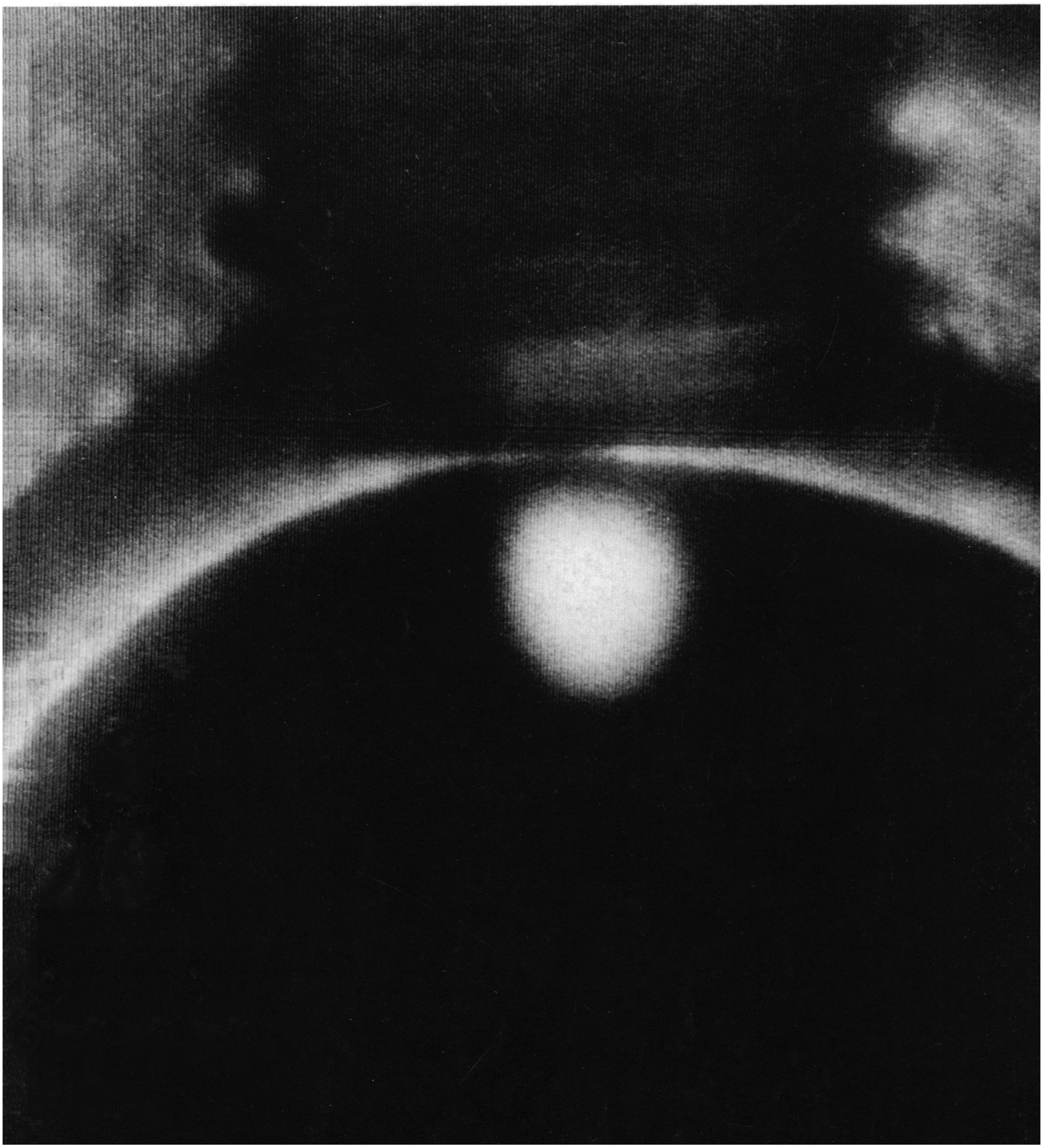
SCIENCE

19 September 1975

Volume 189, No. 4207

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

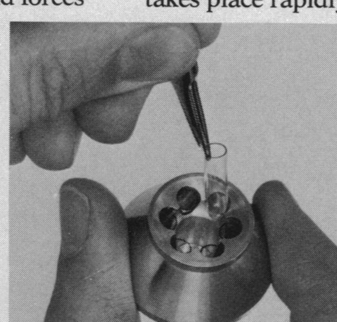


New Airfuge™ Ultracentrifuge–

macro forces for micro samples.

You're looking at a versatile new laboratory tool: a miniature, low-cost ultracentrifuge capable of speeds to 100,000 rpm and forces to 160,000 g.

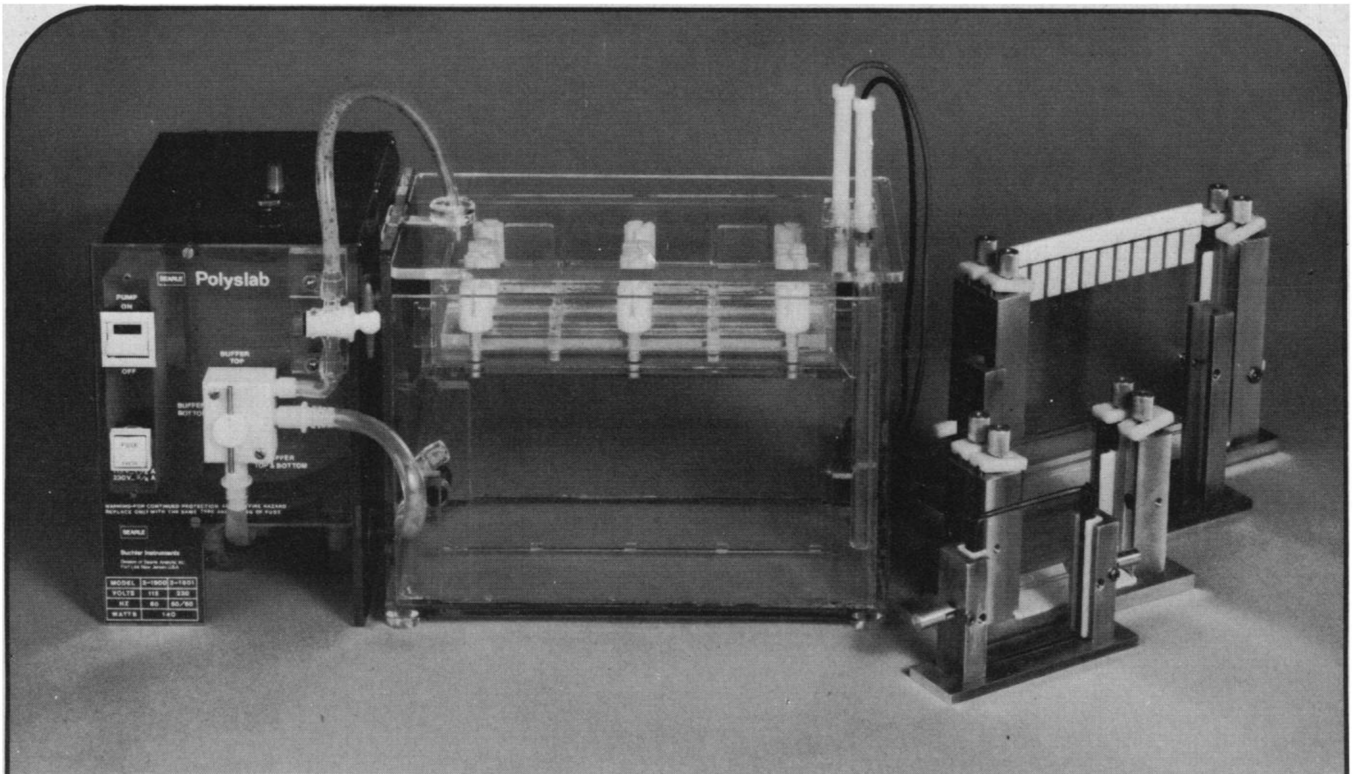
Called the Airfuge, this little ultracentrifuge is driven by ordinary laboratory air. The tiny rotor holds up to six 175-μl samples in individual plastic tubes, and accelerates to top speed in seconds. Sedimentation takes place rapidly in these small tubes–so the overall run times may be hours less than you'd expect. In fact, the Airfuge rotor has the highest efficiency rating of any rotor we make–large or small.



When you have small samples to separate by centrifugal force–lipoproteins, amino acid samples for deproteinizing, rapidly changing or short-lived subcellular components, or whatever–remember: there's an ultracentrifuge that's the right size for them–the Airfuge.

Send for NPI-134 to Beckman Instruments, Inc., Spinco Division, 1117 California Ave., Palo Alto, CA 94304.

Beckman®


Polyslab

19 September 1975

Volume 189, No. 4207

SCIENCE

LETTERS Nuclear Proliferation: *J. J. Glackin*; Indian Corn Cultivation: *H. S. Russell; G. B. Warden; S. A. Moss; L. Ceci*; Defending the Defenders: *G. Wald* 944

EDITORIAL Freedom of Inquiry: *DeWitt Stetten, Jr.* 953

ARTICLES Electron-Hole Condensation in Semiconductors: *C. D. Jeffries* 955

Immunoglobulin-Receptors Revisited: *E. S. Vitetta* and *J. W. Uhr* 964

The Need for an Ethnomedical Science: *H. Fabrega, Jr.* 969

NEWS AND COMMENT Meeting on Unity of the Sciences: Reflections on the Rev. Moon 975

Johnson Health Policy Fellows: Joining the Scientific and Political 977

Biology in Europe: The Wrangling Is Over, EMBO Has a Lab 981

Interior: President's Nominee for Secretary Has His Problems 982

RESEARCH NEWS Cascading Bifurcations: The Mathematics of Chaos 984

Paleontology: Facing a Choice Between Fossils and Trash 985

BOOK REVIEWS Variability of Mammals, *reviewed by G. G. Simpson*; Uniqueness and Diversity in Human Evolution, *H. M. McHenry*; The Genetics of Behavior, *L. Ehrman* and *J. Leonard*; Comprehensive Virology, *A. S. Kaplan* and *C. M. Stoltzfus*; Books Received 987

SCIENCE is published weekly, except the last week in December, but with an extra issue on the fourth Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with The Scientific Monthly® Second-class postage paid at Washington, D.C. and additional entry. Member rates on request. Annual subscription $50; foreign postage: Americas $7, overseas $8, air lift to Europe $30. Single copies $2 (back issues $3) except Food Issue (9 May 1975) is $3 and **Guide to Scientific Instruments** is $6. School year subscription: 9 months $37.50; 10 months $41.75. Provide 6 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. **Science is indexed in the Reader's Guide to Periodical Literature.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORTS

Estimating Evaporation: A Technique Adaptable to Remote Sensing: *S. B. Idso, R. D. Jackson, R. J. Reginato* 991

Infrared Transmittance as an Alternative Thermal Strategy in the Desert Beetle *Onymacris plana*: *K. Henwood* 993

Optical Holographic Three-Dimensional Ultrasonography: *G. Baum* and *G. W. Stroke* . . 994

Biological Uptake of Dissolved Silica in the Amazon River Estuary: *J. D. Milliman* and *E. Boyle* 995

Skeletal Low-Magnesium Calcite in Living Scleractinian Corals: *J. E. Houck, R. W. Buddemeier, K. E. Chave* 997

New Flow-Through Centrifuge Without Rotating Seals Applied to Plasmapheresis: *Y. Ito, J. Suaudeau, R. L. Bowman* 999

Visual Tracking and the Primate Flocculus: *F. A. Miles* and *J. H. Fuller* 1000

Antimitotic Activity of the Potent Tumor Inhibitor Maytansine: *S. Remillard* et al. . . 1002

Cancer by County: New Resource for Etiologic Clues: *R. Hoover* et al. 1005

Somatostatin: Abundance of Immunoreactive Hormone in Rat Stomach and Pancreas: *A. Arimura* et al. 1007

Diphenylhydantoin: Action of a Common Anticonvulsant on Bursting Pacemaker Cells in *Aplysia*: *D. Johnston* and *G. F. Ayala* 1009

Loss of X-Cells in Lateral Geniculate Nucleus with Monocular Paralysis: Neural Plasticity in the Adult Cat: *D. L. Brown* and *W. L. Salinger*. 1011

Technical Comments: Surface Albedo and Desertification: *R. D. Jackson* and *S. B. Idso*; *J. Otterman*; Fuel Savings by Lowering Thermostats: *J. W. Reed*; *T. A. Ferrar* and *J. P. Nelson* 1012

PRODUCTS AND MATERIALS

Liquid Chromatograph; Uric Acid Determination; Thin-Layer Chromatography Plate; Conductivity Meter; Fraction Collectors; Fluorogenic Reagent; Literature 1016

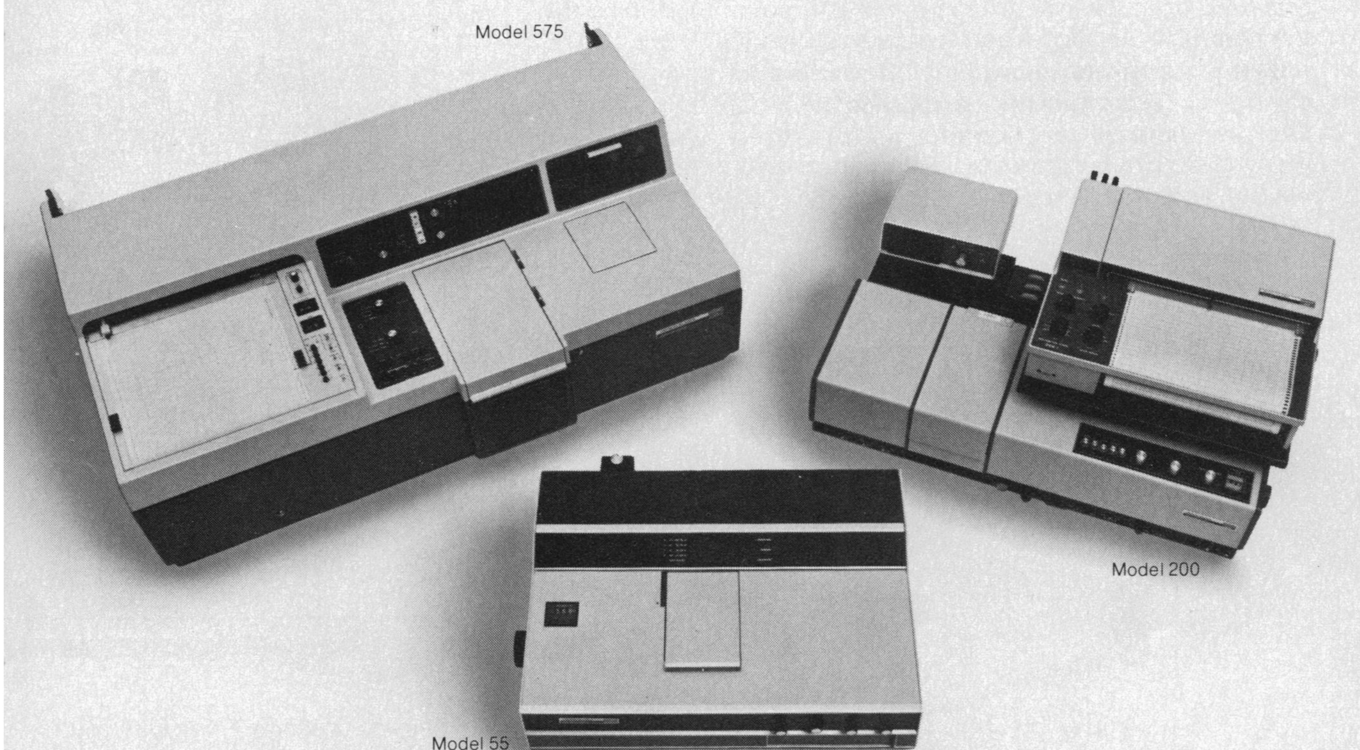
The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress. Postmaster: Send Form 3579 to SCIENCE, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005.

COVER

Electron-hole liquid drop (about × 76) in germanium. A 4-millimeter disk is stressed by a screw (top), cooled to 2°K, and optically excited with an argon-ion laser beam. Electrons and holes condense into a constant density plasma which collects in the potential well produced by the inhomogeneous stress. Photograph was made by imaging the electron-hole recombination radiation (17,400 angstroms) onto an infrared Vidicon image tube. See page 955. [J. P. Wolfe, W. L. Hansen, E. E. Haller, R. S. Markiewicz, C. Kittel, and C. D. Jeffries, University of California, Berkeley]

For AA & IR you think of us.

Here's something more to think about . . .



A Full Line of UV-VIS Spectrophotometers

PERKIN-ELMER UV.

Models 575, 572, 571 and 570 Double Beam Spectrophotometers: *quantitative accuracy: the optimum digital approach* ■ models 575, 572 and 571 feature dark cycle stepping—measures the ratio of sample and reference beam energy at an identical wavelength ■ built-in format recording (models 575, 572, 571) for perfect superimposition of repetitive scans, digital setting of range and zero suppression for precise ordinate presentations ■ both beams brought to intense slit image at cell for unrestricted microsampling ■ step-variable bandpass optimizes reproducibility

Model 200 UV-VIS Double Beam Spectrophotometer: *the only low-cost UV-VIS instrument to give you both first and second derivative spectra* ■ scanning speeds to 240 nm/min ■ bandpass continuously variable from 0.2 to 4 nm ■ choice of three response times ■ large sample compartment handles 100 mm long path cells, and a dozen more sample accessories

Model 55 UV-VIS Single Beam Spectrophotometer: *the low-cost spectrophotometer with 2 nm bandpass, 4-digit readout, full accessory capability* ■ stray light less than 0.05%T at 340 nm ■ 2000:1 signal-to-noise at 2A ■ long-term drift only 0.005A/8 hrs ■ versatile sample compartment holds single cells from 2 to 100 mm, or five 10 mm cells at same time

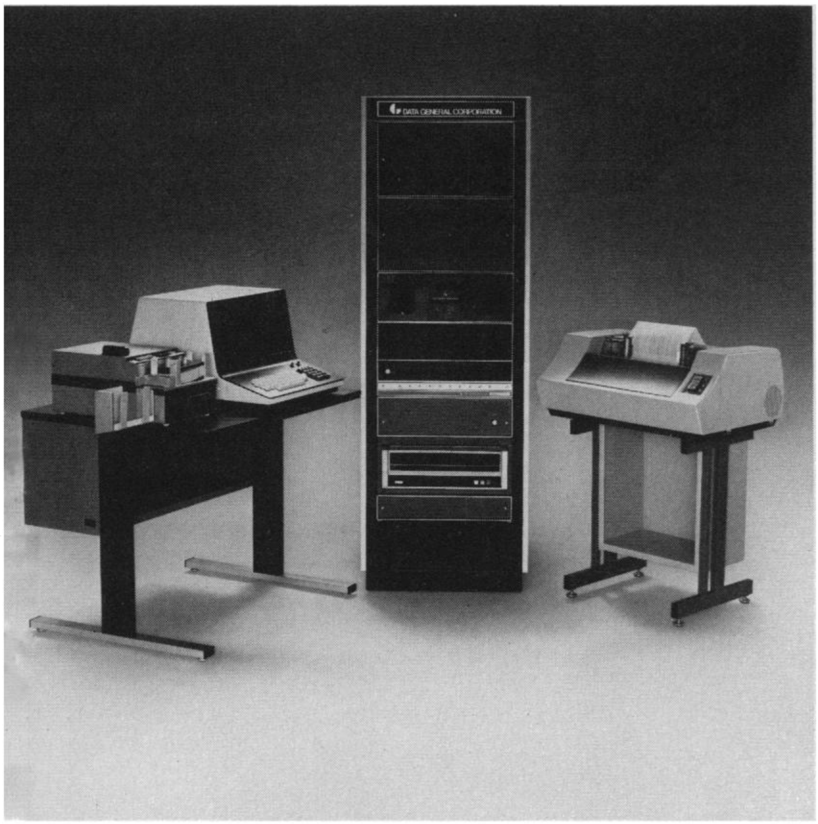
With every instrument you also get applications back-up, prompt, fair service, one-year warranty and product specialists to assist in instrument operation.

If you're thinking of new UV instrumentation, why not think Perkin-Elmer? Write today for the whole story. (Please specify instrument you're most interested in.) Instrument Marketing Division, Mail Station 222, The Perkin-Elmer Corporation, Main Avenue, Norwalk, CT 06856.

PERKIN-ELMER

Circle No. 173 on Readers' Service Card

You can own your own Fortran number cruncher for less than $40,000.



The problem with most FORTRAN computational systems is that they're so expensive only a few companies can afford to own them.

So Data General makes a complete FORTRAN IV system that you can own for only $36,300.

You get a lot of computer system for the money. A Nova® 2/10 with 64K bytes of core, a CRT, 2.5 megabyte disc, 150 cpm card reader, 165 cps printer. Which should be enough to get anybody started.

If you're planning to do a lot of one-shot jobs, you'll want to use FORTRAN IV. Because it compiles as fast as it executes. But if you're going to be running the same job over and over, you may want to spend some more and get a FORTRAN 5 system. Our FORTRAN 5 puts out incredibly efficient, fast-executing programs. Because the compiler globally optimizes the code.

If you want interactive computational support with BASIC, you can start out as low as $6,100. Or get a system for $12,750 that can be expanded to support 32 separate timesharing users.

And no matter what language you decide to work in, you won't have to change the way you work. Our computers will adapt to you. Which means you can go single or multi-user, batch or interactive, local or remote, or with dual operations, any two of the above.

And if you have lots of numbers to crunch, what you'll need is one of our Eclipse™ computers. They've already out-benchmarked computers the likes of the Xerox Sigma 9, IBM 370/155 and Univac 1108. And have out price/performed every large scale computer they've come up against.

So if you'd like to do your computation on your own computer, send in the coupon.

We'll show you why you can't afford to buy from anyone else.

☐ Send me the brochure that shows how Data General computers are being dedicated to computational support.

☐ Send me technical literature on your computational systems.

☐ Send me a sales engineer.

NAME ____________ SCI-9

TITLE ____________

COMPANY ____________

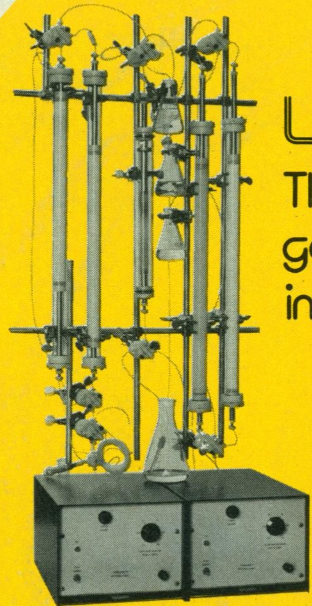
ADDRESS ____________

CITY ________ STATE ________ ZIP ________

DataGeneral

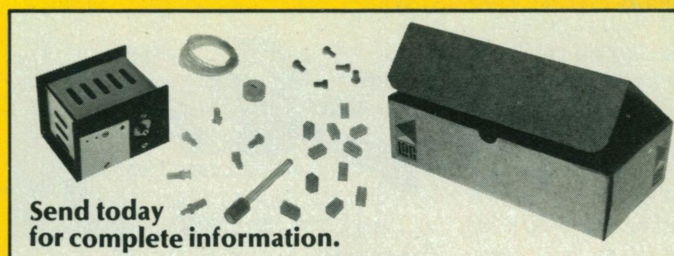
Data General, Route 9, Southboro, Mass. 01772 (617) 485-9100. Data General (Canada) Ltd., Ontario, Data General Europe, 15 Rue Le Sueur, Paris 75116, France. Data General Australia, Melbourne (03) 82-1361/Sydney (02) 908-1366.


It's the little steps that make the big difference in titration
RADIOMETER COPENHAGEN
RADIOMETER COPENHAGEN



LDC/CHEMINERT

The simplest way to get leak-free, chemically inert gel filtration/LC.



Send today for complete information.

Please send literature on the LDC/Cheminert starter kit and products for HPLC and column monitoring.

Name ______________________________

Company ______________________________

Address ______________________________

City ______________ State ______________ Zip ________

everything under the sun for liquid chromatography

Never lose or denature a gel filtration sample again.

LDC/Cheminert Teflon couplings, tube end fittings, adapters and connectors permit you to neatly mate various sizes of tubing and connect Teflon to glass or plastic fittings. Finger tightened connections are all that are necessary to make a chemically inert, leak-free liquid transfer system at pressures to 500 psi.

LDC/Cheminert glass and Teflon columns further ensure that samples will be pure when eluted. Chemically inert sample injectors and pulse-free CMP pumps, with zero dead volume flow passages, perfectly layer precise quantities of sample at the top of the column for maximum throughput in minimum time.

Get acquainted with the convenience, efficiency and economy of the LDC/Cheminert system with our introductory starter kit.

Send today for complete details on the starter kit and more than 200 of our products for HPLC and column monitoring.

LABORATORY DATA CONTROL
DIVISION OF MILTON ROY COMPANY
P.O. Box 10235, Interstate Industrial Park
Riviera Beach, Florida 33404
Phone: (305) 844-5241 or Telex 513479.

Circle No. 240 on Readers' Service Card

Are you paying too much for chromatographic columns?

You may very well be if you're not using Bio-Rad's Econo-Columns™ for your chromatographic separations. These columns are low in price, but their features and performance equal or exceed those of competing columns costing up to three times as much. What's low in price? You can buy Econo-Columns for as little as 98 cents each in quantities of 200—a price that makes them almost disposable.

All Econo-Columns have polypropylene end fittings and porous polyethylene bed supports that retain small (35 microns) and soft particles without damage. All come with Luer inlets and outlets. Reservoirs are all the same diameter so that the optional filling funnel fits every Econo-Column. The bottom Luer fitting will accept either our 3-way nylon stopcock or our 3-way Teflon® stopcock. Yes, Econo-Columns are autoclavable and can be used with organic solvents.

A Ben Franklin offer

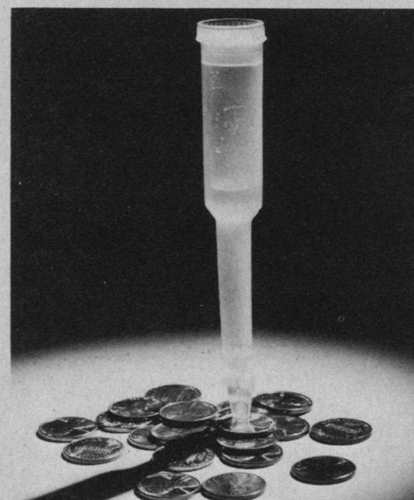
To make it easy for you to try Econo-Columns, here's an offer even penny-wise Ben Franklin would have snapped up. The two new selection packs below give you a variety of columns for a variety of separations at pre-inflation prices. As follows:

Selection Pack No. 2 includes a total of 30 columns, 10 all-polypropylene 0.7 x 4 cm, and 5 each 0.7 cm diameter glass barrel columns in lengths of 10, 15, 20, and 30 cm. Price $42 (1-4 packages).

Selection Pack No. 3 includes 6 glass barrel columns, 3 with 1.0 cm diameter and lengths of 20, 30, and 50 cm, and 3 with 1.5 cm diameter and the same three lengths as above. Price $39.50 (1-4 packages).

Big Brothers too

Just as the plane makers stretch their jets, Bio-Rad does the same with its columns. Measuring 120 cm long, these Big Brothers (shown at far right) come in both 1.0 and 1.5 cm diameters. Although it is a far piece from inlet to outlet, these columns offer the same features as their diminutive relatives but with the increased resolving power many researchers require. That's a lot of column for just over $8 each in quantity.


Prefilled Econo-Column

Prefilled columns

When an analysis calls for only a small amount of chromatographic media that will be used and discarded, many researchers prefer prefilled columns. They save time, trouble and occasionally profanity.

Removing SDS from Enzymes

The potent protein denaturant and solubilizing agent, sodium dodecyl sulfate, can be removed from protein solutions by passing the solution through a 0.4 x 7 cm Econo-Column prefilled with AG 1-X2 ion exchange resin, 200-400 mesh, acetate form. (Bio-Rad catalog 731-6215.) The method is described by Weber, K. and Kuter, D. J., *J. Biol. Chem.*, **246**, 4505 (1971).

Separating Nucleosides from Nucleotides

Nucleosides can be separated from nucleotides using a 0.7 x 4 cm Econo-Column prefilled with AG® 1-X2 ion exchange resin, 100-200 mesh, chloride form. (Bio-Rad catalog 731-6216.) The method is described by Deutscher, M.P., *J. Biol. Chem.*, **247**, 469 (1972).

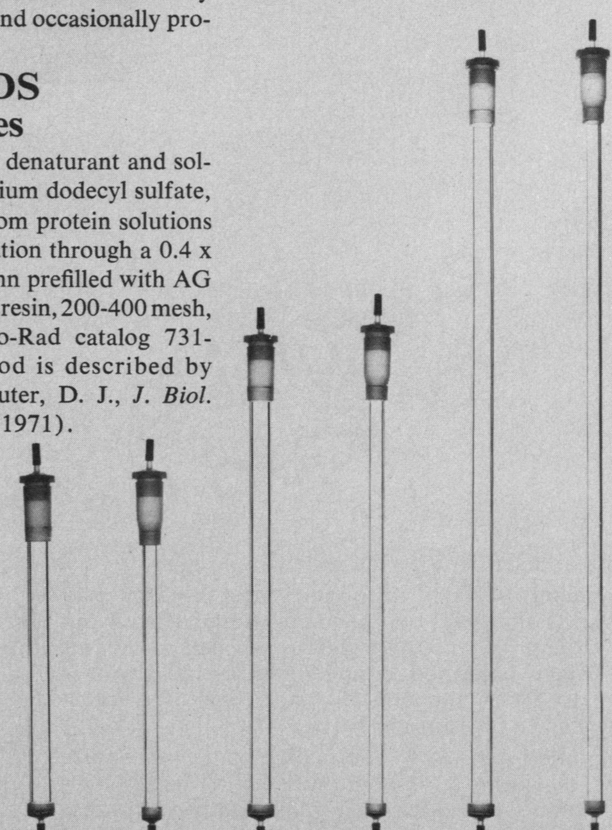
For complete details

A complete description (with prices) of Econo-Columns, including prefilled columns, may be found in Bulletin 1029. For your free copy, write, phone or circle the reader service number.

BIO·RAD Laboratories

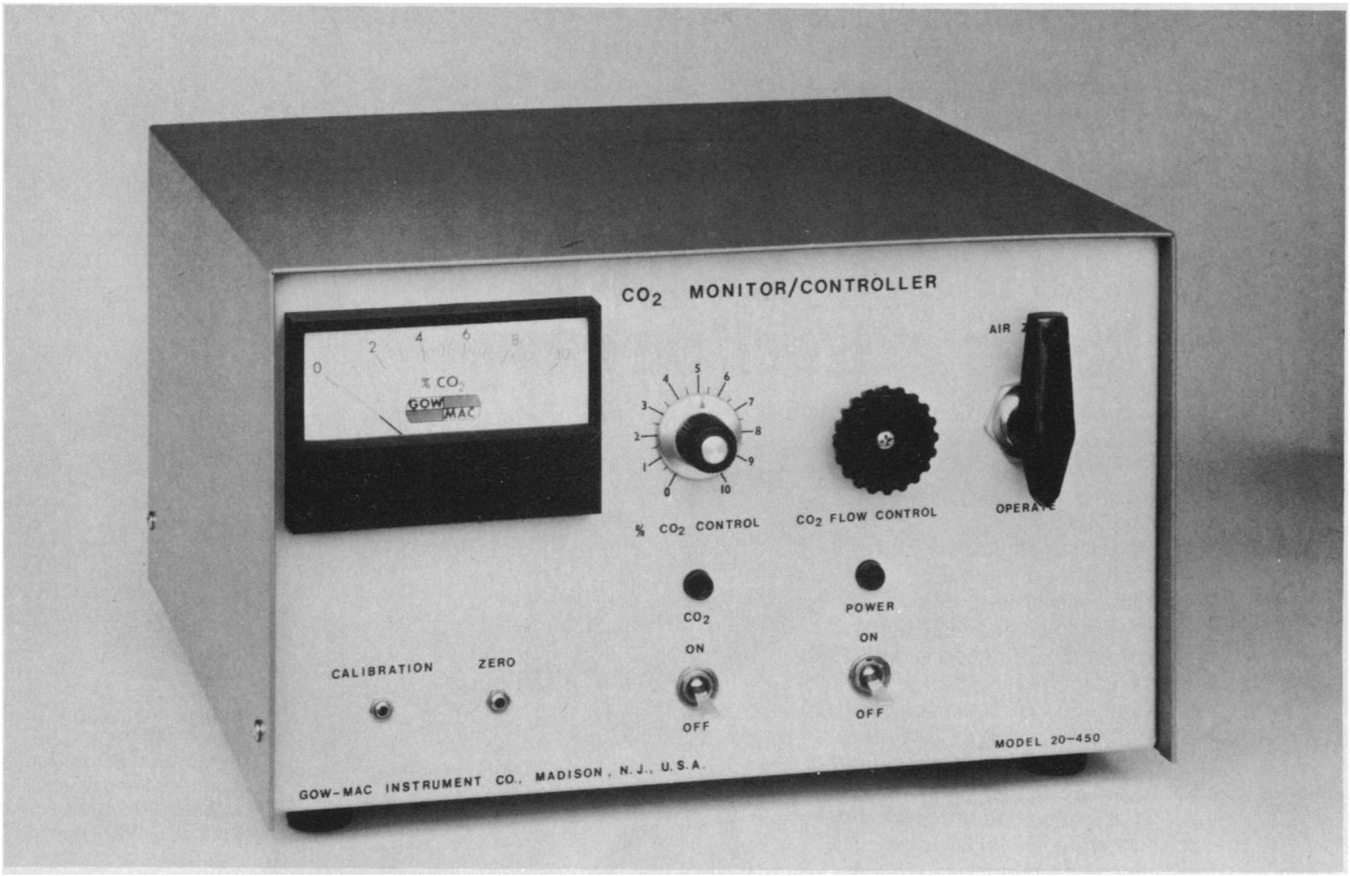
32nd and Griffin Avenue
Richmond, CA 94804
Phone (415) 234-4130

Also in: Rockville Centre, N.Y.; Mississauga, Ontario; London; Milan; Munich; Sao Paulo.



Econo-Columns™

Circle No. 169 on Readers' Service Card



You Know your Cultures are Vitally Important.

So Do We.

That's why we've designed and engineered, in cooperation with the Tissue Culture Department of a leading university, and the USPH Center for Disease Control, a CO_2 Monitor/Controller specifically for your incubator. The instrument monitors and controls accurately and continuously to $\pm 0.2\%$ CO_2. When the incubator door is opened, rapid CO_2 recovery is accomplished by a solenoid valve controlled by a unique GOW-MAC solid state CO_2 sensor. The Monitor/Controller recovers required CO_2 tension at better than 1% per minute. With the exception of the solenoid valve, the circuit is non-mechanical. CO_2 can be vented or can be recycled for economy. GOW-MAC's Model 20-450 CO_2 Monitor/Controller may be located at the incubator or remote from it in the case of cultures susceptible to vibration. A direct reading dial enables the required CO_2 concentration to be easily set. Readout of actual CO_2 concentration is displayed on a 4" meter.

Chances are your Carbon Dioxide supplier knows and uses GOW-MAC gas analyzers throughout his plant. We have pioneered and manufactured gas analyzers for several decades. You look at it as controlling CO_2. We look at it as analyzing and controlling a binary gas mixture in your incubator.

GOW-MAC . . . a new name in Biology—An old name in instrumentation.

GOW-MAC Instrument Co.
100 Kings Road, Madison, NJ 07940
(201) 377-3450

I'd like to know more about controlling CO_2 and about other GOW-MAC instruments.

Name ____________________

Affiliation ____________________

Address ____________________

City ____________________

State ____________ Zip ________

5 new spectrophotometers from Zeiss. Count 'em. 5!

The new PM 6 line of spectrophotometers has four different models. All with double-grating monochromators. All with automatic blank reference. One of them certain to fit your needs.

Consider now the single-package PM 6's. So compact, each takes up less than 2 ft.^{2} of bench space. Sampling capabilities range from manual to fully automatic, and all can be equipped with recorders or printers. Ideal for endpoint and kinetic measurements.

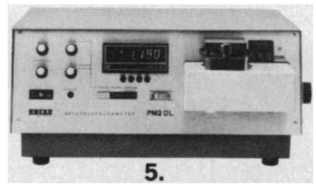
All four PM 6's house Deuterium and Halogen light sources (and their power supplies, too) for efficient coverage from 200 to 800nm. All use wide-range photomultipliers and, with their double-grating monochromators, have the lowest stray-light levels of any spectrophotometers in their price class. The highly accurate and reproducible measurements are displayed in absorbance and concentration units on a 4-digit readout.

Operation is simple and foolproof. Truly human-engineered with few controls for rapid, error-free performance. And the advanced integrated circuitry makes the instruments practically service-free.

For the whole story, write Carl Zeiss, Inc., 444 5th Ave., New York, N. Y. 10018. Phone (212) 730-4400.

In Canada: 45 Valleybrook Drive, Don Mills, Ont., M3B 2S6 (416) 449-4660.

Nationwide Sales and Service direct and only from Zeiss.



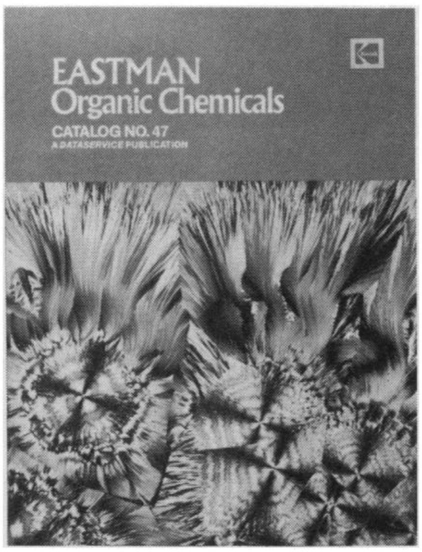
5.

LOW-PRICED WORKHORSE

PM-2: Priced at around $2600. Because some labs don't need the many capabilities built into PM-6's (at $4000-$8000), but do want the same Zeiss precision and ease of operation, we're introducing the PM-2. A precision-grating instrument ideal for clinical use with automatic blank reference. For UV and visible.

BRANCH OFFICES: ATLANTA, BOSTON, CHICAGO, COLUMBUS, HOUSTON, LOS ANGELES, SAN FRANCISCO, WASHINGTON, D.C.

Eastman Organic Chemicals News



EASTMAN Organic Chemicals Catalog No. 47

Featuring:

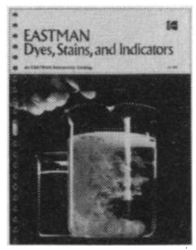
- 332 pages of data on nearly 6,000 EASTMAN Organic Chemicals.
- Structural formulas illustrated for more than 1,000 of the chemicals.
- An index of empirical formulas.
- A functional group listing.
- Color coding on all pages to help you quickly find what you need.
- Reader-service postcards enabling you to request additional literature, quotes on bulk and custom chemicals, and other information.

For your own personal copy, request Kodak Publication No. JJ-1.

Circle No. 176 on Readers' Service Card

If your needs are very specific, perhaps you also need one of these product listings for a particular application.

Dyes, stains, and indicators



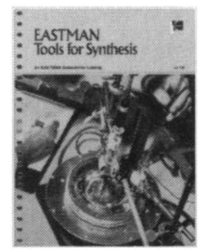
EASTMAN Dyes, Stains, and Indicators, Kodak Publication No. JJ-196, is a new EASTMAN *Dataservice* Catalog to assist you in locating the many dyes, stains, and indicators available from Eastman Organic Chemicals. The product listing is divided into the following categories:

- Adsorption Indicators
- Biological Dyes and Stains
- Buffers
- Chelatometric Indicators
- Colorimetric Indicators
- Cyanine Dyes and Spectral Sensitizers
- Fluorometric Indicators
- Functional Group Determination Reagents
- Organic Laser Dyes and Phthalocyanine-Type Compounds
- Redox Indicators

Use the coupon below to request your copy of JJ-196 and we'll also include a copy of the popular, colorful wall chart, *pH Ranges and Color Changes of EASTMAN Indicators.*

Circle No. 177 on Readers' Service Card

Tools for synthesis



EASTMAN Tools for Synthesis, Kodak Publication No. JJ-195, is a quick reference to reagents commonly used in laboratory and industrial synthesis that are available from Eastman Organic Chemicals. The "Tools for General Organic Synthesis" section is divided into 105 categories listing reagents for chemical reactions (acetylation, etc) and chemical types (acid chlorides, etc).

Also included are separate listings of: ligands for organometallic synthesis, organometallic and complex salts, reagents for polymer synthesis, and reagents for functional group determination. Request Kodak Publication No. JJ-195.

Circle No. 178 on Readers' Service Card

Kodak

Eastman Kodak Company 9-65
Eastman Organic Chemicals
Dept. 412-L
Rochester, N.Y. 14650

Please send the following:

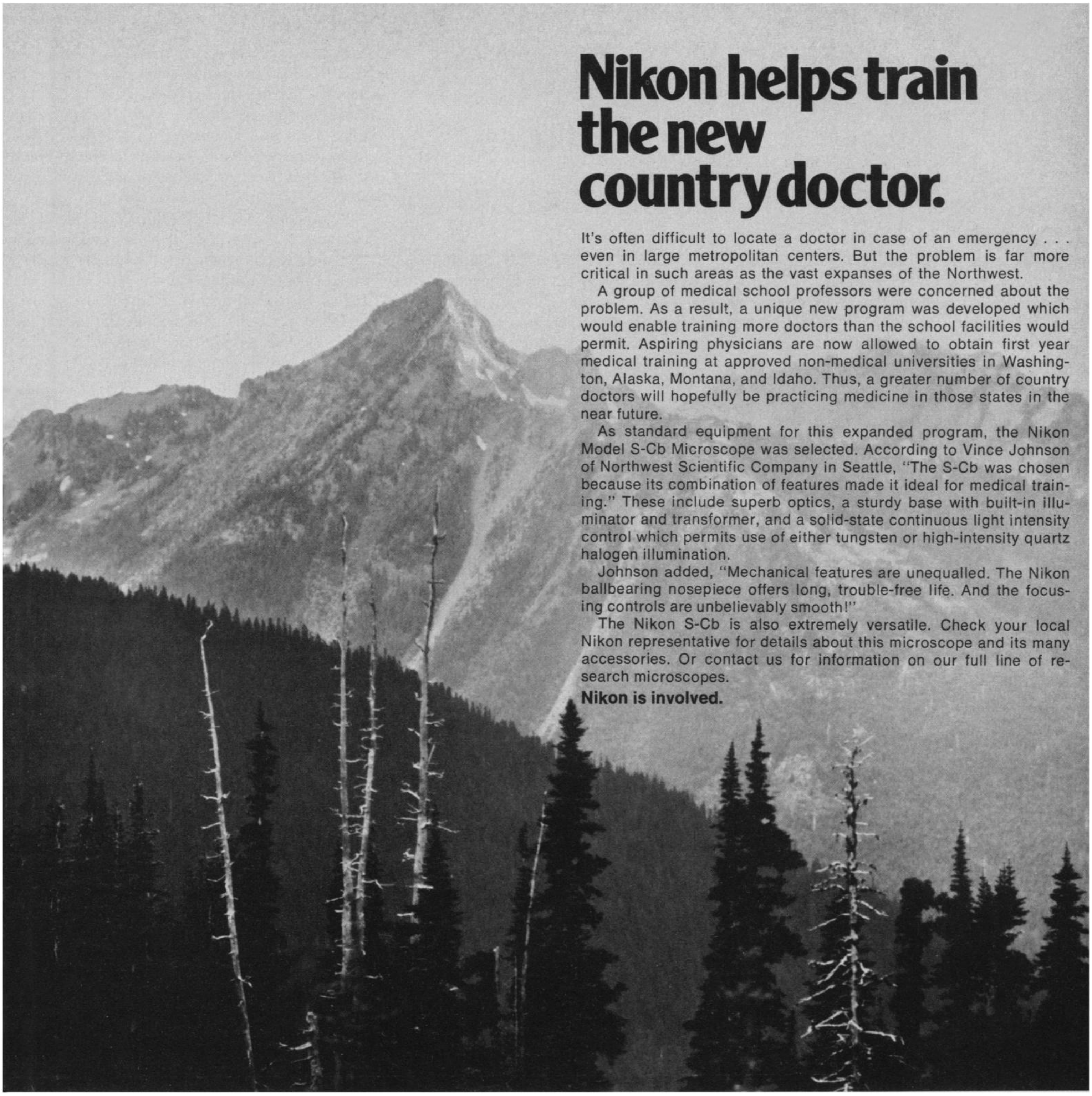
☐ JJ-1, *EASTMAN Organic Chemicals Catalog No. 47*
☐ JJ-195, *EASTMAN Tools for Synthesis*
☐ JJ-196, *EASTMAN Dyes, Stains, and Indicators*

Name ____________________

Affiliation ____________________

Address ____________________

City __________ State __________ Zip __________



Nikon helps train the new country doctor.

It's often difficult to locate a doctor in case of an emergency . . . even in large metropolitan centers. But the problem is far more critical in such areas as the vast expanses of the Northwest.

A group of medical school professors were concerned about the problem. As a result, a unique new program was developed which would enable training more doctors than the school facilities would permit. Aspiring physicians are now allowed to obtain first year medical training at approved non-medical universities in Washington, Alaska, Montana, and Idaho. Thus, a greater number of country doctors will hopefully be practicing medicine in those states in the near future.

As standard equipment for this expanded program, the Nikon Model S-Cb Microscope was selected. According to Vince Johnson of Northwest Scientific Company in Seattle, "The S-Cb was chosen because its combination of features made it ideal for medical training." These include superb optics, a sturdy base with built-in illuminator and transformer, and a solid-state continuous light intensity control which permits use of either tungsten or high-intensity quartz halogen illumination.

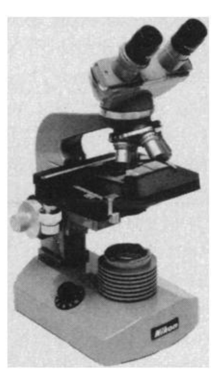
Johnson added, "Mechanical features are unequalled. The Nikon ballbearing nosepiece offers long, trouble-free life. And the focusing controls are unbelievably smooth!"

The Nikon S-Cb is also extremely versatile. Check your local Nikon representative for details about this microscope and its many accessories. Or contact us for information on our full line of research microscopes.

Nikon is involved.

Nikon S-Cb
Laboratory Microscope

Nikon S-Kt
"Compact" Microscope



Nikon CL "Classic"
School Microscope

Nikon Inc., Instrument Group, Ehrenreich Photo-Optical Industries, Nikon
623 Stewart Avenue, Garden City, New York 11530.

EPOI

☐ Please have local Nikon representative contact me.

Please send me detailed information:

☐ **Nikon S-Cb Laboratory Microscope** One of the most versatile microscopes available today. Four configurations extend its capability from a basic school microscope to a laboratory instrument for phase contrast, dark field, and polarizing work. Full range of accessories.

☐ **Nikon S-Kt "Compact" Microscope** Versatile laboratory microscope with built-in transformer, continuously variable light control, and in-base voltmeter. Features brilliant Koehler type illumination.

☐ **Nikon CL "Classic" School Microscope** Designed specifically for student use. Many safety features. High quality Nikon optics, locked-in interchangeable components, Accepts many Nikon accessories.

☐ New forty-two page Nikon microscope catalog.

Name__________ Title__________

Affiliation__________

Address__________

City__________ State__________ Zip__________

Circle No. 131 on Readers' Service Card

lightly plowed or harrowed the seed under. In backward areas poor peasants might have hacked it in by hand after a fallow, without manure. Manuring was sometimes provided by "folding" sheep on a different acre each night. Otherwise any available manure was spread broadcast or "sprinkled" aboveground before seeding (*4*).

Moreover, in war-torn, hungry, 16th- and 17th-century Europe, the practice of manuring land with whole fish, unless spoiled, appears highly improbable. Food for humans was too scarce. It was for food, oil, and profit, not manure, that Basque, Breton, and English fishermen undertook the laborious and dangerous voyage to the Grand Banks. Out of their return cargo, fishheads and fins might have been spread on the land; in the case of pilchards (sardines), once the valuable oil was extracted, the waste may have been "laid upon the fields to enrich them." Yet few are the agricultural writers of the period who even mention fish as manure.

Where in his travels could Squanto have learned fish-in-hill fertilization of maize or Indian corn? Only in Spain's recently conquered Peru was fish manuring practiced. Is it conceivable that the Spanish Conquistadors had brought back fish-in-hill maize culture from South America's Pacific shore and somehow taught it to captive Squanto; that he was so impressed that on recrossing the Atlantic he in turn taught the Pilgrims?

Could Squanto have learned it in cool, damp England, where maize was not grown, or in northerly, often fog-shrouded, Newfoundland? Maize requires week upon week of hot sunshine for its grain to mature. One could easily be misled by the habit of English writers of using the word "corn" in a generic sense for all small grain—wheat, rye, barley—adding the prefix "Indian" only if maize was indicated. The documents that Prowse's *History of Newfoundland* (*5*) quotes show that the "corne" that fisher-farmers attempted to grow there was rye, oats, barley (and in one case, wheat), not Indian corn. As late as 1845 the island's crops were reported as only oats and hay (*6*).

Ceci's suggestion that Squanto might have picked up his knowledge of fish-corn fertilization from the early agricultural attempts of sailors visiting the New England coast appears unlikely. Of the seven recorded stirrings of New England soil previous to 1620, Captain John Smith's appears to have been the lengthiest. His Monhegan Island garden off the Maine coast, so he says, "served us for sallets in June and July" (*7*), too early for Indian corn.

As Ceci points out, on rich, newly

gues that Squanto (and later the Pilgrims) could not have learned the value of fish fertilizer earlier in locations where a hilled and nonbroadcast seeded plant like maize, or maize itself, was not also present. However, the notion of a complex imposes restrictions on learning processes that seem arbitrary, and Russell's survey of European husbandry is insufficient to conclude that, without exception, Squanto could not have seen one or more of these features on European farms. His point that maize may have been grown in Spain is one possible and important example. Mason's 1620 description (*4*) of farming in Newfoundland is another. For here, Squanto could have observed fish fertilizer used not only with "Sommer and Winter corne . . . Wheate, Rye, Barlie, Oats, and Pease," but with nonbroadcast seeded plants such as "Garden herbes . . . Roots: as torneps, Pasnepes, Caretts, and Radishes" (*4*, p. 149).

If Squanto had simply seen how fish dressings generally improved crop productivity in England (*5*) or Newfoundland, couldn't he have learned the critical information necessary for the sound agronomical advice he was to pass on to the next group of English farmers he met?

The original text of Winslow's 1621 letter does not rule out this possibility: "We set the last Spring some twenty Acres of *Indian* Corne, and sowed some six Acres of Barly & Pease, and according to the manner of the Indians, we manured our ground with Herings, or rather Shadds . . ." (*3*). Deletion of the critical passage about sowing barley and pease (see Russell's version) creates the impression that fish fertilizers were restricted to hilled maize plants—a false impression that confirms Russell's notion that the practice was a linked complex. That the Pilgrims used this fertilizer for more general farming, indeed with some of the very same crops grown in Newfoundland, weakens the argument for a complex and for the point that Squanto could not have learned the value of fish fertilizer used with plants other than maize.

Other statements bring into question Russell's methods of interpretation. For example, the above letter continues: "we had a good increase of *Indian* Corne, and our Barly indifferent good, but our Pease not worth the gathering, for we feared they were too late sowne, they came up very well, and blossomed, but the Sunne parched them in the blossome." From this citation, Russell concludes that "indifferent good" for the barley meant "almost complete failure" and that lack (see above) of fish fertilizer was somehow involved in the supposed failure of the barley and the peas.

Many other of Russell's statements cannot be evaluated as evidence because they are either unreferenced or, like that suggesting Squanto had worked in the cornfields with his mother, literary extensions of missing primary data. He ignores the length of the 1606–1607 French colony in Maine and Nova Scotia in the statement about Smith's brief visit having been the "lengthiest" opportunity for New England Indians to learn about European food producing technology. The making of butter and cheese by Indians of Maine in 1605 (*6*) indicates that such "unlikely" possibilities could occur. Given this and the considerable data on early European contact, the many practices assumed to be "native" must be carefully researched before the possibility of European influence can be ruled out.

Warden's arguments for the Indian practice of fish fertilizer are not served by his data. If, as he suggests, a reduced Indian population after 1615 would not have depleted soil nutrients needed for maize cultivation (a questionable hypothesis given the citations for fallowing), then absence of documentation for an Indian reliance on fertilizer reflects the real absence of the practice. Yet later Warden implies that Indians *did* use fertilizers but that its usage went undocumented because observers felt guilty about having no "defensible legal title" to Indian lands. If there is one quality that is uncommon in early settlers' writings, it is guilt concerning the usurpation of Indian lands or ill treatment of Indians. For after all, most settlers believed they had *divine* (if not Royal) title to the lands, and if they did not feel too guilty to describe an illegal use of "fire and sword" (*7*) to destroy whole villages of Indians, whence came the qualms about describing Indians using fish as fertilizer?

Warden's demographic data support my explanation for the absence of documentation. His population density figures—0.10 to 0.20 persons per square mile after 1615 and (by interpolation) 0.27 to 0.53 before 1615—correspond to those estimated for "pre-farming" (*8*) societies, nonsedentary groups who rely primarily on wild foods that may be seasonally distributed in various ecological zones. If maize had comprised as much as half their subsistence, the population density before 1615 should have been more than double (*9*) that given. If the Indian population was then so thin and maize production played a relatively minor role, it would have been unnecessary, if not maladaptive, to establish fixed planting fields (near the coastal sources of fish) that had to be kept permanently productive with annual applications of fish.

That I "overestimated" the "sophistication of technology needed for . . . using fish fertilizer" is quite wrong. Agronomist

R. Lucas (*10*) pointed out to me that my citation of 360 cornhills per acre must be in error since it would have resulted in spacings 11 feet apart—surely too wide. Additional research on cornhill spacing among Indian cultivators produced figures of 2½, 3, 4, and 6 feet (*11*). Spacings of these sizes would produce 1210 to 6970 cornhills per acre. If each were dressed with 2 to 4 fish, the numbers of fish required would not be the 720 to 1440 originally calculated but more like 2420 to 27,880.

With so great an agricultural task before them, I do not understand the basis for the claim that Indian tools "sound much more efficient than the clumsy, expensive, manufactured implements used by Europeans." W. Wood, closer to the relative efficiency of the day, would probably have challenged Warden, for in 1634 he wrote that one plow "could teare up more ground in a day, than the [Indian] Clamme shels could scrape in a month" (*12*).

Most disturbing is Warden's comment that I "did not prove conclusively that the Indians of New England were ignorant or incapable of using fish for fertilizer." To construe that a cultural analysis of native cultivation was an attempt to slur the capabilities of early Native North Americans reveals a basic misunderstanding of how or why anthropologists study cultural adaptiveness. It also unfairly introduces a notion of ethnic bias and nonscientific motivation into my research. My conclusion that fallowing was the more adaptive cultivation practice for Northeastern Indians implies no value judgment on my part regarding the capabilities of Indians, nor should any scholar interpret it as such.

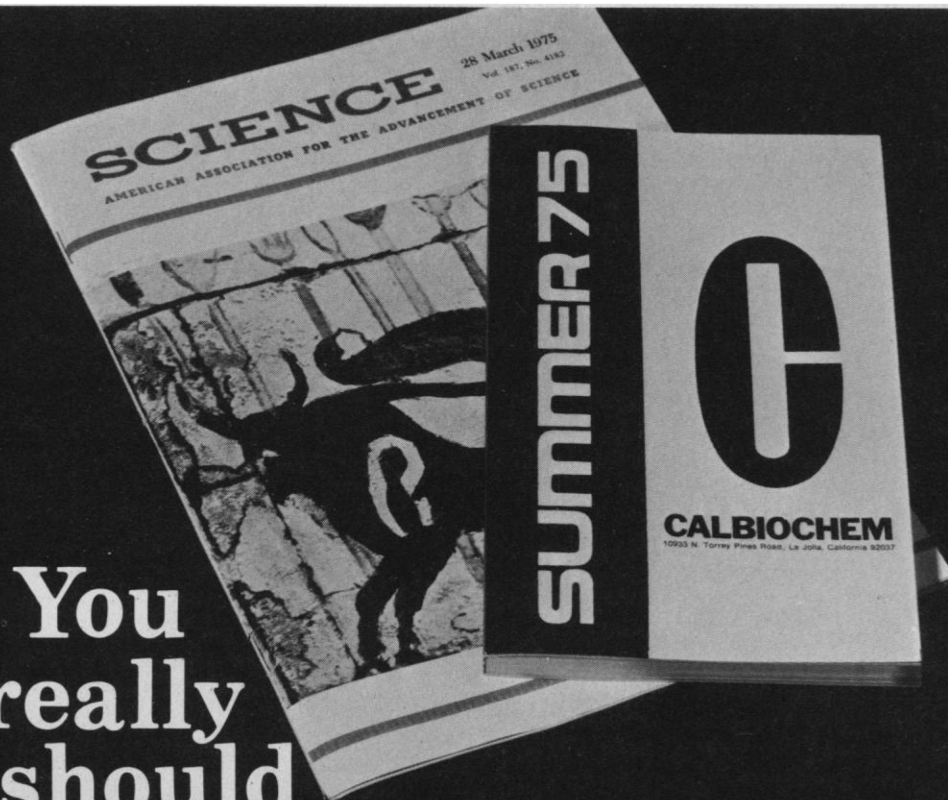
In sum, neither reply to my article contains substantive evidence to show that (i) any early Indians other than Squanto knew about fish fertilizer, or that (ii) the practice would have been adaptive to or even consistent with the known cultural system of the Indians involved. These remain the principal issues to challenge the lovely legend.

LYNN CECI

Department of Anthropology,
Graduate School and University Center
of the City University of New York,
New York 10036

References and Notes

1. "In addition to his ministerial labours, Eliot taught them to improve their wigwams, and to fence their grounds with ditches and stone walls." J. Small, in J. Eliot, *The Indian Primer* (Elliot, Edinburgh, 1877), p. xi.
2. J. Winthrop, *Collect. Mass. Hist. Soc.* **6** (Ser. 4), 515 (1863).
3. W. Bradford and E. Winslow, *Journal of the English Plantation at Plimouth* (University Microfilms, Ann Arbor, Mich., 1966), p. 60. This reference is an unedited, photoreproduced copy of the original work.
4. J. Mason, in *Captain John Mason*, J. W. Dean, Ed. (Franklin, New York, 1967).
5. According to C. Jones (personal communication), the practice of using fish fertilizer was "standard"



You really should read them both...

The publication in your hand contains current technical information of vital importance to your professional research. So does the Calbiochem catalog. Our editors strive to be informative, entertaining and brief in their uncluttered description of more than 2000 authentic research biochemicals. Calbiochem's publications and products are available from 9 offices and 50 local agents throughout the world. If you want a free subscription to our publications, send your name and professional address to Ms. H. Gone, c/o Calbiochem, P.O. Box 12087, San Diego, California 92112. Ask for our current catalog.

CALBIOCHEM

Circle No. 189 on Readers' Service Card

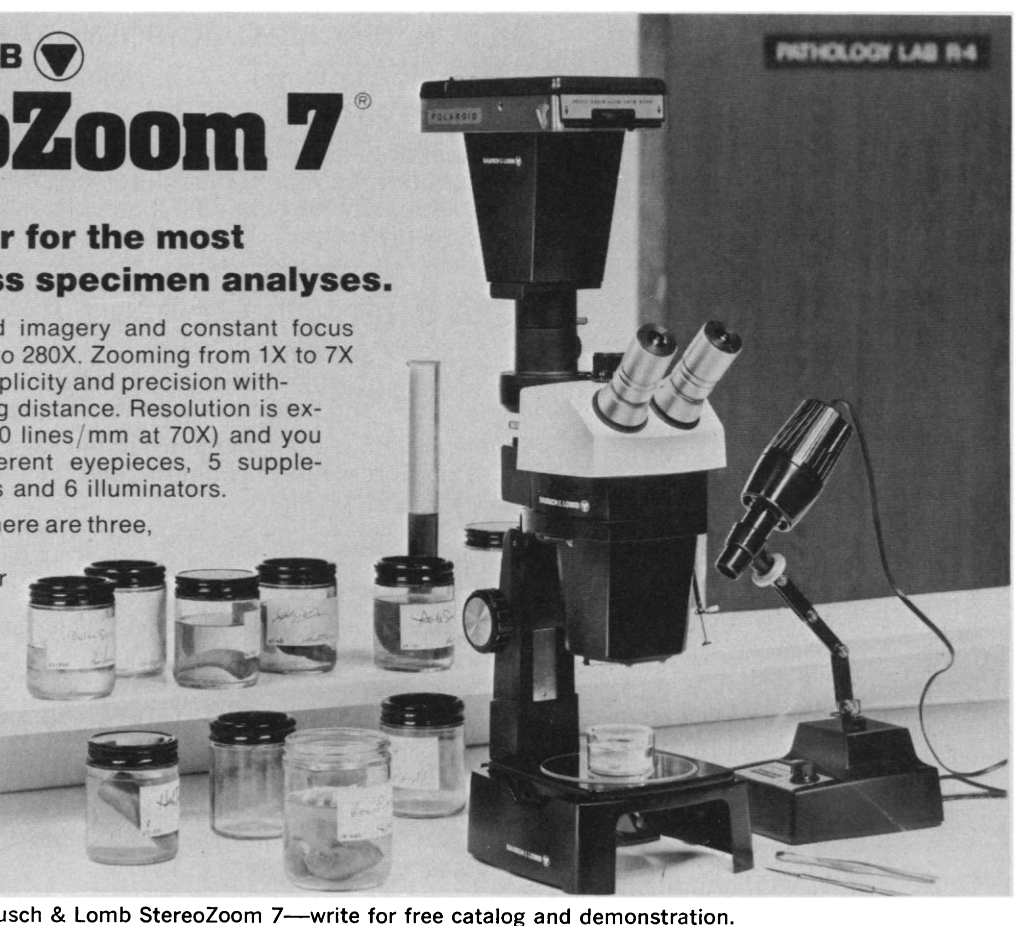
BAUSCH & LOMB

StereoZoom 7® microscope

Resolving power for the most demanding gross specimen analyses.

You get sharp, flat field imagery and constant focus while viewing from 2.5X to 280X. Zooming from 1X to 7X is accomplished with simplicity and precision without changing the working distance. Resolution is extremely high (at least 300 lines/mm at 70X) and you can select from 3 different eyepieces, 5 supplementary lenses, 8 stands and 6 illuminators.

Camera formats? Yes—there are three, plus an exposure meter, 10X wide field view finder . . . and more.



Bausch & Lomb StereoZoom 7—write for free catalog and demonstration.
Bausch & Lomb, Scientific Optical Products Division, 77421 North Goodman Street, Rochester, N.Y. 14602.

Circle No. 91 on Readers' Service Card

19 September 1975, Volume 189, Number 4207

SCIENCE

Freedom of Inquiry

The First Amendment to the Constitution explicitly forbids the Congress from abridging the freedoms of speech and of the press. It imposes no comparable constraint abridging freedom to learn, to teach, or to inquire; yet these may be construed to be implicit freedoms and indeed seem to be of a comparable quality. All of these freedoms are, in fact, abridged from time to time, subject to the test of a real and present danger. In the absence of such demonstrable danger, the accepted position is and should be jealously to guard the constitutionally guaranteed freedoms, both those expressed and those implied.

Abridgments of freedom of speech and of the press have frequently occurred and have been contested. News media report movements in many communities to limit freedom to teach, especially in areas such as sex education. Analogously we encounter today serious questions, arising in part from scientists themselves, about the appropriateness of pursuing certain lines of scientific inquiry.

Some of the consequences of constraining freedom of inquiry are well known. Jacob Bronowski recently reminded us that the loss of Italy's lead position in the Renaissance of science followed immediately upon and doubtless was caused by the adverse judgment of the Inquisition against Galileo, which forbade certain lines of inquiry. In an otherwise impressive forward march of science in the Soviet Union, a generation of genetics research was lost by the constraints resulting from Lysenkoism. Such losses must enter into the cost-benefit analysis in determining whether to encourage, permit, discourage, or forbid a particular line of investigation.

Among the lines of research against which voices have recently been raised are the following:

1) What are the genetic contributions to intelligence?

2) What kinds of experiments may properly be performed on informed consenting adults? Minors? Fetuses? Prisoners?

3) May one screen infants for a variety of genetic defects, some with known, others with currently unknown clinical consequences?

4) Under what circumstances may one tamper with the genetic process, as by the introduction of foreign genetic material into the genome?

5) When may one meddle with human conception and pregnancy as by artificial insemination, abortion, cloning, in vitro fertilization, or the use of surrogate mothers?

In arriving at considered judgments on these and a number of other problems, it is suggested that we treat freedom of inquiry as we have learned to treat freedom of speech—that is, agree to abstain when there is a real and present danger. By this test, the fact that the problem may be difficult, or that its solution may prove politically embarrassing or unpopular, is insufficient ground for invoking constraint. Indeed, a science that shies away from a line of inquiry merely because the result may be difficult to manage is in a sorry state.

Each man or woman will assess whether a real and present danger exists in each particular line of inquiry. The judgment will be difficult but not entirely unfamiliar. It is the same judgment we make in assessing every instance of censorship that comes to our attention. Is the danger in pursuing a particular line of research of such a magnitude that, in another context, we would willingly abdicate freedom of speech?

Judgments will surely be individual. For example, I acknowledge the danger inherent in some of the scenarios composed for the fabrication of certain types of DNA recombinant molecules. On the other hand, it strikes me that screening infants for abnormal karyotypes presents only such difficulties and problems as practicing physicians cope with on a daily basis. The wise physician must try to minimize the adverse consequences of unfavorable diagnosis.

It is fashionable to criticize the ethics and humanity of scientists, as in other times we have criticized the writers or painters. If history is any guide, this too shall pass. Then we may arrive at the balanced state where all questions may be asked save those which pose a real danger to the community, the environment, or the individual.—DEWITT STETTEN, JR., *Deputy Director for Science, National Institutes of Health, Bethesda, Maryland 20014*

PRODUCTS and MATERIALS

Liquid Chromatograph

System 1 features modular components including a solvent reservoir, a pumping system, an injection valve with a loop filling syringe, a packed column, an ultraviolet detector, and a chart recorder. The detector is equipped with filters for wavelengths of 254 and 280 nanometers. An optional gradient elution accessory is also available as is a variety of columns depending on the analysis to be performed. The system occupies only a nominal amount of bench space when fully assembled. Substances suitable for study with this system include nucleic acids, steroids, proteins, herbicides, drugs of abuse, pharmaceuticals, and many others. Glenco Scientific. Circle 691.

Uric Acid Determination

The Urichrome reagent set is specific for the determination of uric acid content in human serum. The procedure involves an enzymatic reaction to which colorimetry may be applied in reading the result. This eliminates the need for protein-free filtrates. Readings are linear to concentrations of 15 milligrams of uric acid per deciliter of serum. Each test requires 20 minutes. Packaged kits include uric acid reagent, enzyme reagent, color reagent, and calibrator reagent sufficient for 75 determinations. Harleco. Circle 692.

Thin-Layer Chromatography Plate

New TLC plates are available with an absorbent spotting area. This absorbs large quantities of crude, dilute organic, or aqueous sample. As the solvent passes through the absorbent it is extracted, concentrated, and presented uniformly to the silica gel. The absorbent area is stable in acid, base, or neutral systems. Kontes. Circle 693.

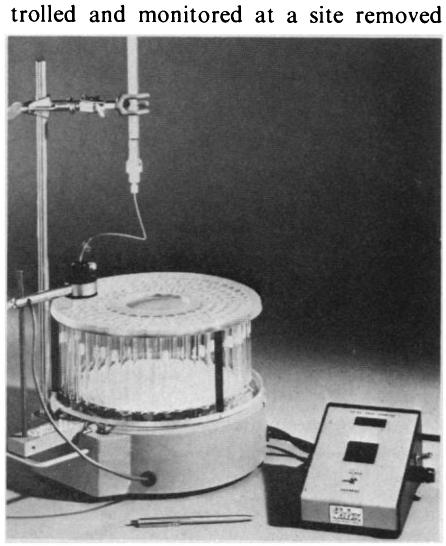
Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement 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 942A and 1014A) and placing it in the mailbox. Postage is free.—RICHARD G. SOMMER

Conductivity Meter

The DA-1 is a battery-operated instrument that measures the electrical conductivity of solutions. The single-probe meter features a range selector. Operator determines whether measurements are to be made in the 0 to 100, 1,000, or 10,000 micromhos per centimeter range. The mirrored scale eliminates reading errors due to parallax. A manual dial enters a compensation for any temperature from 0° to 100°C. LaMotte Chemical Products. Circle 695.

Fraction Collectors

Model FC-DC has an extended time base and drop-counting capability. In a single operation the device will collect 136 fractions in 9-milliliter test tubes or 160 fractions of 1 milliliter each may be collected in formed polypropylene plates. Time and drop counting of 1 to 999 seconds or drops per fraction, respectively, are feasible. These functions may be controlled and monitored at a site removed from that of the actual collection. The device is suitable for use in analytic liquid chromatography, electrophoresis, gradient centrifugation, and in other sampling applications. Eldex Laboratories. Circle 696.



Fluorogenic Reagent

Fluoropa is a sensitive reagent for the detection of primary amines in chromatographic column effluents. It can also be used to detect peptides, proteins, amino sugars, polyamines, and ammonia. It is soluble and stable in water and detects as little as 20 picomoles of most amino acids. Peptides may be determined from samples as small as 10 micrograms. Unreacted Fluoropa is nonfluorescent. Within a few seconds of mixing at room temperature maximum fluorescence is achieved. It may be used with any amino acid analyzer or other liquid chromatograph. Fluoropa is available in 5-gram bottles with complete instructions for use. Durrum Chemical. Circle 694.

Literature

Fluorescence Detector for Liquid Chromatography is devoted to the FS 970. It provides illustrations and design specifications and discusses applications. Schoeffel Instrument. Circle 697.

Liquid-Handling Systems includes pipettors, dispensers, dilutors, micropipettes and samplers, solution transfer systems, syringes, and disposable tips. Oxford Laboratories. Circle 699.

Carrier Ampholytes for Isoelectric Focusing are available in nine different ranges including a general one from *p*H 2 to 10. Brinkmann Instruments. Circle 700.

Laboratory p*H* includes an article on the measurement of *p*H in theory and practice. The text is incorporated in a catalog of instrumentation for conductivity and *p*H. Markson Science. Circle 701.

Carbon 14 and Tritium Labeled Compounds lists over 450 different compounds for biological studies with radioactive tracer methodology. A brief introduction defines nomenclature and specifies purity, specific activity, and radioactive decomposition. Research Products International. Circle 702.

Infrared Accessories features items for transmission, micro sampling, reflectance, gas chromatography, pyrolysis, and other accessories and crystals in over 40 pages. Wilks Scientific. Circle 703.

Inorganic and Organic Laboratory Reagents includes more than 3000 products for instrumental analysis. J. T. Baker Chemical. Circle 704.

BOOKS RECEIVED

(Continued from page 990)

ert L. Sternberg, Eds. Dekker, New York, 1975. xii, 412 pp., illus. Paper, $24.50. Lecture Notes in Pure and Applied Mathematics, vol. 10.

The Dynamic Environment. Water, Transportation, and Energy. Edwin H. Marston. Xerox College Publishing, Lexington, Mass., 1975 (distributor, Wiley, New York). xii, 406 pp., illus., + appendices. $10.95.

Ecologie du Plancton Marin. Paul Bougis. Masson, Paris, 1974. Two volumes, illus. Vol. 1, Le Phytoplancton, x, 196 pp.; vol. 2, Le Zooplancton, vi, 200 pp. Paper, each volume 98 F. Collection d'Ecologie, Nos. 2 and 3.

The Economics and Politics of the Middle East. Abraham S. Becker, Bent Hansen, and Malcolm H. Kerr. Elsevier, New York, 1975. x, 134 pp. $7.95. The Middle East Economic and Political Problems and Prospects.

Electron-Ion Exchangers. A New Group of Redoxites. A. V. Kozhevnikov. Translated from the Russian edition (Leningrad, 1972) by R. Kondor. A. J. Pick, Transl. Ed. Halsted (Wiley), New York, and Israel Program for Scientific Translations, Jerusalem, 1975. xii, 130 pp., illus. $18.75.

Elements of Advanced Quantum Theory. J. M. Ziman. Cambridge University Press, New York, 1975. xii, 270 pp. Paper, $6.95. Reprint of the 1969 edition.

Endocrinologie Sexuelle de la Période Périnatale. Sexual Endocrinology of the Perinatal Period. Papers from a symposium, Lyon, France, May 1974. Maguelone G. Forest and Jean Bertrand, Eds. INSERM, Paris, 1974. 434 pp., illus. Paper, 50 F. Les Colloques de l'Institut National de la Santé et de la Recherche Médicale, vol. 32.

Energy for Tomorrow. Philip H. Abelson. University of Washington Press, Seattle, 1975. x, 80 pp., illus. Cloth, $5.95; paper, $2.50. The Jessie and John Danz Lectures.

Environmental Policy, Law, and Administration. A Guide to Advanced Study. Prepared by Lynton K. Caldwell and Toufiq A. Siddiqi. Indiana University School of Public and Environmental Affairs, Bloomington, 1974. xiv, 596 pp. Paper, $6.50.

Epitaxial Growth. Part B. J. W. Matthews, Ed. Academic Press, New York, 1975. xiv pp. + pp. 381–680, illus. $29.50. Materials Science and Technology.

Ergebnisse der Angiologie. Band 7, Untersuchungen zur Hämodynamik in Venen der unteren Extremität. Physiologische and pathophysiologish-klinische Aspekte. Henner Müller-Wiefel. Schattauer, Stuttgart, Germany, 1974. vi, 138 pp. + tables. Paper, DM 39.

The Existence of Space and Time. Ian Hinckfuss. Clarendon (Oxford University Press), New York, 1975. xii, 154 pp., illus. $11.25.

Exploration from the Mountains to the Basin. Proceedings of a meeting, El Paso, Tex., Jan. 1975. John M. Hills, Ed. El Paso Geological Society, El Paso, Tex., 1975 (available from H. Jackson, Department of Geological Sciences, University of Texas at El Paso). 190 pp., illus., + loose maps. Paper, $10.

The Far Side of Consciousness. Daniel Cohen. Dodd, Mead, New York, 1975. x, 214 pp. + plates. $6.95.

Foundations of Quantum Dynamics. S. M. Blinder. Academic Press, New York, 1974. x, 226 pp. $17.25.

Fusian Reactor Physics. Principles and Technology. Terry Kammash. Ann Arbor Science Publishers, Ann Arbor, Mich., 1975. xiv, 496 pp., illus. $29.50.

The Future of International Fisheries Management. H. Gary Knight, Ed. Published for the American Society of International Law by West Publishing Co., St. Paul, Minn., 1975. xiv, 254 pp. $14.

General University Chemistry. A Developmental Approach. Sidney Golden. Oxford University Press, New York, 1975. 2 vols., illus. Vol. 1. xiv, 704 pp. Vol. 2. x, 694 pp. Paper, each vol., $6.95. Responses to Queries, Problems, and Exercises, au., x, 238 pp., illus. Paper, $2.50.

A Geography of World Economy. Hans Boesch. Halsted (Wiley), New York, ed. 2, 1974. xvi, 304 pp., illus. $12.95.

Glossary of Molecular Biology. A. Evans. Halsted (Wiley), New York, 1975. viii, 56 pp. $6.95.

Groups. D. A. R. Wallace. Allen and Unwin, London, 1974, and Crane, Russak, New York, 1975. vi, 104 pp., illus. Paper, $5.25. Problem Solvers, No. 16.

Grzimek's Animal Life Encyclopedia. Bernhard Grzimek, Ed. Vol. 2, Insects. Franz Bachmaier and ten others, Eds. Translated from the German edition (Zurich, 1969). Van Nostrand Reinhold, New York, 1975. 644 pp., illus. $29.95; 13-volume set, $325.

Handbook of Laboratory Animal Science. Vol. 1. Edward C. Melby, Jr., and Norman H. Altman, Eds. CRC Press (Chemical Rubber Co.), Cleveland, 1974. xii, 452 pp., illus. $39.95.

Hormone Binding and Target Cell Activation in the Testis. Proceedings of a conference, Houston, Feb. 1974. Maria L. Dufau and Anthony R. Means, Eds. Plenum, New York, 1974. xii, 372 pp., illus. $25. Current Topics in Molecular Endocrinology, vol. 1.

Human Growth Hormone and Gonadotrophins in Health and Disease. Paul Franchimont and Henry Burger. North-Holland, Amsterdam and Elsevier, New York, 1975. xiv, 494 pp., illus. $49.95.

The Illustrated Manual of Sex Therapy. Helen Singer Kaplan. Drawings by David Passalacqua. Quadrangle (New York Times), New York, 1975. x, 182 pp. $14.95.

Immunoassays for Drugs Subject to Abuse. Proceedings of a meeting, Rockville, Md., Mar. 1973. S. J. Mulé, I. Sunshine, M. Braude, and R. E. Willette, Eds. CRC Press (Chemical Rubber Co.), Cleveland, 1974. x, 126 pp., illus. $23.

International Review of Cytology. Vol. 41. G. H. Bourne, J. F. Danielli, and K. W. Jeon, Eds. Academic Press, New York, 1975. x, 364 pp., illus. $29.

The Interpretations of Multiple Observations. F. H. C. Marriott. Academic Press, New York, 1974. x, 118 pp., illus. $9.

Intracellular Protein Turnover. Papers from a symposium, Stanford, Calif., Dec. 1973. Robert T. Schimke and Nobuhiko Katunuma, Eds. Academic Press, New York, 1975. xiv, 348 pp., illus. $16.

An Introduction to Genetics. David J. Merrell. Norton, New York, 1975. xxii, 822 pp., illus. $14.95.

Introduction to Human Anatomy. Carl C. Francis and Alexander H. Martin. Mosby, St. Louis, ed. 7, 1975. xiv, 512 pp. + plates. $12.95.

Introduction to Modern Virology. S. B. Primrose. Halsted (Wiley), New York, 1975. viii, 134 pp., illus. Paper, $5.95. Basic Microbiology, vol. 2.

Introduction to Physiological Psychology. Richard F. Thompson. Harper and Row, New York, 1975. xvi, 670 pp., illus. $14.95. Harper's Physiological Psychology Series.

Joseph Fourier. The Man and the Physicist. John Herivel. Clarendon (Oxford University Press), New York, 1975. xii, 350 pp. + plates. $31.25.

Kanker. Het Raadsel van zijn Oorzaak en Ontstaan. C. G. Van Wijk. Servire, Wassenaar, the Netherlands, 1974. vi, 296 pp., illus. Paper, Dfl. 24.

Leukemia. Frederick Gunz and Albert G. Baikie. Grune and Stratton, New York, ed. 3, 1974. xxii, 842 pp., illus. $37.50.

Limnology of Shallow Waters. Proceedings of a symposium, Tihany, Hungary, Sept. 1973. J. Salánki and J. E. Ponyi, Eds. Akadémiai Kiadó, Budapest, 1975. 304 pp., illus. $19. Symposia Biologica Hungarica, vol. 15.

Macroeconomics. Measurement, Theory, and Policy. Michael C. Lovell. Wiley, New York, 1975. xviii, 542 pp., illus. $14.95.

The Malnourished Mind. Elie A. Shneour. Anchor (Doubleday), Garden City, N.Y., 1975. xxiv, 210 pp. Paper, $2.95. Reprint of the 1974 edition.

Management of Industrial Particulates. Corporate, Government, Citizen Action. Joseph M. Heikoff. Ann Arbor Science Publishers, Ann Arbor, Mich., 1975. x, 260 pp., illus. $14.50.

Mass Media Violence and Society. Dennis Howitt and Guy Cumberbatch. Halsted (Wiley), New York, 1975. viii, 168 pp. $12.50.

Mathematical Methods in the Social and Managerial Sciences. Patrick Hayes. Wiley-Interscience, New York, 1975. xviii, 460 pp., illus. $19.95.

Mathematical Structure in Human Affairs. R. H. Atkin. Crane, Russak, New York, 1975. viii, 212 pp., illus. $18.75.

The Mathematical Theory of Diffusion and Reaction in Permeable Catalysts. Vol. 1, The Theory of the Steady State. Rutherford Aris. Clarendon (Oxford University Press), New York, 1975. xvi, 444 pp., illus. $39.50.

The Mathematics of Diffusion. J. Crank. Clarendon (Oxford University Press), New York, ed. 2, 1975. x, 414 pp., illus. $39.

Medical Microbiology in the Tropics. Eninnaya Nnochiri. Oxford University Press, New York, 1975. vi, 386 pp. + plates. Paper, $19.25.

Memory, Related Functions and Age. Jack Botwinick and Martha Storandt. Thomas, Springfield, Ill., 1974. viii, 198 pp., illus. $12.75.

Methods in Enzymology. Sidney P. Colowick and Nathan O. Kaplan, Eds. Vol. 38, Hormone Action. Part C, Cyclic Nucleotides. Joel G. Hardman and Bert W. O'Malley, Eds. Academic Press, New York, 1974. xxiv, 454 pp., illus. $29.50.

Microwave Integrated Circuits. K. C. Gupta and Amarjit Singh, Eds. Halsted (Wiley), New York, 1975. xii, 380 pp., illus. $12.95.

Modern Atomic Physics. Quantum Theory and Its Applications. B. Cagnac and J.-C. Pebay-Peyroula. Translated from the French edition (Paris, 1971) by J. S. Deech. Halsted (Wiley), New York, 1975. xx, 254 pp., illus. $17.95. A Macmillan Physics Text.

Modern Physical Techniques in Materials Technology. T. Mulvey and R. K. Webster, Eds. Oxford University Press, New York, 1974. xiv, 322 pp., illus. $30.50. Harwell Series.

Molecular Radiobiology. N. B. Strazhevskaya, Ed. Translated from the Russian edition (Moscow, 1972) by A. Mercado. P. Harry, Transl. Ed. Halsted (Wiley), New York, and Israel Program for Scientific Translations, Jerusalem, 1975. vi, 218 pp., illus. $27.

Motivation and Dynamic Structure. Raymond B. Cattell and Dennis Child. Halsted (Wiley), New York, 1975. xii, 288 pp., illus. $15.95.

Les Mycoplasmes de l'Homme, des Animaux, des Végétaux et des Insectes. Mycoplasmas of Man, Animals, Plants and Insects. Papers from a congress, Bordeaux, Sept. 1974. J. M. Bové and J. F. Duplan, Eds. INSERM, Paris, 1974. 450 pp., illus. Paper, 70 F. Les Colloques de l'Institut National de la Santé et de la Recherche Médicale, vol. 33.

Nuevas Noticias sobre las Obras Hidráulicas Prehispánicas y Coloniales en el Valle de México. Teresa Rojas R., Rafael A. Strauss K., and José Lameiras. Instituto Nacional de Antropología e Historia, Tlalpan, Mexico, 1974. 232 pp., illus. Paper, $4.

Ordovician Brachiopoda from the Shelve District, Shropshire. Alwyn Williams. British Museum (Natural History), London, 1974. 164 pp. + plates. Paper, £12.80. *Bulletin of the British Museum (Natural History)*, Geology, Supplement 11.

Origins of the State and Civilization. The Process of Cultural Evolution. Elman R. Service. Norton, New York, 1975. xxii, 362 pp., illus. $12.50.

Particle Size Measurement. Terence Allen. Chapman and Hall, London, and Halsted (Wiley), New York, ed. 2, 1975. xviii, 454 pp., illus. $25.95. Powder Technology Series.

Pediatric and Adolescent Echocardiography. A Handbook. Stanley J. Goldberg, Hugh D. Allen, and David J. Sahn. Year Book-Medical Publishers, Chicago, 1975. xiv, 326 pp., illus. $19.50.

Phage. Sewell P. Champe, Ed. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1974 (distributor, Halsted [Wiley], New York). xiv, 424 pp., illus. $27. Benchmark Papers in Microbiology.

Philosophy of Geohistory. 1785–1970. Claude C. Albritton, Jr., Ed. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1975 (distributor, Halsted [Wiley], New York). xiv, 386 pp. $24. Benchmark Papers in Geology, vol. 13.

Physical Chemistry Laboratory Experiments. John M. White. Prentice-Hall, Englewood Cliffs, N.J., 1975. xii, 564 pp., illus. $12.95.

Physics, Energy and Our World. Phillip Highsmith. Saunders, Philadelphia, 1975. xii, 456 pp., illus. $12.95. Saunders Golden Series.

The Physics of Stellar Interiors. An Introduction. V. C. Reddish. Edinburgh University Press, Edinburgh, 1974 (U.S. distributor, Crane, Russak, New York). viii, 108 pp., illus. $8.75.

The Physiology of Physical Stress. A Selective Bibliography, 1500–1964. Carleton B. Chapman and Elinor C. Reinmiller. Harvard University Press, Cambridge, Mass., 1975. x, 370 pp. $15.

Physiology of the Kidney and of Water Balance. Peter Deetjen, John W. Boylan, and Kurt Kramer. Translated from the German edition by R. V. Coxon. Springer-Verlag, New York, 1975. x, 142 pp., illus. Paper, $8.80. Springer Study Edition.

Plant Carbohydrate Biochemistry. Proceedings of a symposium, Edinburgh, Apr. 1973. J. B. Pridham, Ed. Academic Press, New York, 1974. xiv, 270 pp., illus. $18.50. Annual Proceedings of the Phytochemical Society No. 10.

Plant Physiology. Molecular, Biochemical, and Physiological Fundamentals of Metabolism and Development. Dieter Hess. Translated from the German edition. Springer-Verlag, New York, 1975. xvi, 334 pp., illus. Paper, $14.80. Springer Study Edition.

Plant Tissue Culture Methods. O. L. Gamborg and L. R. Wetter, Eds. National Research Council of Canada Prairie Regional Laboratory, Saskatoon, Canada, 1975. vi, 110 pp., illus. Spiral bound, $C6.

Pollution Criteria for Estuaries. Proceedings of a conference, Southampton, England, July 1973. P. R. Helliwell and J. Bossanyi, Eds. Halsted (Wiley), New York, 1975. Variously paged, illus. $34.50.

Polymer Conversion. W. A. Holmes-Walker. Halsted (Wiley), New York, 1975. viii, 286 pp., illus. $32.50

Positional Astronomy. D. McNally. Halsted (Wiley), New York, 1975. xiv, 376 pp., illus. $15.95.

Practical Approach to Pattern Classification. Bruce G. Batchelor. Plenum, New York, 1974. xii, 244 pp., illus. $18.

Practical Studies of Animal Development. F. S. Billett and A. E. Wild. Chapman and Hall, London, and Halsted (Wiley), New York, 1975. xii, 252 pp., illus. $15.

Practical Systems and Procedures Manual. J. Van Duyn. Reston (Prentice-Hall), Reston, Va., 1975. x, 218 pp., illus. $13.95.

Preschool IQ. Prenatal and Early Developmental Correlates. Sarah H. Broman, Paul L. Nichols, and Wallace A. Kennedy. Erlbaum, Hillsdale, N.J., 1975 (distributor, Halsted [Wiley], New York). x, 326 pp., illus. $18.

Problems in Physical Chemistry. A. Wood. Clarendon (Oxford University Press), New York, 1974. viii, 168 pp. Paper, $6.50.

Proceedings of a Feature Presentation on Spectroscopy and Drug Abuse. Ottawa, Canada, Oct. 1974. The Spectroscopy Society of Canada, Ottawa, 1975. ii, 192 pp., illus. Paper, C$5.00.

Progress in Geography. International Reviews of Current Research. Vol. 6. Christopher Board, Richard J. Chorley, Peter Haggett, and David R. Stoddart, Eds. St. Martin, New York, 1975. vi, 252 pp. $22.95.

Projected Range Statistics. Semiconductors and Related Materials. James F. Gibbons, William S. Johnson, and Steven W. Mylroie. Dowden, Hutchinson and Ross, Stroudsburg, Pa., ed. 2, 1975 (distributor, Halsted [Wiley], New York). Variously paged. $45.

Protection of Human Rights in the Light of Scientific and Technological Progress in Biology and Medicine. Proceedings of a conference, Geneva, Nov. 1973. Council for International Organizations of Medical Sciences, Geneva, 1974 (distributor, World Health Organization, Geneva; available in the United States from Q Corp., Albany, N.Y.). viii, 384 pp. Paper, $11.85.

The Proteins. Vol. 1. Hans Neurath, Robert L. Hill, and Carol-Leigh Boeder, Eds. Academic Press, New York, ed. 3, 1975. xvi, 548 pp., illus. $41.

The Psychobiology of Depression. Joseph Mendels, Ed. Spectrum, New York, 1975 (distributor, Halsted [Wiley], New York). xiv, 176 pp., illus. $15.

A Psychological Approach to Abnormal Behavior. Leonard P. Ullmann and Leonard Krasner. Prentice-Hall, Englewood Cliffs, N.J., ed. 2, 1975. xxiv, 776 pp. $13.95. Prentice-Hall Psychology Series.

Psychopharmacological Agents. Vol. 3. Maxwell Gordon, Ed. Academic Press, New York, 1974. xii, 404 pp., illus. $28.50. Medicinal Chemistry, vol. 4-III.

Psychopharmacology. A Biological Approach. Robert A. Levitt. Hemisphere, Washington, D.C., and Halsted (Wiley), New York, 1975. x, 502 pp., illus. $17.50. Series in Experimental Psychology.

Race as News. Otto Klineberg, Colette Guillaumin, Paul Hartmann, Charles Husband, and Jean Clark. Unesco Press, Paris, 1974 (U.S. distributor, Unipub, New York). 174 pp. Paper, $7.90.

Racism and Apartheid in Southern Africa. South Africa and Namibia. A Book of Data Based on Material Prepared by the Anti-Apart-

heid Movement. Unesco Press, Paris, 1974 (U.S. distributor, Unipub, New York). 156 pp., illus. Paper, $4.95.

Radar Precision and Resolution. G. J. A. Bird. Halsted (Wiley), New York, 1974. viii, 152 pp., illus. $18.50.

A Reader in Culture Change. Ivan A. Brady and Barry L. Isaac, Eds. Schenkman, Cambridge, Mass., and Halsted (Wiley), New York, 1975. xvi, 154 pp. + xiv, 344 pp. $15.

Readings in Wildlife Conservation. James A. Bailey, William Elder, and Ted D. McKinney, Eds. The Wildlife Society, Washington, D.C., 1974. xviii, 722 pp., illus. Paper, $8.

Recent Advances in Science and Technology of Materials. Vol. 3. Proceedings of a conference, Cairo, Apr. 1973. Adli Bishay, Ed. Plenum, New York, 1974. xvi, 392 pp., illus. $27.50.

Reproduction in Man and His Ancestors. For 700 Million Years. Richard Torpin. Published by the author, 2618 Walton Way, Augusta, Ga., 1974. iv, 212 pp., illus. Paper, $4.

Research Advances in Alcohol and Drug Problems. Vol. 2. Robert J. Gibbins, Yedy Israel, Harold Kalant, Robert E. Popham, Wolfgang Schmidt, and Reginald G. Smart, Eds. Wiley, New York, 1975. xx, 348 pp. $24. A Wiley-Biomedical Health Publication.

Research Advances 1975. National Institutes of Health, Bethesda, Md., 1975 (available from the Division of Scientific Reports, NIH, Bethesda, Md.). 102 pp., illus. Paper. DHEW Publication No. (NIH) 75-3.

Romantic Progression. The Psychology of Literary History. Colin Martindale. Hemisphere, Washington, D.C., and Halsted (Wiley), New York, 1975. x, 226 pp., illus. $17.50.

The Sargasso Sea. John and Mildred Teal. Illustrated by Leslie Morrill. Atlantic-Little, Brown, Boston, 1975. xxxii, 216 pp. $10. An Atlantic Monthly Press Book.

Science, Man and Society. Robert B. Fischer. Saunders, Philadelphia, 1975. x, 208 pp., illus. Paper, $5.75. Saunders Golden Series in Environmental Studies.

The Search for Peking Man. Christopher G. Janus with William Brashler. Macmillan, New York, 1975. 222 pp. + plates. $8.95.

Semiconductor Circuits. Linear and Digital. Marlin P. Ristenbatt. Prentice-Hall, Englewood Cliffs, N.J., 1975. xx, 392 pp., illus. $16.95.

Sensory Capabilities of Hearing-Impaired Children. Proceedings of a workshop, Baltimore, Oct. 1973. Rachel E. Stark, Ed. University Park Press, Baltimore, 1974. xii, 244 pp., illus. $9.75.

Short Period Climatic Variations. Collected Works of J. Namias, 1934 through 1974. University of California, San Diego, Graphics and Reproduction Services, San Diego, 1975. xiv, 906 pp., illus. Cloth, $16; paper (two volumes), $12.50.

Silver Creek Woodland Sites, Southwestern Wisconsin. William M. Hurley. Office of State Archaeologist, University of Iowa, Iowa City, 1974. xiv, 198 pp., illus. Paper, $4. Report 6.

So Small a World. Guy Mountfort. Scribner, New York, 1975. 224 pp. + plates. $8.95.

Social Learning in Childhood. Readings in Theory and Application. Donna M. Gelfand, Ed. Brooks/Cole, Monterey, Calif., ed. 2, 1975. xiv, 442 pp., illus. Paper, $8.95.

Social Psychology for Sociologists. David Field, Ed. Halsted (Wiley), New York, 1975. viii, 186 pp., illus. $11.95.

The Sociology of Human Fertility. An Annotated Bibliography. Ronald Freedman. Irvington, New York, and Halsted (Wiley), New York, 1975. iv, 284 pp. $14.95. A Population Council Book.

Soil Microscopy. Proceedings of a meeting, Kingston, Canada, Aug. 1973. G. K. Rutherford, Ed. Limestone Press, Kingston, Canada, 1974. xvi, 860 pp. + plates. $30.

Solid-Phase Synthesis. E. C. Blossey and D. C. Neckers, Eds. Dowden, Hutchinson and Ross, Stroudsburg, Pa., 1975 (distributor, Halsted [Wiley], New York). xviii, 360 pp., illus. $27. Benchmark Papers in Organic Chemistry, vol. 2.

Solid Wastes. Origin, Collection, Processing, and Disposal. C. L. Mantell, Ed. Wiley-Interscience, New York, 1975. xviii, 1128 pp., illus. $45.

Space Physics. The Study of Plasmas in Space. R. L. F. Boyd. Clarendon (Oxford University Press), New York, 1975. xviii, 100 pp., illus. $11.25. Oxford Physics Series, 7.

The Spheres of Life. An Introduction to World Ecology. Joseph W. Meeker. Scribner, New York, 1975. xii, 126 pp., illus. $6.95.

Spinors in Hilbert Space. P. A. M. Dirac. Plenum, New York, 1974. viii, 92 pp. $12.50.

Statistical Concepts. A Basic Program. Foster Lloyd Brown, Jimmy R. Amos, and Oscar G. Mink. Harper and Row, New York, ed. 2, 1975. xii, 148 pp., illus. Paper, $3.95.

Stimulating Creativity. Vol. 1, Individual Procedures. Morris I. Stein. Academic Press, New York, 1974. xx, 348 pp. $16.50.

Structural and Cut-Off Diaphragm Walls. R. G. H. Boyes. Halsted (Wiley), New York, 1975. x, 182 pp., illus. $22.50.

Structure and Function of Plasma Proteins. Vol. 1. A. C. Allison, Ed. Plenum, New York, 1974. x, 316 pp., illus. $24.50.

Supplement to Brown's Organic Chemistry. Extensions, the Literature of Organic Chemistry, and Solutions to Extension Exercises and Problems. Ronald F. Brown. Wadsworth, Belmont, Calif., 1975. vi, 260 pp., illus. Paper, $5.95.

Synopsis of Gynecologic Oncology. Philip J. Disaia, C. Paul Morrow, and Duane E. Townsend. Wiley, New York, 1975. xvi, 344 pp., illus. $19.50. Clinical Monographs in Obstetrics and Gynecology. A Wiley Biomedical-Health Publication.

Terrestrial Environments. J. L. Cloudsley-Thompson. Halsted (Wiley), New York, 1975. viii, 254 pp., illus. $14.95.

Treatise on Materials Science and Technology. Herbert Herman, Ed. Vol. 6, Plastic Deformation of Materials. R. J. Arsenault, Ed. Academic Press, New York, 1975. xx, 504 pp., illus. $45.

Urban and Regional Models in Geography and Planning. A. G. Wilson. Wiley-Interscience, New York, 1975. xiv, 418 pp., illus. Paper, $12.

Virus Survival in Water and Wastewater Systems. Papers from a symposium, Austin, Tex., Apr. 1974. Joseph F. Malina, Jr., and Bernard P. Sagik, Eds. Center for Research in Water Resources, University of Texas, Austin, 1974. xviii, 264 pp., illus. $17.50. Water Resources Symposium No. 7.

Weather in the West. From the Midcontinent to the Pacific. Bette Roda Anderson. American West Publishing Co., Palo Alto, Calif., 1975. 224 pp., illus. $18.95. Great West Series.

The Work of the River. A Critical Study of the Central Aspects of Geomorphogeny. C. H. Crickmay. Elsevier, New York, 1975. xvi, 272 pp., illus. $29.50.

World Review of Nutrition and Dietetics. Vol. 22. Geoffrey H. Bourne, Ed. Karger, Basel, 1975. xii, 346 pp., illus. $72.25.

Xenopus. The South African Clawed Frog. E. M. Deuchar. Wiley-Interscience, New York, 1975. x, 246 pp., illus. $29.50.