum output attainable by the Organization of Petroleum Exporting Countries (OPEC)—and that for only a short period—is of the order of 90 million barrels (13 million tons) a day. In 1973, output was about 30 million barrels a day. Nine years of a 12 percent or 11 years of a 10 percent increase would have brought the Western world to the downhill road with respect to oil.

The 1973–1974 and subsequent price increases for oil will probably prove most deleterious to a group of developing countries having a total population of 900 million and GNP's of \$200 and more per capita. Some of these countries, such as Brazil, were rapidly increasing their use of cheap oil and experiencing annual growth of GNP in the neighborhood of 10 percent. During the past 3 years growth has slowed in some and stopped in others, while their total current account deficits have increased from \$6 billion in 1973 to \$31 billion in 1975. Much of the debt is owed to private investors, including U.S. banks. How long can such deficits be increased before credit worthiness is destroyed? What happens then?

The advanced countries are engaged in tough competition to sell enough goods to pay for their oil. In the competition, France, Italy, and the United Kingdom have not fared well. The two champions have been Germany and Japan. The United States, which has been losing its position in high-technology goods, has stayed in the game by selling agricultural products and military weapons. But even so, this year it has incurred a big deficit in its balance of payments.

All in all, the performance of the United States has been mediocre and its credibility in energy matters is questionable. The highest government officials have made great promises to the world that have proved repeatedly to be only idle words. A conspicuous example was "Project Independence." In addition, there was talk of the impending collapse of the OPEC cartel, statements about the enormous amounts of oil to be discovered and produced by 1985, a goal of reducing oil imports by 1 million barrels per day (in the past year they have increased by more than that). Instead of working for conservation, Congress encouraged consumption by rolling back the price of oil. The United States has engineered an international agreement to share oil in an emergency, but it is the one major country with the smallest ratio of inventory over daily consumption. Legislation was passed to establish a strategic reserve of oil, but not one barrel has been stored. Neither by deed nor by example has the United States provided the world with any alternative but to go nuclear.—PHILIP H. ABELSON

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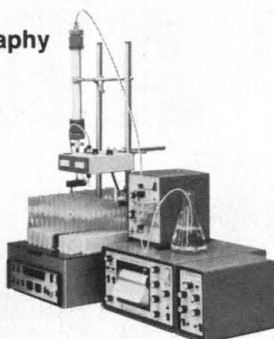
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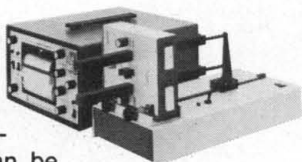
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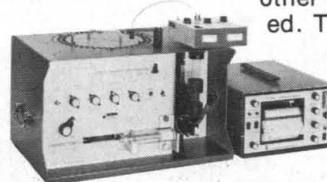
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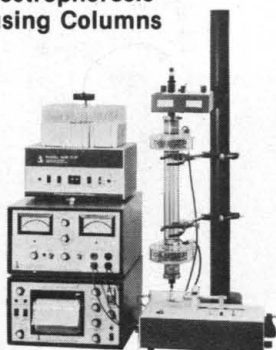
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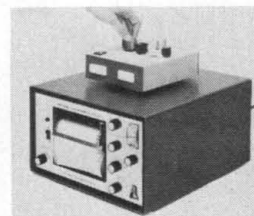
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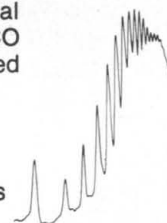
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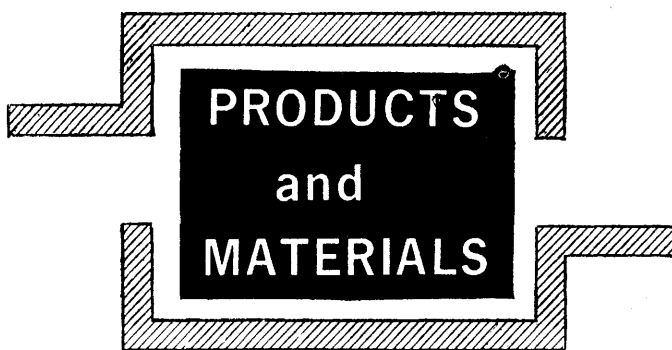
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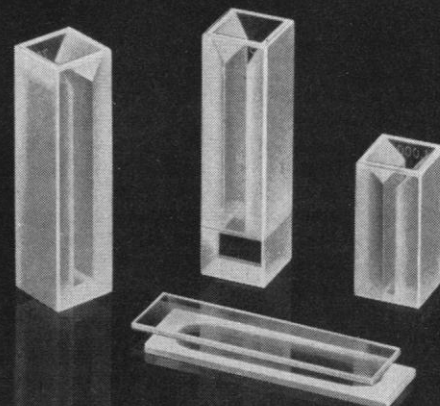


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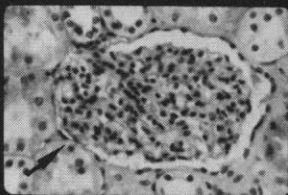
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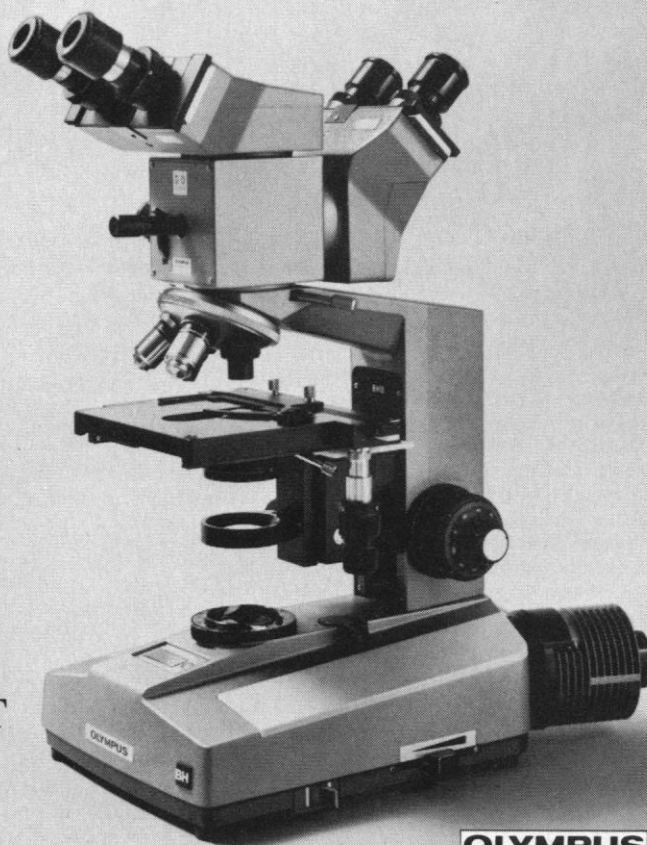
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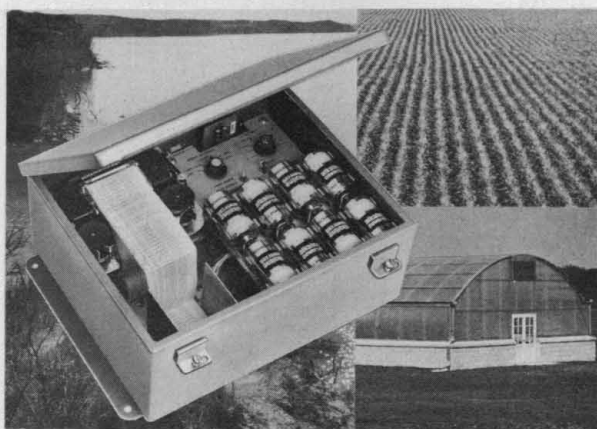
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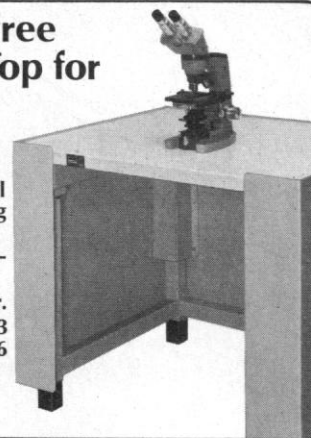
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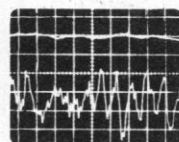
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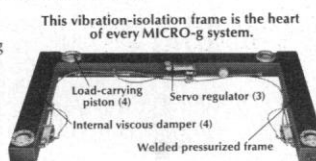


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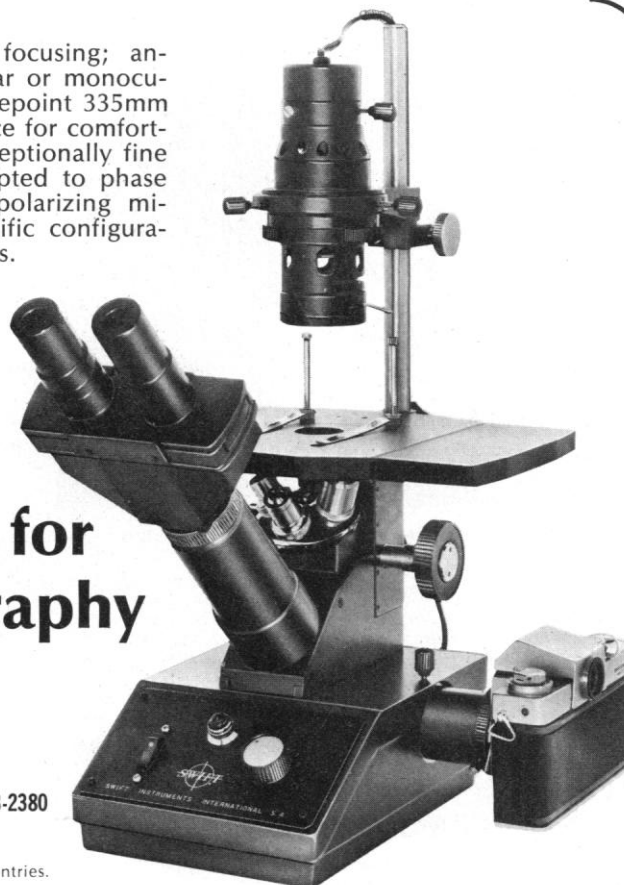
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RESEARCH NEWS

(Continued from page 714)

12 patients at least did not progress; that of three patients showed definite improvement; and that of two additional patients may have improved.

This was not a controlled study but the NHLBI is now sponsoring a more extensive clinical trial, involving several clinical centers, to confirm that the surgical technique can cause improvement of atherosclerotic lesions in patients with coronary artery disease. The trial will ultimately include 1000 patients; 500 will undergo the surgery and 500 will be treated conventionally.

A sensitive technique for observing what is happening within the arteries before atherosclerotic lesions become large enough to actually block the vessels and cause symptoms could help to provide information about whether or not early lesions will regress. David Blankenhorn and his colleagues at the University of Southern California have applied computer technology originally developed for analysis of photographic images taken by spacecraft to the analysis of angiograms of the femoral artery of the thigh. With their technique they can visualize the plaques and determine whether they change in size over a period of time.

The investigators have performed a series of angiograms on 25 men who have high concentrations of lipids, including cholesterol, in their blood. Before therapy to reduce the blood lipids and also high blood pressure, where required, the men all had moderately severe atherosclerosis of the femoral artery but did not yet have symptoms of obstruction. Blankenhorn is using a variety of drug and diet therapies on the men. After 13 months of treatment, nine of the 25 patients experienced regression of the lesions, whereas the lesions of 13 got worse and those of three did not change.

Blankenhorn says that the patients whose lesions regressed showed significant declines in blood cholesterol concentration; these decreases did not occur in individuals whose disease progressed. Statistical analysis of the data indicated that decreases in blood pressure made an independent contribution to the rate of change of the atherosclerosis, with a decrease favoring regression. Blankenhorn thinks that the changes in the femoral artery are representative of those that may occur in early lesions of the coronary arteries, but confirmation of this hypothesis will require the development of a similar technique for examining the coronary arteries.—JEAN L. MARX

BOOKS RECEIVED

(Continued from page 718)

A Conference on Key Factor Analysis. A Logic Leading to Social Accountability. Papers from a conference. Irwin M. Jarett and Patricia A. Brady, Eds. Published for the Illinois Regional Medical Program and the Southern Illinois University School of Medicine by Southern Illinois University Press, Carbondale, and Feffer and Simons, London, 1976. xii, 438 pp. Cloth, \$10; paper, \$4.95.

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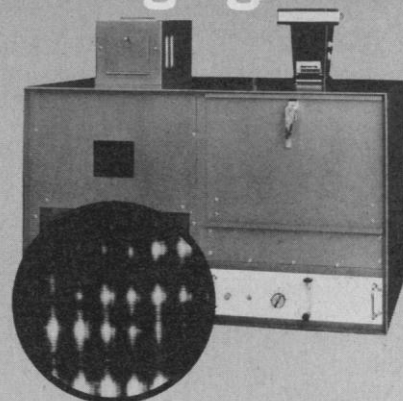
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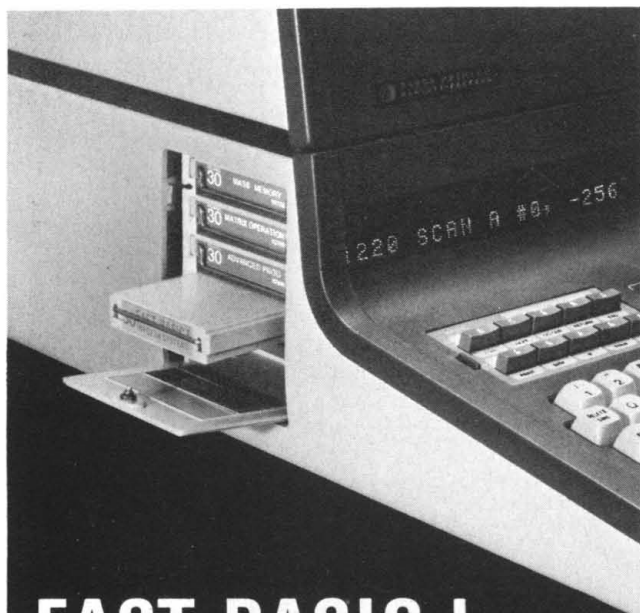
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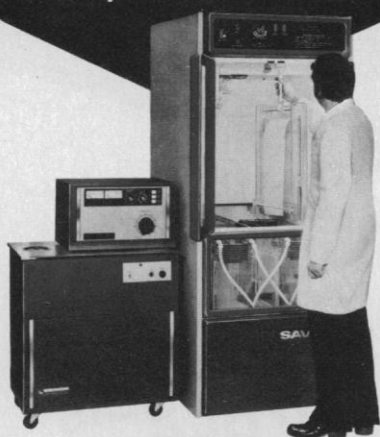
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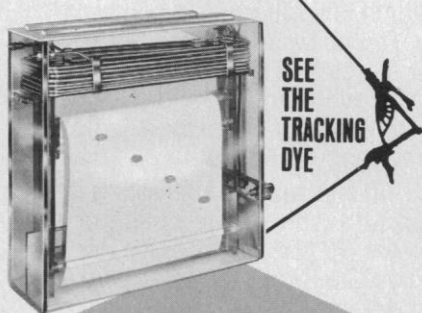
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Advances in Psychobiology. Vol. 3. Austin H. Riesen and Richard F. Thompson, Eds. Wiley-Interscience, New York, 1976. xx, 490 pp., illus. \$15.95. To order this book Circle No. 351 on Readers' Service Card

Air Pollution. Vol. 1, Air Pollutants, Their Transformation and Transport. Arthur C. Stern, Ed. Academic Press, New York, ed. 3, 1976. xviii, 718 pp., illus. \$39.50. Environmental Sciences. To order this book Circle No. 383 on Readers' Service Card

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A Long, Deep Furrow. Three Centuries of Farming in New England. Howard S. Russell. University Press of New England, Hanover, N.H., 1976. xvi, 672 pp., illus. \$18.50. To order this book Circle No. 403 on Readers' Service Card

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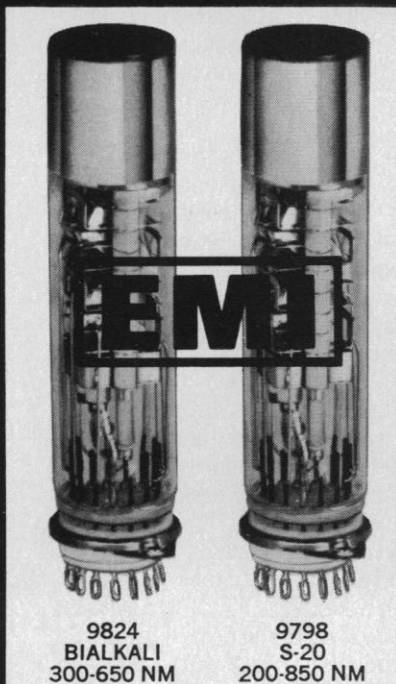
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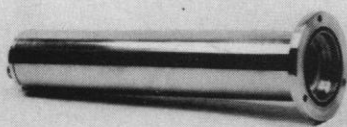
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