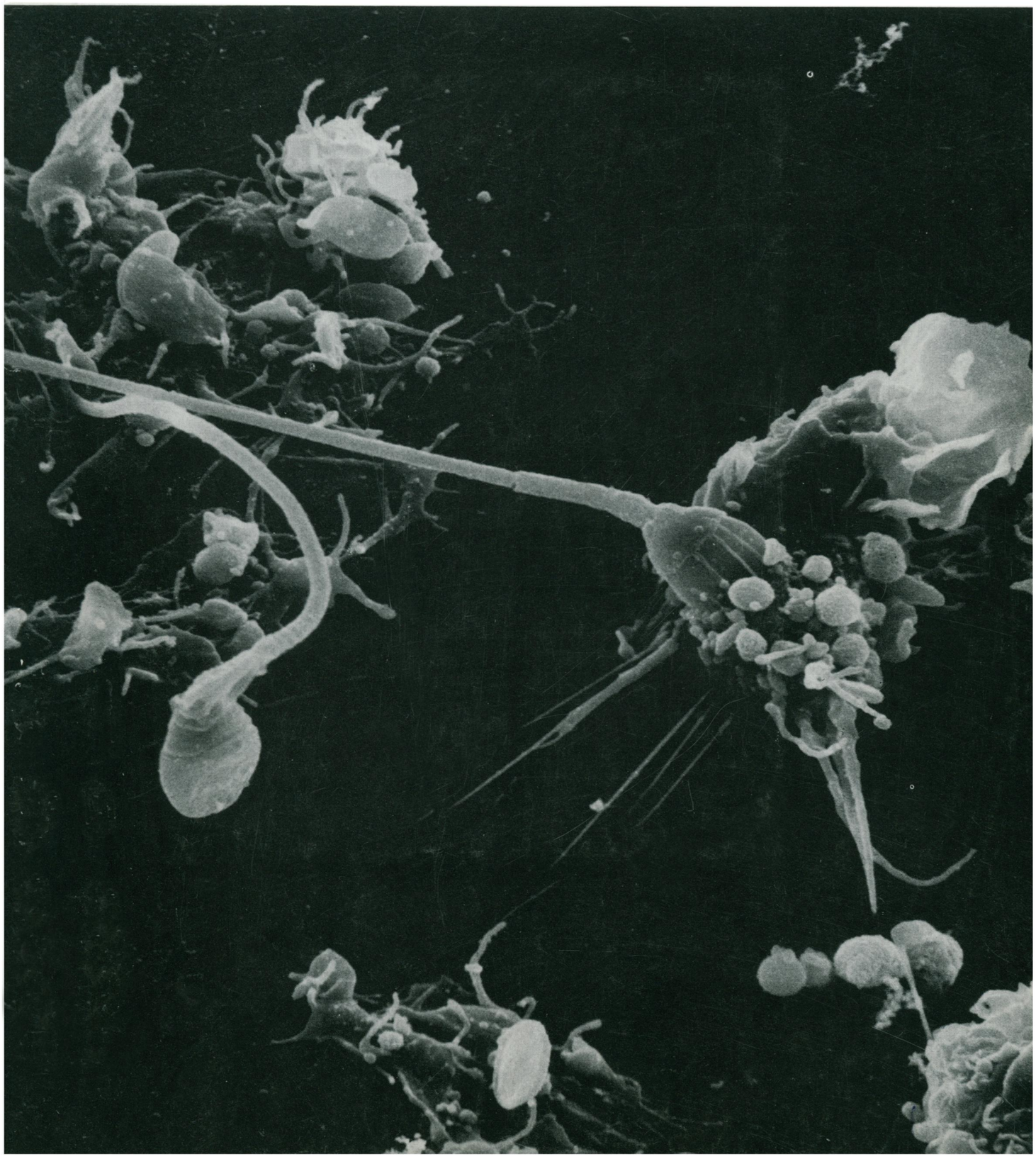
SCIENCE

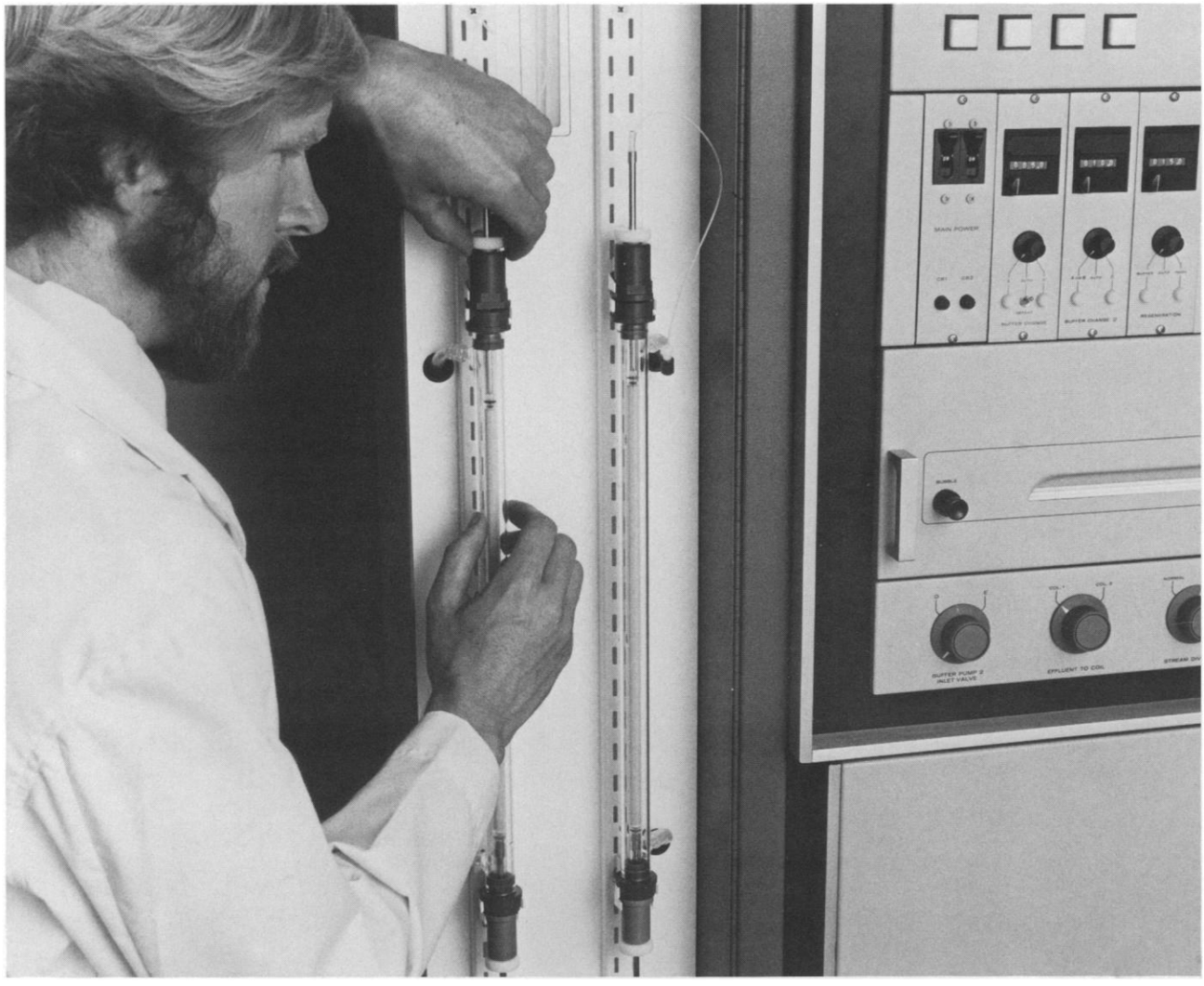
23 January 1976

Volume 191, No. 4224

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



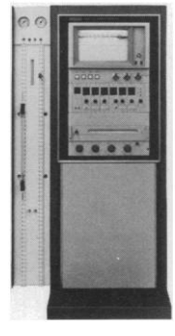
New Beckman Model 119C: The easiest-to-use amino acid analyzer now offers the benefits of 6-mm columns



The Model 119 automatic amino acid analyzer is well known for its reliability and simplicity of operation. Now in the new Model 119C with 6-mm columns, you can also get the advantages of faster analyses, twice the sensitivity, and half the reagent consumption.

Along with this improved performance comes a new Beckman method for the single-column analysis of physiological samples using lithium citrate buffers. It clearly separates glutamine and asparagine and lets the 119C handle these analyses completely automatically.

The 119C is one of a family of four Beckman amino acid analyzers covering a wide range of needs and budgets. Others include the automatic 119B which uses conventional 9-mm columns, and the semi-automatic 118B and 118C which have manual instead of automatic sample injection.

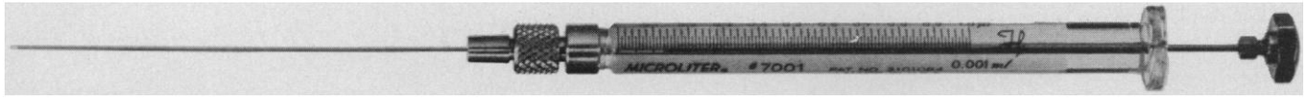


For more information, write for Data File 428 to Spinco Divison, Beckman Instruments, Inc., 1117 California Avenue, Palo Alto CA 94304.

Beckman

Circle No. 73 on Readers' Service Card

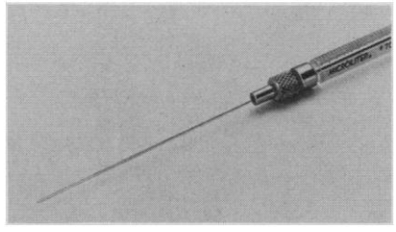
The full scale capacity of this syringe is one microliter



It's hard to imagine, when you look at this syringe, that it's not a normal syringe. Your sample never reaches the glass barrel. The barrel is used simply as a volume indicator.

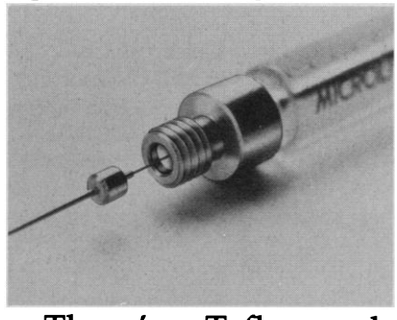
It's all in the needle

The total capacity of the syringe is contained in the needle. A tiny tungsten wire plunger travels to the tip of the needle, discharging the complete sample.



It's available in three capacities: 1.0 μl, 2.0 μl, and 5.0 μl. With any degree of skill samples can be repeatably injected to ±1%.

You can use Hamilton's plunger guide or Chaney Adaptor to make injections easier and strengthen the plunger against bending.



There's a Teflon seal in the hub that can be finger tightened to compensate for wear and to prevent leakage. You simply tighten the knurled hub to make the adjustment for a leak-tight seal.

Tested for accuracy

Every 7000 Series syringe is tested for accuracy by injecting a series of samples into a gas chromatograph. When you purchase a Hamilton 7000 syringe, you have our guarantee that it will deliver the capacity with reproducibility to ±1%.

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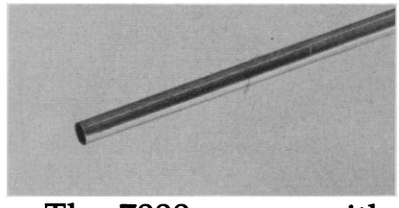

The 7000s come with a 90° needle point, which has proven successful in providing longer septum life and in reducing the likelihood of septum traces being injected.

If you need to inject samples smaller than 1.0 μl, this is your syringe. Five models, three capacities: 1.0 μl, 2.0 μl, and 5.0 μl, selling for $35.00. They're available from authorized dealers or direct from the factory. For more information and literature, write to John Nadolny, Hamilton Company, Post Office Box 10030 Reno, Nevada 89510.

HAMILTON SYRINGES

23 January 1976

Volume 191, No. 4224

SCIENCE

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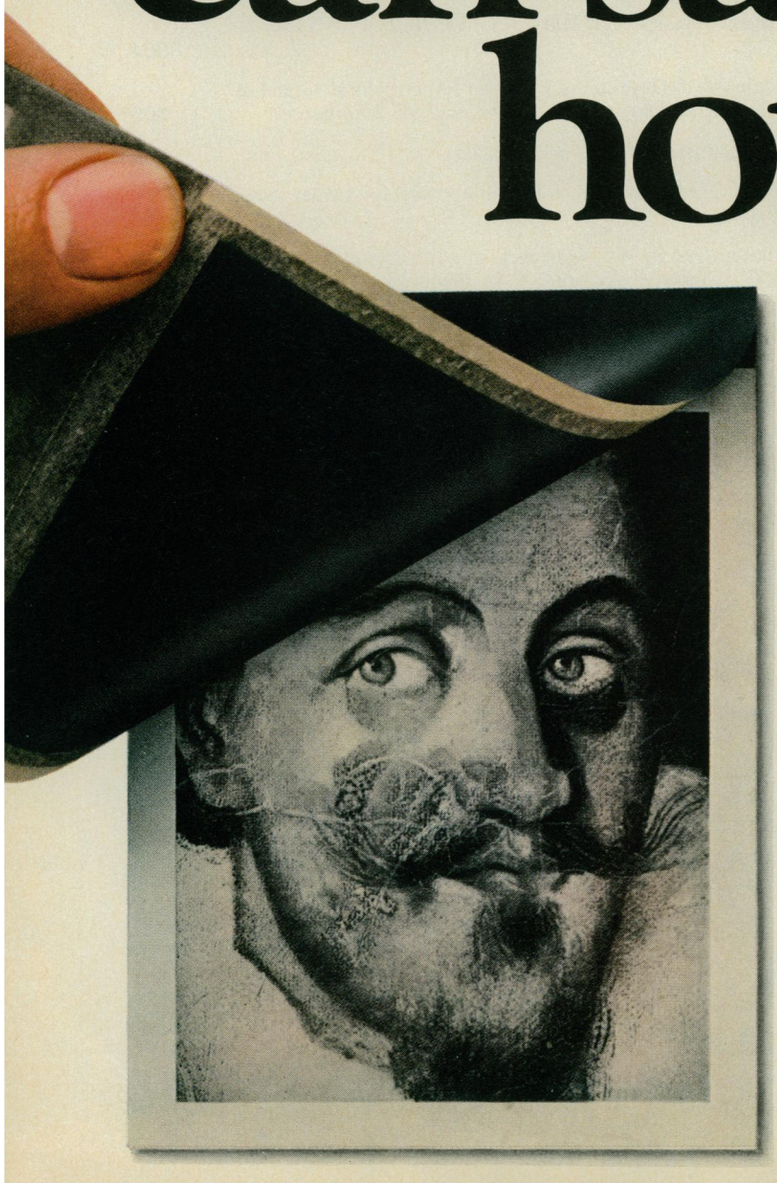
PRODUCTS AND MATERIALS

COVER

Head of human spermatozoon appears embedded in a leukocyte from an unrelated blood donor on the right of this scanning electron micrograph (about × 5300). Small blebs appear on the leukocyte adjacent to the point of entry. See page 302. [Bruce Wetzel, Edwina Westbrook, Harry G. Schaefer, and William R. Levis, National Cancer Institute, Bethesda, Maryland]

Pictures you see in seconds can save you hours.



In scientific detection.

When photography is used for scientific detection, special lighting and filtration is often required. Just coming up with the right combination using conventional methods (shooting, developing, adjusting light and filters, and reshooting) can take hours, even days.

Fortunately, there's a faster, more economical way—by using Polaroid's Type 105 or Type 55 positive/negative films on standard view cameras. With Type 105 (3¼ x 4¼ inch pack format) and Type 55 (4 x 5 inch sheet format), seconds after the picture has been taken you can evaluate the results, make adjustments and reshoot. Until it's just right.

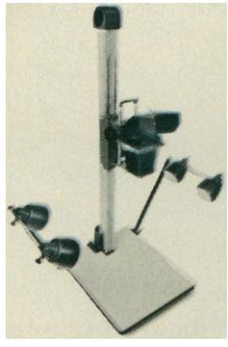
And since both films provide a high-resolution negative along with the positive print, enlargements can be made for closer scrutiny, or multiple copies for distribution.

The picture on the left is an ultraviolet reflectogram that tells the art conservationist that the painting in question has badly deteriorated be-

neath the surface. The deterioration took decades. The proof took seconds.

In record keeping.

How can a laboratory assure that it has accurate visual records of thousands of experimental results? One way is to use a central photo lab,



MP-4 MULTIPURPOSE CAMERA

which is costly, time consuming and sometimes impossible.

A better way is to take pictures with a centrally-located Polaroid MP-4 Multipurpose Land camera. It can be operated by just about anyone with a little training. No darkroom is required. And there are 15 different Polaroid self-developing films (from black and white slides to 4x5 color prints) to choose from. Best of all, the pictures are available instantly — to clip into a lab notebook, to be routed, or to be filed.

The picture above, for example, was one of a series taken on our brilliant new Polacolor 2 film. It illustrates the effect of a specific amount of ozone on a tobacco cultivar.

In making a diagnosis.

This is Jeffrey's malocclusion. A year from now, it will be considerably improved. And pic-

CU-5 CLOSE-UP CAMERA

tures taken at every stage will tell just how the treatment is progressing.

Many dentists now make such pictures on the spot to study, then to show at consultation meetings and later to file for reference — using Polaroid's hand-held CU-5 Close-up Land camera. It requires virtually no experience to operate and there's little or no guesswork involved.

The CU-5 can be used effectively anywhere that same-size, 2 : 1 and 3 : 1 magnification photographs are needed in color or black and white. Everywhere from patrol cars to computer readout terminals. Perhaps you have an application we haven't thought of.

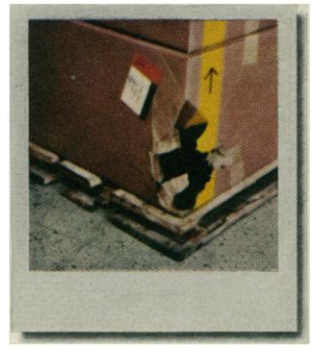
In rapid communication.

How can you describe the need for more care in shipments? The best and by far the fastest way is to send a photograph.

Our SX-70 Land camera makes it very simple. Just focus (as close as 10.4 inches without any attachments), aim and shoot. Minutes later you know you have a permanent, color record.

The SX-70 has become a new kind of transistorized business machine. Because it's the most compact, versatile, easy-to-use instant-picture camera made. Chances are it can make some function in your organization function better.

THE SX-70 CAMERA



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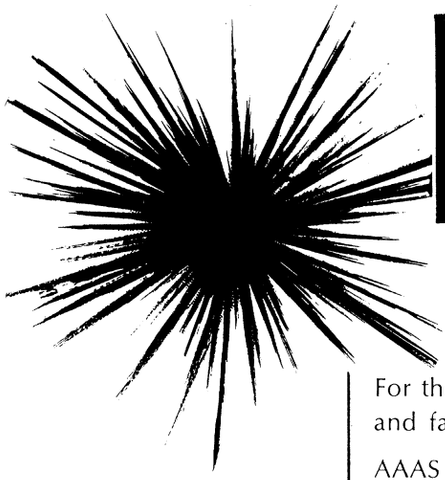
Polaroid Instant Photographic Systems



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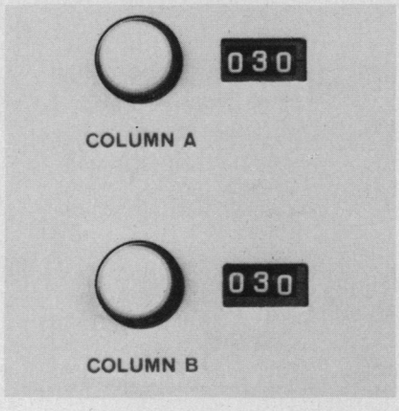

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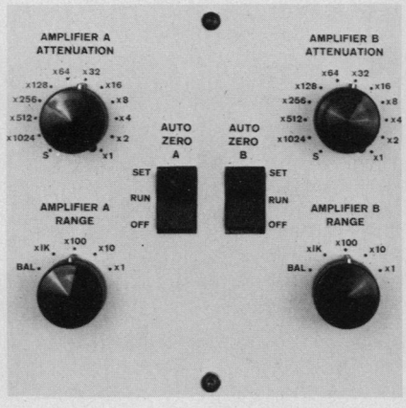

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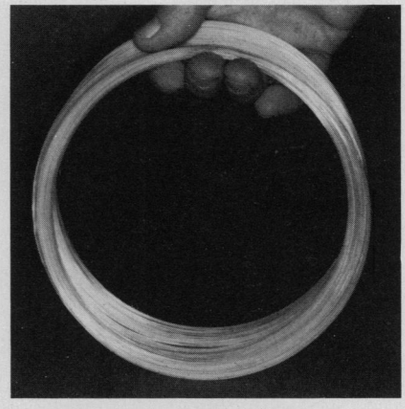

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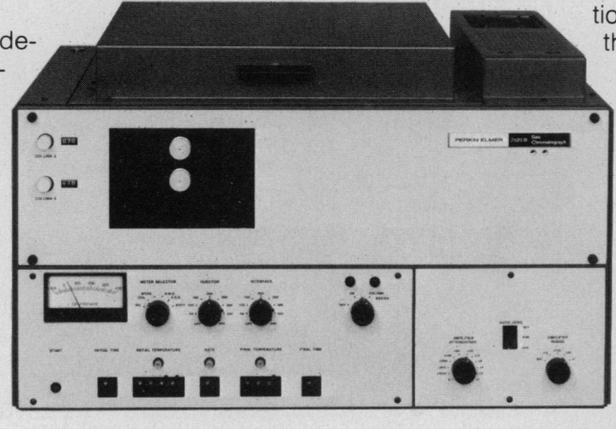

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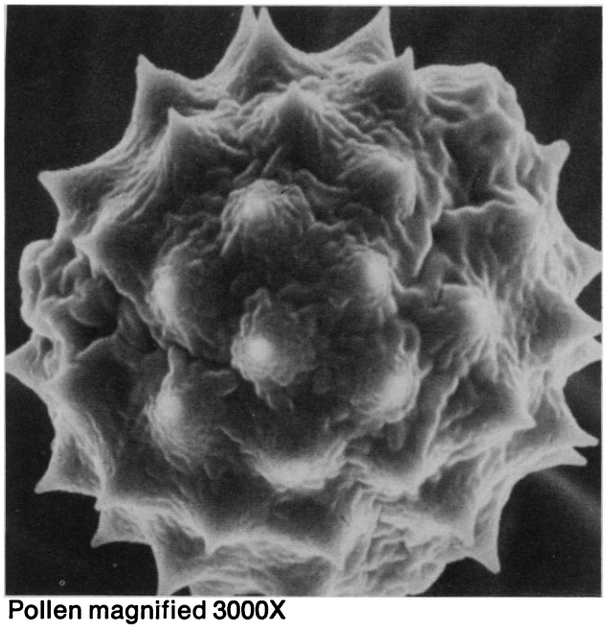

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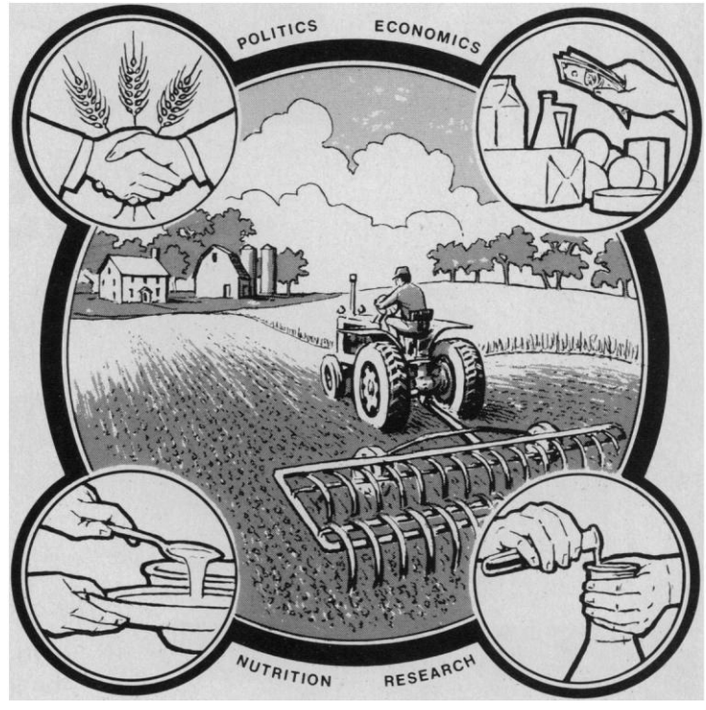
. . . polulation growth and rising affluence exceed the world's capacity to feed itself?

. . . we run out of land, water, energy?

. . . applications of new agricultural technology yield essential benefits?



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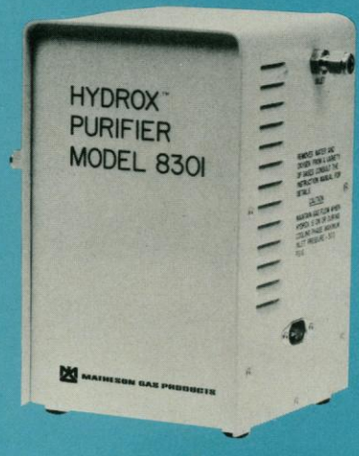
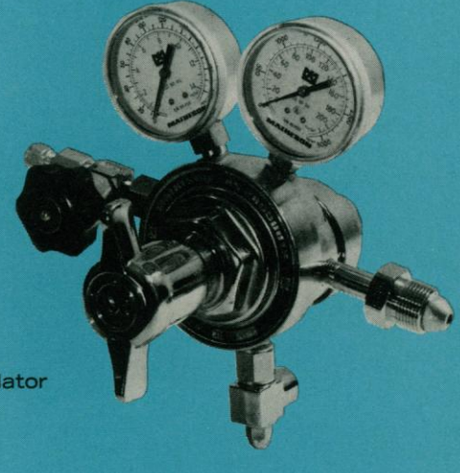


Model 8301
Hydrox Purifier



Model 3104
Two stage regulator

You know that your gas chromatograph can do the job. Your recorder is perfectly matched to the instrument.

But they don't work alone.

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Some instruments are so sensitive that extra purification to remove minute levels of impurities on-site is required. A proper line filter helps to ensure purity and decrease background noise for detectors that are sensitive to dust and particulate matter. When oxygen or water vapor may pose a problem a Model 8301 Hydrox Purifier can be a valuable accessory.

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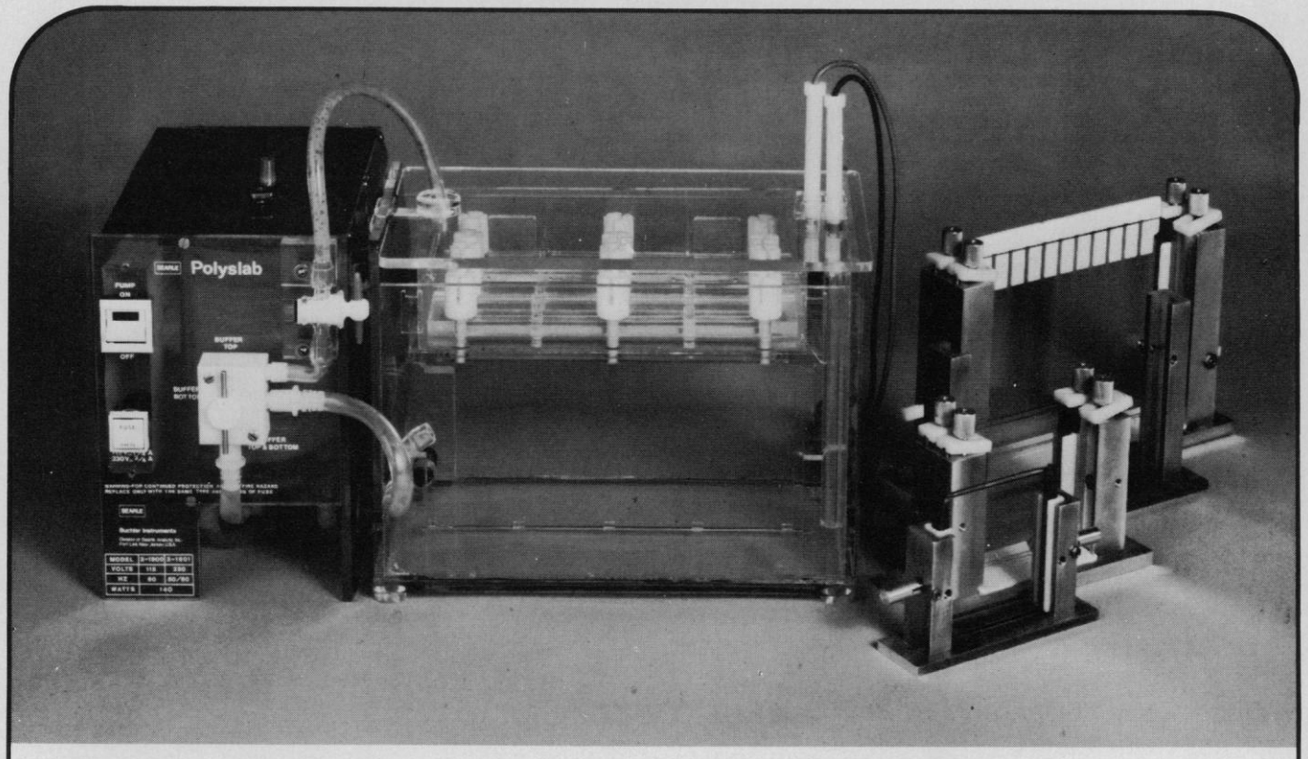

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Applications Invited for AAAS Congressional Science Fellowships

The American Association for the Advancement of Science invites applications for the fourth consecutive year of its Congressional Science and Engineering Fellow Program.

The Program selects postdoctoral level to midcareer scientists and engineers to spend one year on the staffs of individual congressmen, congressional committees, or with some other area of the Congress. In the past three years, 15 AAAS Fellows have been in positions in the House and Senate and the Office of Technology Assessment. Each Program year includes several AAAS Fellows as well as several other Fellows selected by six cooperating affiliated professional societies.

The award will be $16,000 for the period of one year, beginning 1 September 1976. An intensive two-week orientation is developed for the Fellows by the AAAS. Each Fellow's assignment is worked out by that individual with guidance by the AAAS.

Candidates may apply from any physical, biological or behavioral science or field of engineering. The term science is used broadly to include the system sciences, public health, and other technical professional areas. Candidates are required to be members of the AAAS or concurrently applying for membership.

Detailed information on the application procedure and other information about the program are available from **Dr. Richard A. Scribner, Director, AAAS Congressional Science Fellow Program, AAAS, 1776 Massachusetts Avenue, NW, Washington, D.C. 20036**. The deadline for application is 31 March 1976. Announcement of the awards will be made on about 1 May 1976.

conditions one sees cell killing, often very marked, and also a considerable percentage of cells have chromosome breakage and other chromosome abnormalities, such as aneuploidy (*21*). Specific chromosomal abnormalities (somatic mutation) caused by the chemical carcinogens are thought by some to be responsible for the expression of malignant transformation and carcinogenicity (*22*). The experiments mentioned by Rubin with the polycyclic hydrocarbons on the prostate cell line (not used much at present because of its aneuploidy and high spontaneous rate of transformation) have several complications that make it difficult to calculate the frequency of cell transformation: it is notoriously difficult to wash polycyclic hydrocarbons out of cells, and the transformants are expressed per clone rather than per cell (large numbers of cells, with a few foci, are present at the end of the experiment). Mutation in animal cells is not necessarily that rare, even when single genes are looked at: 3 to 6 percent of cells treated with a frameshift mutagen (which works at mutational hot spots) give rise to immunoglobulin mutants (*23*).

It is likely that mutation (initiation) is not the only cause of cancer and that a few environmental chemicals may well work through other mechanisms, (*10, 24*); however, there is not much evidence that such environmental chemicals (or even viruses) are contributing in a major way to human cancer. Rather, the evidence indicates that chemicals and radiations in the environment (cigarette smoke, ultraviolet light, nitrosamines, and so forth) damage DNA and that this damage, incurred throughout our lifetimes, is the initiator of most of human cancer. DNA damage is quite likely to be a major contributor to birth defects, aging (*25*), and heart disease (*26*) as well.

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The "Sunday Seminar"

We are a group of Americans who attended a symposium on nucleic acids sponsored jointly by the Soviet and American academies of science. The symposium was held in Moscow from 29 September through 4 October 1975. While in Moscow we visited the "Sunday Seminar," a weekly meeting of a group of scientists, most of whom have applied for emigration visas and as a result have lost their jobs. These people are not permitted to function as working scientists: they do not have access to laboratories, classrooms, scientific meetings, or even scientific libraries. The current head of the Sunday Seminar is Mark Azbel, in whose apartment the group meets. He is a theoretical solid state physicist of international reputation, who lost his positions at Moscow State University and at the Landau Institute of Theoretical Physics 3 years ago. He is now being threatened with arrest if these scientific seminars continue. Most of the scientists present the day we visited were physicists and mathematicians. The biologists included Edward Trifonov and his wife Helene Lebedeva; before losing their jobs, they worked, respectively, in the Kurchatov Institute of Atomic Energy and at the Institute of Genetics and Selection of Industrial Microorganisms. Both were involved in research on basic problems in biology of interest to our group and now face an uncertain future. During our visit to the Seminar, which lasted several hours, some of us presented summaries of our work as Trifonov translated. Even though most of the Soviet scientists were from different fields, they were grateful for this direct professional contact.

We urge all scientists who visit the Soviet Union to make an effort to contact these dispossessed colleagues and to visit the Seminar, if it still exists (*1*). External contact is of vital importance to these scientists, whose intellectual life has been severely curtailed by their government and who are permitted neither to work productively within their society, nor to leave it. This destructive treatment of individuals, whatever the pretext, is clearly in violation of the spirit of the Helsinki Accords and can only serve to impede future cooperation between American and Soviet scientists.

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Notes

1. The following was reported in the Washington *Post* (5 Jan. 1976, p. A7): "Soviet police told a weekly seminar of Jewish scientists today that the meetings must stop because of complaints from neighbors. . . ."

23 January 1976, Volume 191, Number 4224 **SCIENCE**

From "Jaws": A Lovable Scientist

Go see the record-breaking movie "Jaws." Better yet, send your nonscientific neighbors and acquaintances. Hardly for what they will learn about sharks, but for what they will feel about scientists. The movie has created and popularized, better than almost any series of lectures, slides, or other devices to promote public understanding of science could, a new cultural hero—a concerned and considerate, warm, yet highly competent scientist, in the character of oceanographer Hooper, played by Richard Dreyfuss. Hooper provides a fine antidote to the image of the scientist as Dr. Strangelove, a cold, mad person dedicated only to his instruments, indifferent to the world, an image that may not dominate popular culture but is surely a widely held one.

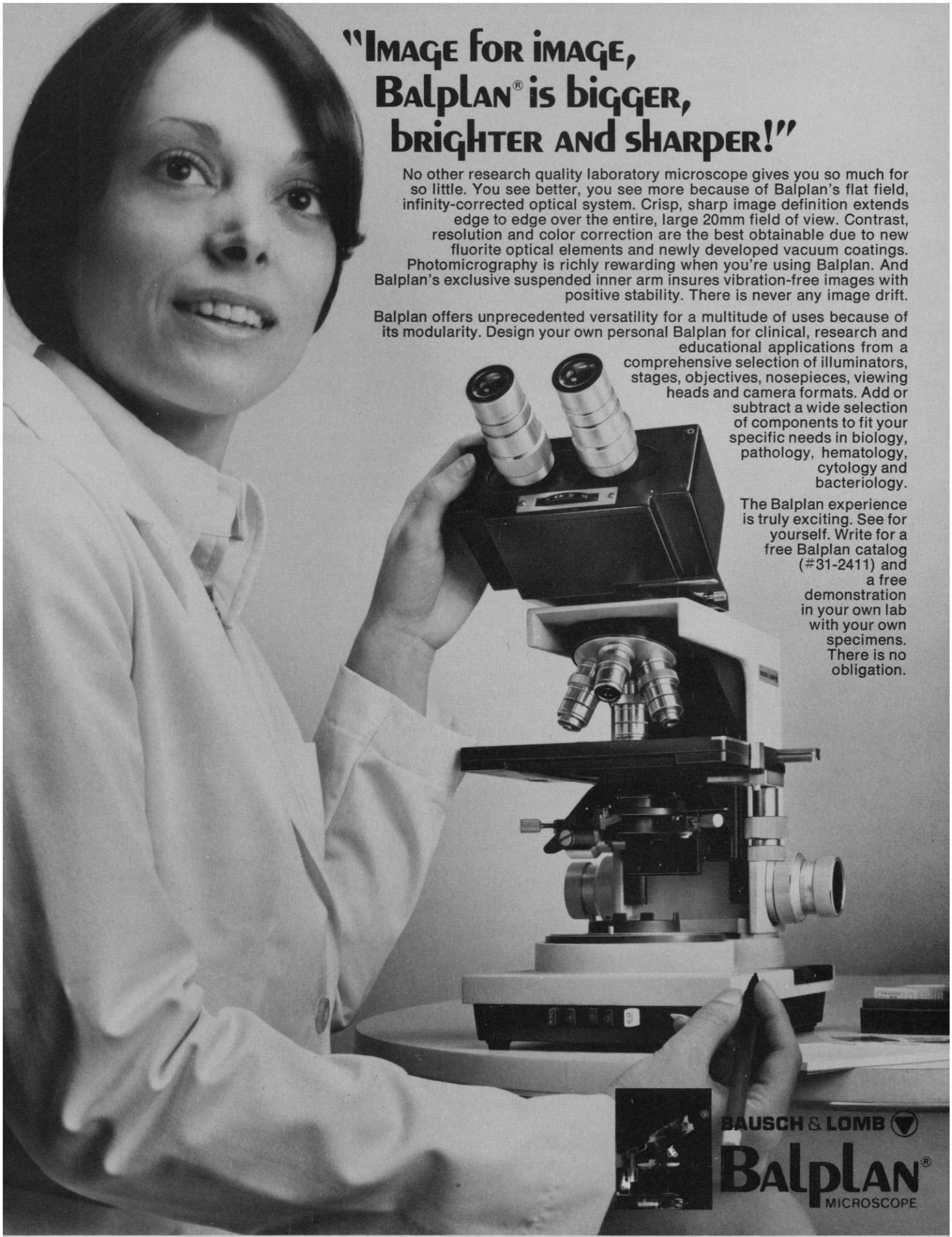
In the view of this observer, next to the mechanical supershark, Hooper steals the show. The other roles were created from the papier-mâché of clichés: the mayor, more concerned with the profit of the merchants of the town than with the lives and limbs of visiting tourists; the police chief, wavering between doing his duty to protect the public and following the orders of the mayor; the rough sailor who takes on the shark, a Captain Ahab versus Moby Dick. Only the scientist succeeds in breaking out of these cinematic stereotypes.

Faced with the body of a young woman dismembered by the shark, the scientist does not coldly and mechanically observe, record, and measure, but first is properly distressed, expressing his dismay, and comes across as a human being, not a frigid pathologist. And yet, despite his feelings, he does go on with his work, to record what must be recorded, to measure what must be measured, and to draw the appropriate conclusions. Suddenly encountering another victim, a dead fisherman, the scientist initially appears as much subject to fright as any other person, but then conquers his fear in order to go on with his exploration—even to face the supershark later in what turns out to be a fragile underwater cage. He is thus portrayed not as a bloodless machine but as a person of strong feeling and stronger character.

Confronted by a mayor who is unwilling to close the beaches, even when told that the teeth of a captured shark thought to be the killer do not match the marks the supershark left on his victims, this scientist fights for the proper public policy—to keep the beaches closed—with both competently assembled scientific evidence and passionate human concern.

At sea, far from conforming to the image of the aloof, unbending, humorless "brain," more able to deal with objects than to relate to people, Hooper holds his own in a drinking party with the sailor and police chief, matching them in capacity for liquor, language, and tall tales.

Not every scientist will care to identify with Hooper. Some will see him as too involved, overly sentimental, maybe even too much of a "hippie." But, recalling that all the human "failings," from feeling strong emotions to taking a normative stand to mixing in politics to rowdy socializing, do not deter the man from doing his scientific work and doing it well, "Jaws" does offer an image of the scientist as a cultural hero that counters the Frankenstein or Strangelove movie myth. "Jaws" will hardly kill off all antiscientific sentiments, but it will sink some, and introduce to the mass audience a positive character—a character who has considerably less historical depth than Thomas Edison or Madame Curie, but at least as much warmth!—AMITAI ETZIONI, *Department of Sociology, Columbia University*, and *Director, Center for Policy Research, Inc., 475 Riverside Drive, New York 10027*



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Model 607 measures between 0 and 14 *p*H units. Resolution is within 0.05 *p*H unit and accuracy is ±0.03 unit when standardized within 3 *p*H units. Temperature is compensated for between 0° and 100°C. The device is read with a digital display. This model may be battery operated for field use. Extech International. Circle 712.

Wind Turbines

Turbines packaged in kits will be available in diameters of 8, 12, and 16 feet. These are suitable for harnessing wind power for performing mechanical tasks such as driving pumps. Towers, gear boxes, generators, and other accessories are also offered. The turbines are of the bicycle-wheel type with a rigid outer rim and 48 blades threaded by spokes for attachment to a hub. The design is such that even a 2-mile-per-hour breeze will cause rotation and an 80-mile-per-hour gale may be withstood. American Wind Turbine. Circle 716.

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 Readers' Service Card (on pages 242A and 314A) and placing it in the mailbox. Postage is free. – RICHARD G. SOMMER

Electronic Balance

Model AD-2Z features an automatic zero setting which enables rapid operation. The operator places the empty sample container on the balance pan, presses the auto-zero button, adds the sample, and reads the weight of the sample. Capacity is 5 grams and sensitivity is ±0.1 microgram. Perkin-Elmer. Circle 710.

Scanning Transmission Electron Microscope

Elmiskop ST 100 F (Fig. 1) features 100-kilovolt accelerating voltage, illumination with a scan-controlled electron beam, reproduction of scan image on a television monitor, and maximum resolution of 0.2 nanometer. Because of the field emission system and line-by-line scanning, both bright- and dark-field techniques can be used. Signals may be differentiated as to elastic dispersion properties as well. Data storage and processing is also possible. The probe is formed by an electromagnetic lens for high magnifications or by an integrated miniature lens for low magnifications. The beam scans the image field line by line with deflector systems and between 400 and 3200 lines may be selected with and without line jump as the scan frequency. Point screens may also be formed. Vacuums of more than 10^{-9} millibar in the cathode chamber and 10^{-7} millibar in the specimen chamber are attained. A two-stage air lock facilitates specimen exchange without vacuum interruption. Siemens. Circle 705.

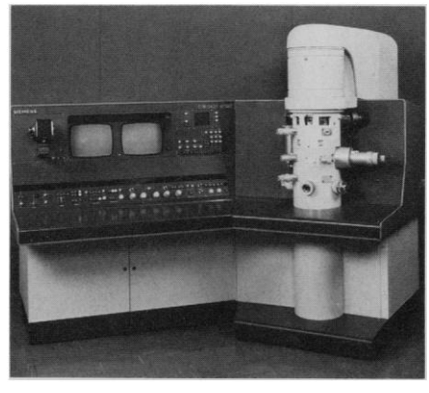

Fig. 1. The Siemens Elmiskop ST 100 F derives its name from Scanning Transmission 100-kilovolt accelerating voltage Field emitter. At a magnification of 10 million to one, a ball 35 centimeters in diameter would have the same diameter as the moon. Elmiskop ST 100 F offers magnification from 50 power to 10 million power with a resolution of 0.2 nanometer.

Ion Chromatograph

This device combines ion exchange chromatography with conductivity detection to determine trace concentrations of ionic species in aqueous solutions. This facilitates analysis of biological fluids such as plasma, urine, tissue extracts, or cerebrospinal fluid. Model 10 will analyze either anions or cations and model 14 will analyze both anions and cations. Analyses require approximately 3 minutes per ionic species. Detection limits are better than one part per million. Durrum Instrument. Circle 708.

Aquatic Temperature and Depth Telemetry

The 904S Temp/Depth system consists of readout modules housed in a splash-proof aluminum case, field-tested sensors, an analog or digital recorder, and interconnecting electrical cable. The sensors may be hand-lowered, mounted in transducer arrays, or secured to underwater stations. Readout modules offer direct display on panel meters. Hydro Products. Circle 718.

Rotator

TekTator V is available in platform sizes of 5 by 6.5 inches or 12 by 12 inches. Speed is controllable from 20 to 220 revolutions per minute. Accuracy is to within 5 revolutions per minute. A tachometer indicates speed of rotation independent of platform load. An integral timer offers control from 0 to 35 minutes of operation. Scientific Products Division, American Hospital Supply. Circle 719.

Iodine-Labeling Service

Iodination by any of three methods is available. Chloramine-T with sodium iodide is used in applications where proteins and peptides have been successfully labeled previously. The second method uses lactoperoxidase enzyme immobilized on Sepharose resin, hydrogen peroxide, and labeled sodium iodide for surface-exposed

tyrosine. This is particularly suited to preparation of labeled antigens for radioassay. The third method involves iodinating *N*-succinimidyl 3-(4-)hydroxyphenyl) propionate with ^{125}I or ^{131}I and using the derivative as an acylating agent to react with free amino groups. Biochemical and Nuclear. Circle 715.

Gel Electrophoresis System

Polyslab (Fig. 2) enables the operator to perform general analyses, preparative, two-dimensional, and polyacrylamide gel gradient electrophoresis. Polyslab is a temperature-regulated unit that accepts two sizes of gel slabs or columns. Features include a buffer-saving design, a safety interlock system, a centrifugal cooling pump, and three-way buffer circulation. Buchler Instruments. Circle 706.

Blood *p*H/Blood Gas Analyzer

The BGA3 (Fig. 3) makes determinations with samples as small as 130 microliters. It features a gas-mixing apparatus and simultaneous digital display of *p*H and partial pressure of oxygen and carbon dioxide. Hard copy is available in card or strip-chart form. The entire system is modular for adaptation to a variety of needs. London. Circle 707.

Aquatic Marking Beacon

The ECO-M/L-38 is an ultrasonic marking-relocating signal. Its basis is a pinger that operates at 38 kilohertz. It is attached to any marine instrument and will operate for up to 6 months on a single replaceable electrode. It operates at depths exceeding 300 feet and is detectable up to 0.5 nautical mile. Detection is facilitated by a compact receiver and a directional hydrophone. Johnson Laboratories. Circle 713.

Reciprocating Shaker

The R2 shaker accepts up to 18 different platforms for various types of glassware. Speed is controlled from 40 to 300 strokes per minute. Speed is read on a tachometer. Stroke amplitude is variable from 0.5 to 1 inch. An integral timer regulates the length of operation with automatic shutdown. The motor and drive are designed for quiet operation 24 hours a day. A selection of 18 different platforms is available for flasks, test tubes, and beakers. New Brunswick Scientific. Circle 711.

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Spectra/Glo is suitable for monitoring fluorescein-labeled compounds in liquid chromatography. Fluorophors created by fluorescein labeling are stable for several hours and may be detected in concentrations as low as 10 to 40 nanograms. This method of detection is more sensitive than monitoring of ultraviolet or visible absorption. Gilson Medical Electronics. Circle 709.

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Safety-Flasks feature a vacuum break system that operates through the filter system. This ensures gentle release of vacuum and prevents loss of dried material due to turbulence. Round- and flat-bottom designs are available. Flat-bottom flasks come in 650- and 1750-milliliter capacities. Round-bottom flasks are available in 750-milliliter size. They are available with either 0.5- or 0.75-inch straight adapters. Flasks, caps, and adapters are made of polycarbonate; gaskets are made of silicone rubber. Spectroderm International. Circle 714.

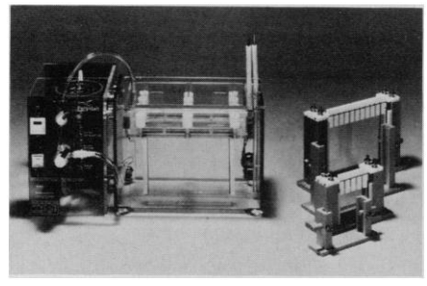

Fig. 2. The Buchler Polyslab polyacrylamide slab gel electrophoresis system accepts two sizes of gel slabs as well as analytical columns. The unit is designed to operate with a smaller amount of buffer than is normally needed for small gels.

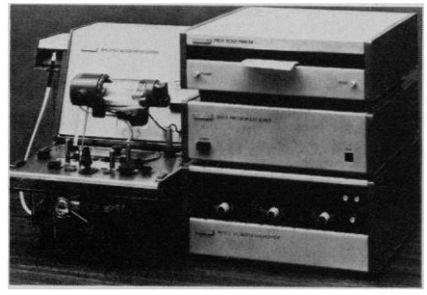

Fig. 3. The Radiometer BGA3 Blood *p*H/Blood Gas Analyzer from London Company features simultaneous digital display of *p*H, partial pressure of carbon dioxide, and partial pressure of oxygen. The unit provides output suitable for electronic data processing and storage in research or clinical applications.

Literature

Organic Chemicals (No. 48) lists items for all chemical applications in over 200 pages. Formulas and key physical properties are included for thousands of entries. Eastman Organic Chemicals. Circle 720.

Membrane Filtration Products includes chemical compatibilities and specifications. Gelman Instrument. Circle 721.

Airless-ware Portable Vacuum Rack is devoted to a line of vacuum components including pumps, glassware, and frameworks. Kontes. Circle 722.

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Liquid Ring Vacuum Pumps is a 52-page manual that describes applications and modes of operation as well as specifications. Kinney Vacuum. Circle 729.

Fume Hoods are described in a new 12-page bulletin. Fisher Scientific. Circle 730.

Infiltrometer details a portable system for ventilation and air exchange in laboratories based on a microprocessor-controlled, continuous sampling, electron-capture gas chromatograph. Systems, Science and Software. Circle 731.

Fluid Densitometer describes a device for determining density and specific gravity of liquids and gases. FluiDynamic Devices. Circle 732.

Laboratory Chromatograph Data System is a computer-based data reduction and processing array. Electronic Associates. Circle 733.

RIA Products and Services lists test kits, reference serums, antiserums, standards, reagents, chemicals, and laboratory test capabilities. Nuclear Medical Systems. Circle 734.

Foto-UV Lighting System for Ultraviolet Photography is devoted to an illumination system for specific applications. Camag. Circle 735.

BOOKS RECEIVED

(Continued from page 282)

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