

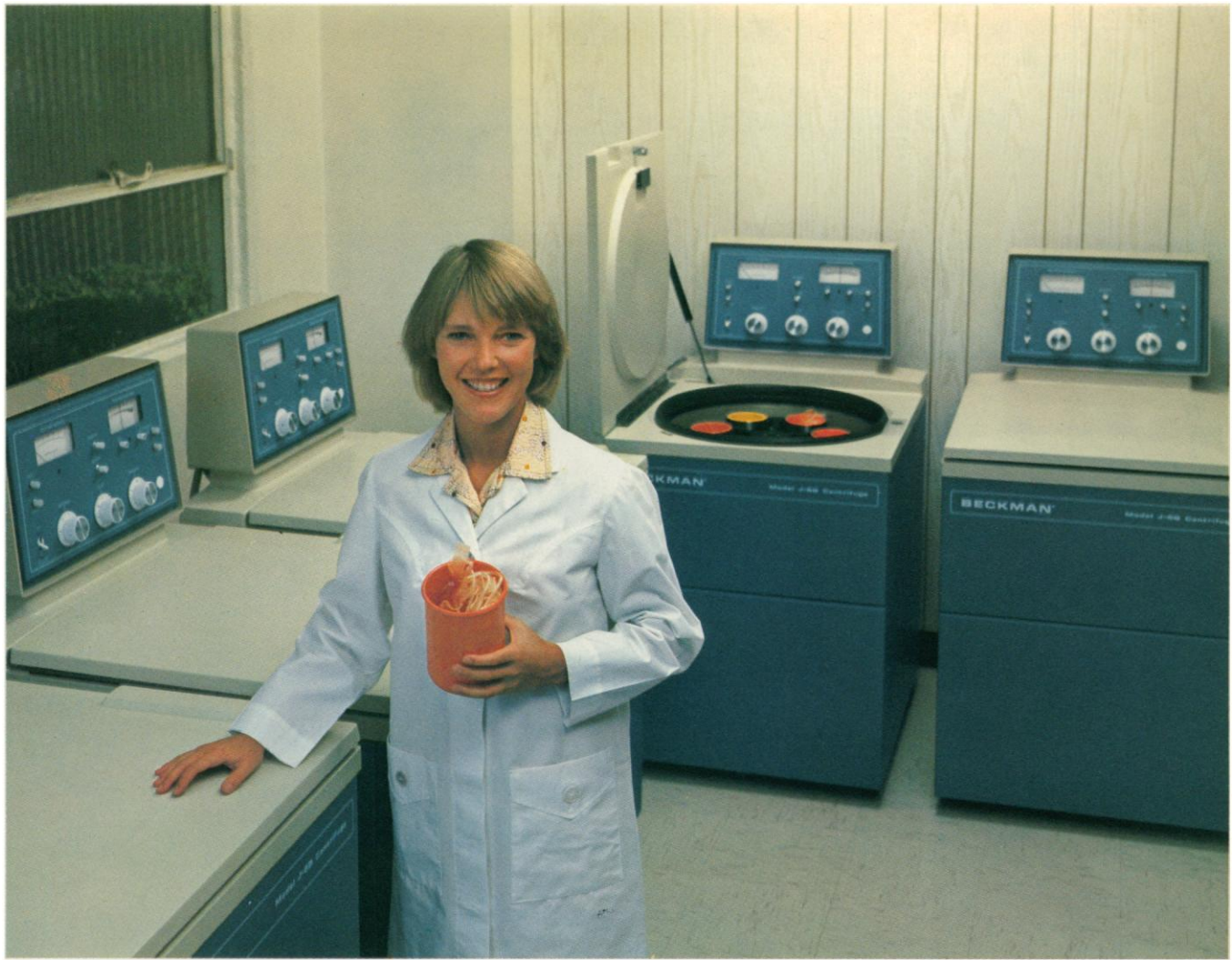
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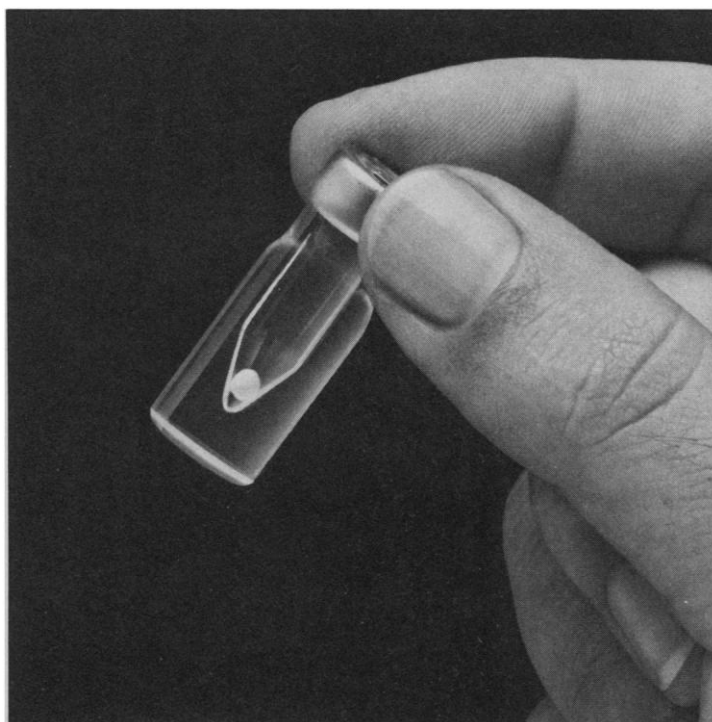
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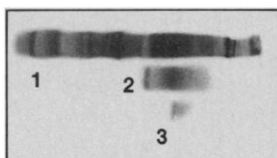
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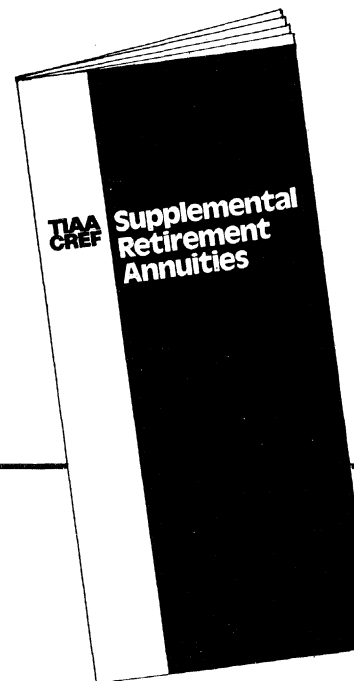
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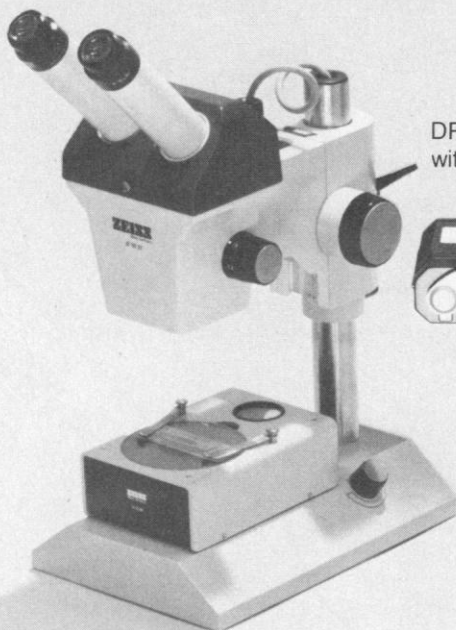
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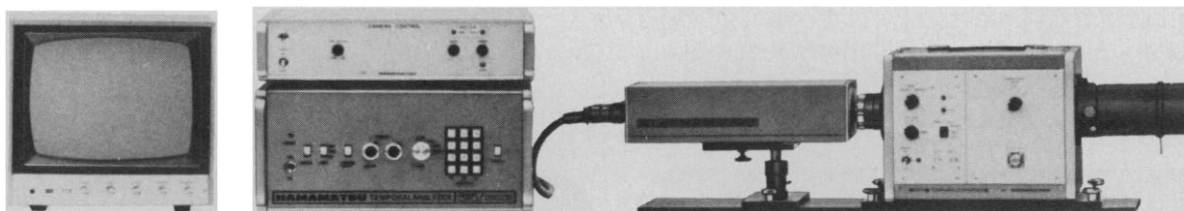


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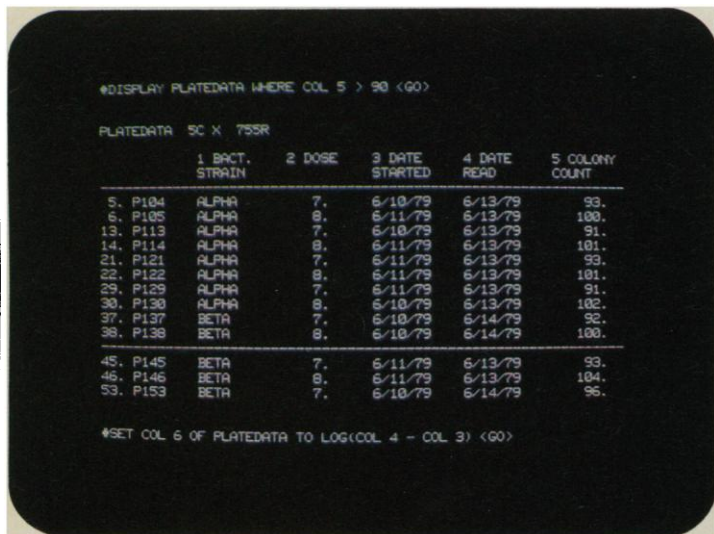
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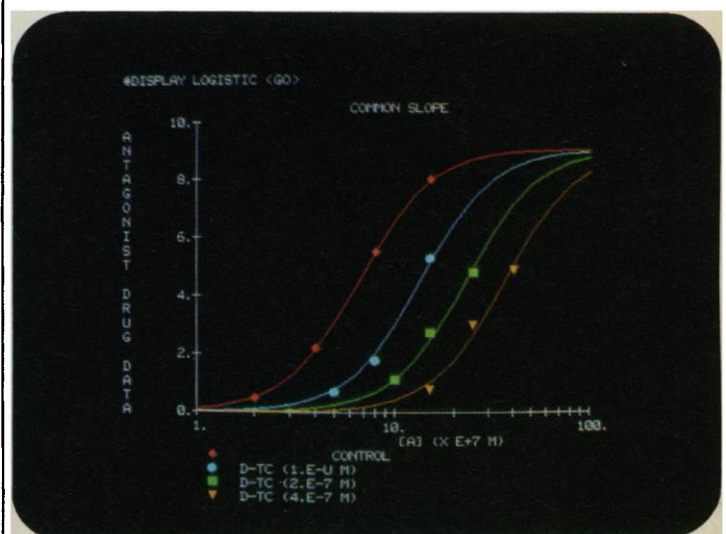
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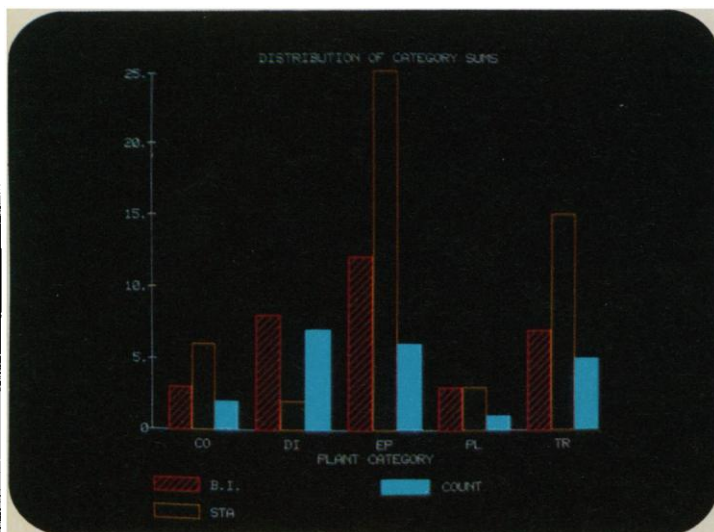
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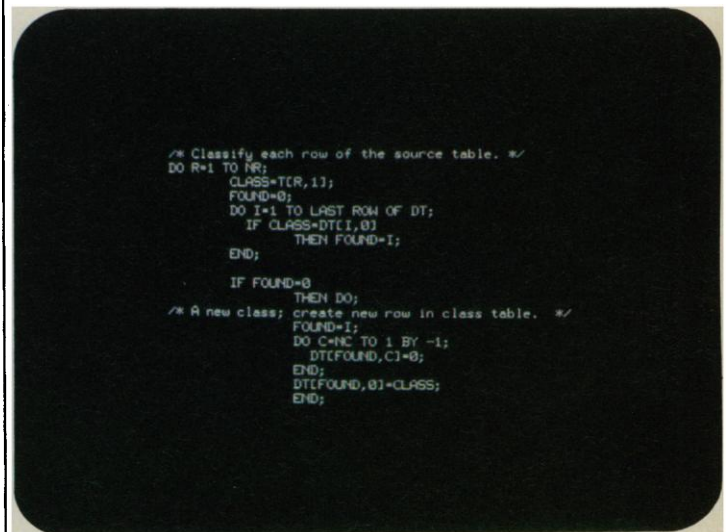
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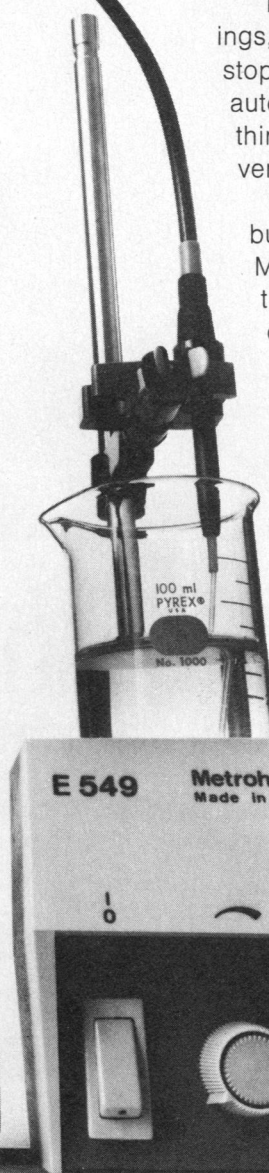
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All Really Great Lies Are Half True

The proposition that good is preferable to evil is for most of us an axiom, a self-evident truth. Not so evident, however, is what is good and what is bad. This lack of consensus exists for a wide range of issues—political, social, and personal—as a glance at the morning paper will show.

If costs can be totally equated with bad and benefits with good, then cost-benefit analysis of medical research would appear equally axiomatic. Government and private sources of research money are increasingly asking, "In what way will your project contribute to our ability to prevent or treat human disease?" And because good is so obviously preferable to bad, to questioning cost-benefit analysis appears as illogical as questioning motherhood.

Questioning motherhood, however, may not be so illogical if you are 14, unmarried, and 7 months pregnant. Similarly, there are two fatal flaws in the current demand for cost-benefit analysis. First, it is increasingly demanded of individual projects, rather than of research as a whole. Second, while benefits are benefits, the costs incurred may have redeeming features—that is, they may not be wholly bad.

The first question is that of the part and the whole. The discovery of effective polio vaccines saves the U.S. community more each year than the entire medical research budget; this takes care of the global question. But it is still asked about your project, and mine, "If \$50,000 is invested, can you show us conclusively and prospectively how we will save \$100,000?"

Since the milestone study by Comroe and Dripps of the scientific basis for the support of biomedical research,* such a question appears increasingly naïve. Effective, safe, corrective open-heart surgery involves the application of findings—more often than not of basic, undirected research—in a staggering range of fields. Could Landsteiner have provided a cost-benefit justification of his work on blood groups, on the basis that one day it would be crucial for cardiac surgery?

Second, the premise that the cost of medical research is unrelievedly bad needs careful scrutiny. In Western societies a very small percentage of people are involved in primary production of the necessities of life. The majority work in occupations that are "nonproductive" in this sense—they service, administrative, or creative. In Bangladesh, priorities may rightly favor skim milk over medical research, soybeans over symphonies; we have the luxury of options.

The politician, the treasury official, the research worker—we are all costs on the public purse. We are all judged to be more or less worthwhile on criteria different from those of subsistence farmers or hunting-and-gathering societies. Financially, the doctor may be better off in private practice, the politician back in his law office, the treasury official in a boardroom. What keeps you in the laboratory at nights, at home writing on weekends, is not cost-benefit but commitment.

And the commitment is to doing something well, not saving mankind. The pursuit of excellence—in singing, or science, or whatever—is the logical extension of our starting axiom; if good is preferable to bad, then we should strive for the best. And you know, and the politician listening to Joan Sutherland knows, that excellence is not just its own reward.

When the people of the Île-de-France began building Notre Dame, the population of Paris was 35,000; on any short-term, dollars-and-cents basis, they needed Notre Dame like a hole in the head. So the next time you are asked for a cost-benefit analysis of a particular project, think of polio, think of Landsteiner, think of Notre Dame—and innocently inquire of your questioner if he has data on the costs and benefits of cost-benefit analyses.
—JOHN FUNDER, *President, Australian Society for Medical Research, Medical Research Centre, Prince Henry's Hospital, Melbourne, Australia 3004*

*Julius H. Comroe, Jr., and Robert D. Dripps, *Science* 192, 105 (1976).



We pay these scientists to make our production lines obsolete.

As soon as there's a better way to do something, the old way becomes obsolete.

And these scientists do nothing *but* design new and better ways for Western Electric to manufacture products for the Bell System. In the last two years, they and their colleagues at Western Electric's Engineering Research Center have helped cut costs by over \$156 million.

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The Factory's Laboratory

The people at our Engineering Research Center work full time on manufacturing research. Over 50% of them are PhD's.

At home in the factory as well as the lab, they turn theoretical

experiments into real savings. For example, while exploring ways to improve production of telephone circuit boards, they invented a totally new material with which to make the boards and a whole new way to mass-produce them.

Another breakthrough is already saving more than \$2 million a year. It's a new soldering technique that makes 20,000 connections in less than 60 seconds.

The list of money-saving developments goes on. A new computer program that makes technical drawings in one-fourth the time of manual methods. An automatic system for sorting telephone parts by color. A process that measures the production of optical fiber 1000 times per second, keeping its diameter accurate within 30-millionths of an inch. And there's a new system that takes only 30 seconds to help align tiny integrated circuits that are

200 times thinner than the thinnest human hair.

These are just a few examples of what the Engineering Research Center does throughout *all* of Western Electric's manufacturing operations — developing new ideas in technology to improve telephone products and produce them at lower cost.

Anticipating the Future

Much of the work of the Engineering Research Center is designed to keep Western Electric ahead of technology, by anticipating what new processes will be needed for tomorrow's products.

It's a total and ongoing commitment. A commitment to provide you with the highest quality telephone service at the lowest possible cost.

Keeping your communications system the best in the world.



Western Electric

The China Issue of *Science*

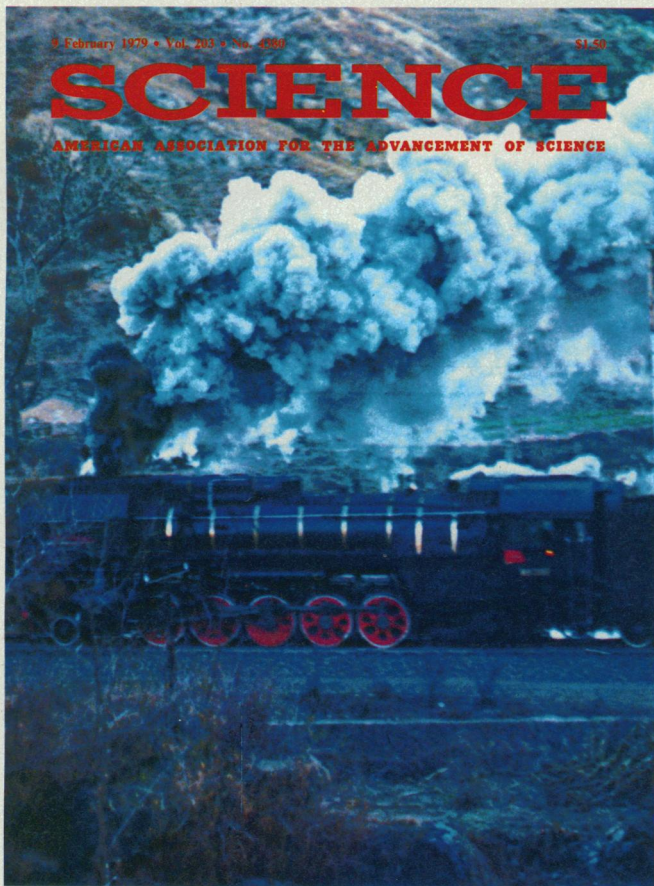
United States/International Version

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SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



ISSN 0036-8075

9 February 1979

Volume 203, No. 4380

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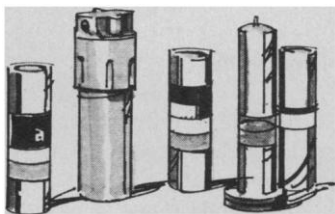
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SCIENCE is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1815 Massachusetts Avenue, NW, Washington, D.C. 20036. Second-class postage paid at Washington, D.C. and at additional entry. Postmaster: Send Form 3579 to Science, 1815 Massachusetts Avenue, NW, Washington, D.C. 20036. Science is indexed in the Reader's Guide to Periodical Literature and in several specialized indexes.

A comparison of two versions of the 9 February 1979 issue of *Science*: on the left the United States/international version which goes to 130 countries; on the right the version circulated in the U.S.S.R.

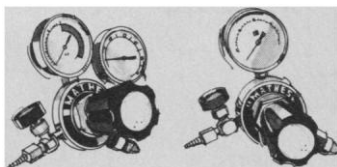
No. 450 Gas Stream Purifier

The model 450 purifier with model 454 replaceable cartridge is specially designed for controlling the acetone vapor in acetylene. The cartridge contains activated charcoal. It belongs in an AA system. Circle



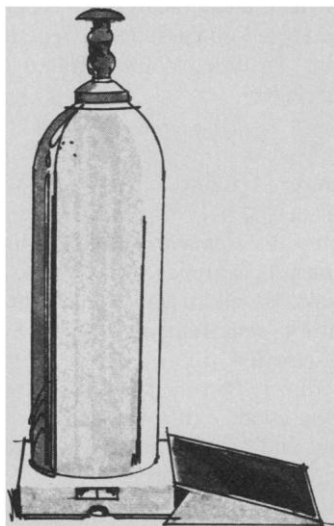
Automatic Regulators 1PA-510 and 1L 326

If you are using AA, choose the correct regulators. In the laboratory, use regulators designed for the specific gas. Information on these regulators can be obtained. Circle



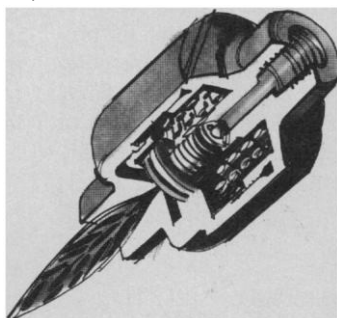
Cylinder Scale, Model 8510

To judge accurately when a liquefied gas is nearing empty, Matheson has designed and sells a cylinder scale. We recommend this for nitrous oxide because it will let you know ... and it's the only way ... when the cylinder is empty. Invaluable! Circle



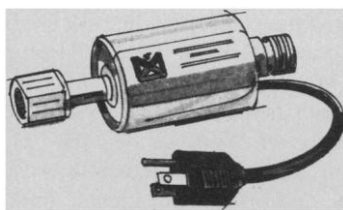
Series 6103 Flash Arrestor

A flash arrestor is installed as a part of the AA system downstream, after the regulator and cylinder. Some instruments have a built-in flash arrestor. If yours does not, two should be installed. Acetylene is highly flammable. Should flashback occur, with the accompanying shock wave, this device will instantly seal off the path to both regulator and cylinder ... preventing an explosion of much greater magnitude in either regulator or cylinder, both of which contain more gas. Flash arrestors are recommended for both fuel gas and oxidizer gas lines. For more information, circle



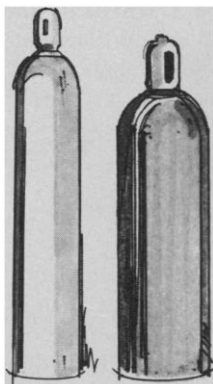
Nitrous Oxide Heater

Because nitrous oxide, frequently used as an oxidizer gas in AA, is liquefied gas, or a gas over liquid in a cylinder, it often cools or ices on expansion, causing problems in automatic control. The heater we offer is installed between cylinder and regulator and eliminates icing and allows for higher flows. Thermostatically controlled, the N_2O is not overheated and the operator can concentrate on his instrument. Works simply with 115 VAC. Circle



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Improved Operation Of An Atomic Absorption Spectro- photometer

Chemical analysis by atomic absorption spectroscopy is achieved by converting the sample into an atomic vapor and measuring its absorbance at a selected wavelength. The measured absorbance is proportional to concentration. The analysis is made by comparing this absorbance with a reference sample of known composition under similar conditions.

Atomic absorption lines are so narrow that the use of a conventional monochromator is impractical to measure them. Commercial instruments overcome this by the use of hollow cathode lamps which emit atomic spectral lines of the element to be determined.

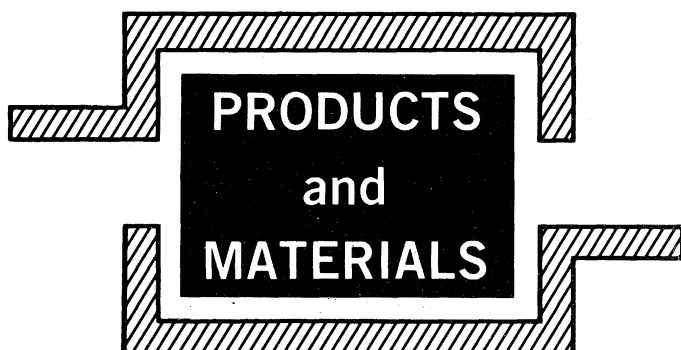
Elements are measured after they have been put into solution either aqueous or organic. The solution is then sprayed into a flame, generally, air-acetylene. Some compounds, like the rare earths, require a highly reducing flame. This is done most safely by burning the acetylene in nitrous oxide which gives more available oxygen than air.

For years Matheson has been servicing scientists using AA spectroscopy, not only with gases but with other equipment which makes operation easier, and more important, safer. These items are at left. If you're not familiar with them we will be delighted to rush literature to you.

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Respirator

Model 900 will filter particles 0.02 to 2 microns with 99.997 percent efficiency. The device uses permanent stainless steel HEPA filters which may be autoclaved or cold-sterilized. An audible and visual alarm alerts the wearer to low battery power in the 6-hour units. The hood features double cape-collar construction for adjustability. The hood also offers good visibility. Flow rates are 5 to 7 cubic feet per minute depending on battery charge. Medical Measurements. Circle 810.

Micro Osmometers

Osmettes are freezing-point osmometers. They operate on standard samples of 20 or 50 microliters. They have sufficient range to work with diluted samples as small as 5 microliters. Inexpensive, disposable sample tubes eliminate problems of cleaning and breakage. The thermoelectric cooling system obviates liquid baths. Automatic operation and small size are additional features. A reading is displayed within 60 to 90 seconds after sample introduction. Precision Systems. Circle 811.

Cryostat

Model HR Mark II refrigerated microtome accommodates specimens up to 40 by 55 millimeters and prepares sections in the range of thickness from 1 to 20 micrometers. An optional range offers sections from 2.5 to 50 micrometers. The temperature is displayed and may be

controlled from ambient to -30°C . A heated window eliminates frosting as an impediment to viewing operation of the microtome. The knife retracts on its return stroke to clear the specimen. Slee International. Circle 812.

Flame Photometer

The MicroFlame photometer is designed to measure sodium and potassium in serum or in urine and to measure lithium in serum. It incorporates simultaneous digital display of sodium and potassium or lithium concentrations. The operator may choose lithium or cesium as an internal standard. The device is designed to accommodate small samples and to use minimum amounts of propane. Calibration and zeroing are automated. Diagnostic circuits monitor flame condition to warn of lack of fuel or air or of depletion of the internal standard. Gilford Instrument Laboratories. Circle 813.

Audio Signal Synthesizer

The DMX-1000 is a signal-processing computer designed to synthesize music. However, this programmable electronic device with a 16-bit digital-analog conversion channel and a $4\text{K} \times 16$ -bit data memory may be easily adapted to psychoacoustic research. It includes an 8-bit parallel interface for easy control by many computers. The DMX-1000 will perform several voices in real time with programmed notes, volume, timbre, and duration. Digital Music Systems. Circle 814.

Solar Energy Meter

Model LI-175 displays instantaneous insolation in watts per square meter or in British thermal units per square foot. With the flip of a switch, the LI-175 displays integrated insolation in watt-hours

per square meter and British thermal units per square foot per hour. The sensor is an accurately calibrated pyranometer with 3 to 5 percent accuracy under clear daylight conditions. The device operates in the temperature range from 0° to 50°C . Li-Cor. Circle 815.

Infrared Spectrometer

The Miran 980 is fully automated. It may be quickly calibrated for analysis of up to ten components. Such an analysis requires 70 seconds. Data may be presented as absorbance, concentration, or ratio. The display interacts with the keyboard to prompt the operator through the analysis. The single-beam device scans the background and automatically subtracts the background spectrum. The Miran 980 provides printouts of each step with each component identified by name and unit as well as the time at which it was analyzed. Programs may be stored on cassette for repetition. Foxboro Analytic, Wilks Infrared Center. Circle 816.

Literature

Laboratory Apparatus details a line of instruments, supplies, glassware, and materials for all research and teaching laboratory requirements. SGA Scientific. Circle 804.

Stationary Phases for Gas Chromatography is an extensive guidebook to columns and packing materials. Analabs, Foxboro Analytic. Circle 817.

Laboratory Furniture is devoted to the Exemplar line of cabinetry, sinks, hoods, work surfaces, and more. Sargent-Welch Scientific. Circle 818.

Microcomputers describes the TRS-80 line of microcomputers, peripherals, software, and accessories. Radio Shack. Circle 819.

Biochemical Equipment includes products for separation techniques featuring apparatus and reagents. BioLab Products. Circle 820.

Columns for Gas Analysis offers separation techniques and columns and packings for more than 50 specific gases. Supelco. Circle 821.

Quartz Paper describes Papsil, a laboratory paper that is 99.99+ percent quartz for laboratory applications. Atomergic Chemetals. Circle 822.

Fluorescence Systems features photometers, analyzers, detectors, calorimeters, and other instruments. American Instrument. Circle 823.

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Reader Service Card (on pages 1138A and 1218 A) and placing it in the mailbox. Postage is free.

—RICHARD G. SOMMER

Leitz Diavert. The only inverted microscope system with Leitz quality any way you look at it.

The Leitz® Diavert is the perfect answer to the constantly changing applications of the inverted microscope. Because as lab needs evolve, the highly modular Diavert is made to meet them. All of them.

The core of the Diavert is an L-shaped stand. It easily supports elaborate photographic and specimen handling equipment as well as a multitude of accessories for transmitted and reflected light microscopy.

Microscopical Techniques

The condenser system provides a 62mm free working distance for brightfield and phase contrast up to 40x objective magnification. The optional Ploem incident light fluorescence illuminator offers two wave length fluorescence readily adaptable for

fluorescence studies in multiple well dishes or regular slides. Of course, you can call upon darkfield, interference contrast and the new reflection contrast for the study of phase phenomena in tissue cultures.

Micromanipulation

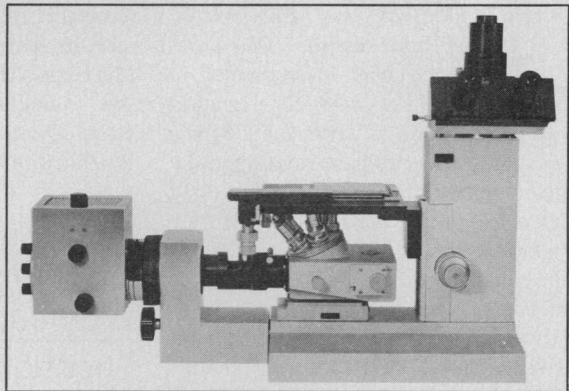
The stage is positioned low and the specimen is accessible from three sides. Plus a simple adaptation lets you focus the nosepiece rather than the stage. So you can use the renowned Leitz Micromanipulator without restriction.

Unlimited Photomicrography

Cameras are mounted vertically, not horizontally. This increases stability, convenience of operation and minimizes vibrations. Consistent with all Leitz microscopes, the photographic abilities of the Diavert are virtually unlimited and it accepts the extremely versatile new Vario-Orthomat camera system.

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The special long working distance condensers of the Diavert easily allow ample space for handling delicate in vivo specimens in roller flasks or larger laboratory vessels. For studies in differential interference contrast, the Diavert is equipped with a special long working distance system for ob-



jective magnifications up to 32x.

On a day to day basis, the Diavert becomes a very reliable laboratory asset. The images seen move in the same direction as the specimen moves. This is especially convenient for micromanipulation and whenever the culture vessel is moved by hand. Since the very large (164 x 160mm) stage is positioned relatively low, the technician can comfortably see the specimen during operation. There is a broad range of interchangeable components for studies in tissue culture, histocompatibility, physiology and marine biology.

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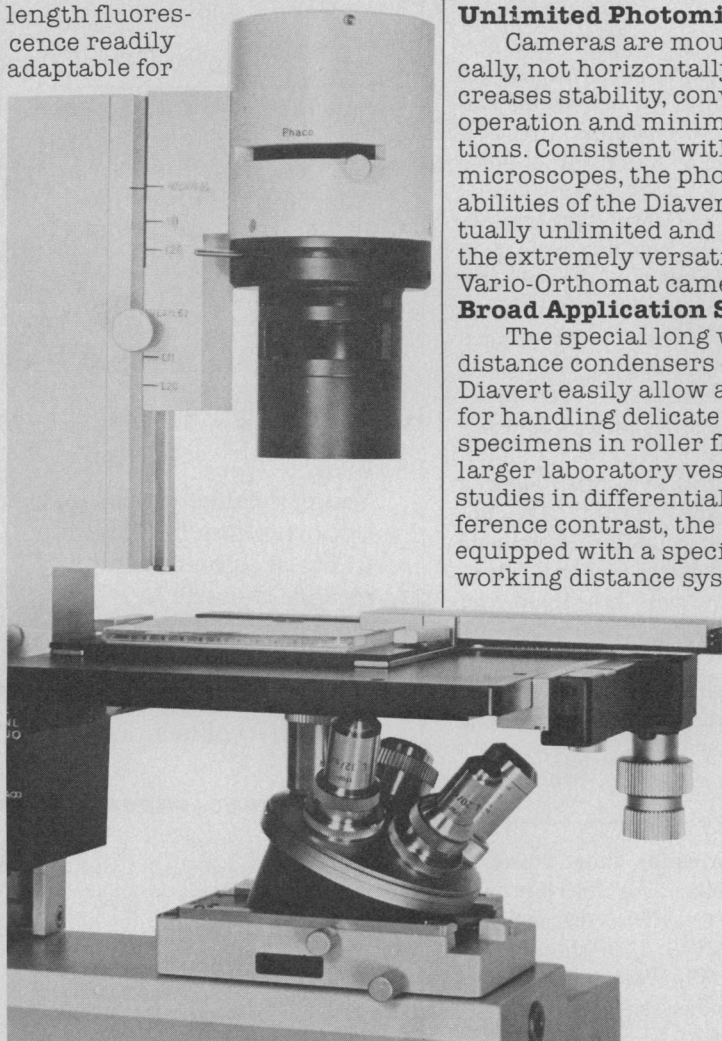
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AAAS NEWS

(Continued from page 1172)

tainly am grateful for the AAAS Mass Media Program for providing this opportunity." Ron Dagani, who worked at the Raleigh, N.C., *News and Observer* this summer, now is assistant editor in the Department of Science, Education and Technology of the American Chemical Society's *Chemical and Engineering News*. Dagani believes that this summer's experience was instrumental in helping him obtain his new job. "In addition to teaching me to write science for a general audience, my participation in the program demonstrated a serious interest in science journalism. That's what they were looking for," he states.

The Mass Media Science Fellows Program provides an opportunity for up to 20 advanced students in the natural and social sciences to work for 10 weeks during the summer at newspapers, magazines, and radio and television stations throughout the United States. Applications for the 1980 program now are being accepted. For application materials write to the Mass Media Science Fellows Program, at the AAAS address.

Section News—Section B (Physics)

The various AAAS Sections once had much closer ties to their corresponding professional societies, many of which originally sprang from the AAAS Sections and at first continued to work closely with them. These ties then largely withered, particularly in physics. As a first step in re-forming these connections, the American Institute of Physics has recently elected Section B (Physics) as an affiliated society, to encourage interaction between the Section and the AIP and its nine member Societies (two of which are the American Physical Society and the American Association of Physics Teachers). Section B members who are not already members of an AIP Society may now subscribe at reduced rates to AIP journals (for example, *Physics Today*); for further information contact Ms. Rose Litow, AIP, 335 East 45 Street, New York City 10017. In turn, AIP Society members are encouraged to use the AAAS meetings and publications to reach a broader audience with ideas of general interest. In addition, Section B will arrange a session of invited talks of general interest at the next annual meeting of the APS/AAPT (Chicago, 21-24 January 1980).

The input of Section B to the AAAS Annual Meeting continues to be symposia for a general audience in which physicists can bring their unique viewpoints to bear on more general problems of science and technology. In connection with the San Francisco Meeting, Section B will have an open business meeting on Friday, 4 January 1980, at 6 p.m. in the Victorian Room of the Hotel St. Francis to consider further the role of the Section and its contribution to future AAAS Meetings. Items for discussion should be sent to Section B Secretary Rolf M. Sinclair, National Science Foundation, Washington, D.C. 20550.

ROLF M. SINCLAIR
Secretary, Section B

Women, Science, and Technology at UNCSTD: A Follow-Up

The only resolution passed at last August's United Nations Conference on Science and Technology for Development (UNCSTD) was on women, science, and technology. Introduced by Wilbert Chagula, ambassador and permanent representative of the United Republic of Tanzania to the United Nations, the resolution was cosponsored by the United States as well as by 14 other countries.

In particular, the resolution stresses the importance of including women in the planning, formulation, design, and implementation of development projects and programs and urges member states to facilitate the training for women as well as the equal distribution of the benefits of scientific and technological development.

The AAAS provided a direct input to the resolution in the form of the U.S. position paper, drafted by Priscilla Reining of the Office of International Science. Reining's paper was based on the UNCSTD preparatory workshop on Women and Development held by the AAAS last March with funding from the U.S. Department of State. (See p. 482, *Science*, 3 August 1979.)

For more information about the activities and publications described in "AAAS News," write to the appropriate office, AAAS, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036, unless otherwise indicated.

The Natural History of the Mind Gordon Ratray Taylor

The most complex structure in the universe has never been so thoroughly explored as in this altogether absorbing work by the author of *The Biological Time Bomb* and *The Doomsday Book*. "Many books about the brain have been published in recent years, but only this one relates it to mind, consciousness, self, perception, and memory...I didn't find a boring page in the entire book."
—PETER FARB, author of *Humankind*. With drawings, bibliog.; index.

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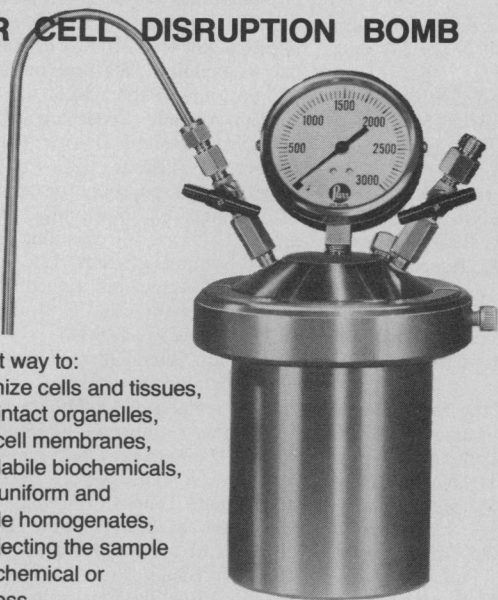
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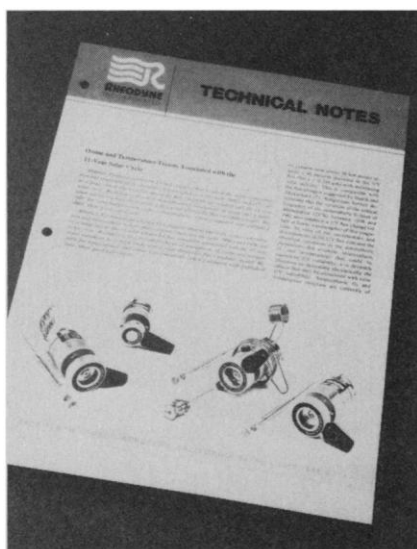


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Free report tells how to improve precision by choice of injection technique.

This 8-page Rheodyne technical note reports the results of experiments using different sample loading techniques — and discusses the distinctive characteristics of eight popular injectors. Among the questions answered are:

- What analytical precision can be expected in HPLC?
- Which injection techniques provide the highest reproducibility?
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- How can volumetric errors of injectors be avoided?

The report covers sample injectors from various manufacturers. It contains practical advice on the use of injectors for the novice — as well as for the experienced chromatographer.

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BOOKS RECEIVED

(Continued from page 1177)

ny, Santa Monica, Calif., 1979. xiv, 562 pp., illus. \$16.95

Biomaterials. An Introduction. Joon Bu Park. Plenum, New York, 1979. x, 252 pp., illus. \$22.50.

Civilization. Readings from *Scientific American*. With introductions by Brian M. Fagan. Freeman, San Francisco, 1978. vi, 158 pp., illus. Cloth, \$14; paper, \$6.50.

The Clear Mirror. A Pattern of Life in Goa and in Indian Tibet. G. Evelyn Hutchinson. Leets's Island Books, New Haven, Conn., 1979. x, 172 pp. Paper, \$4.95. Reprint of the 1936 edition.

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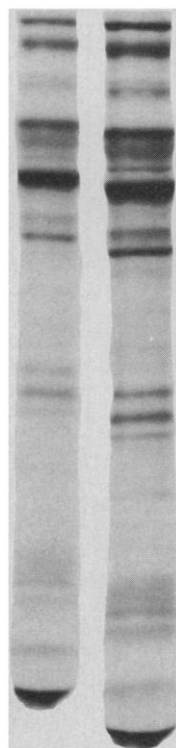
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