

11 December 1981 • Vol. 214 • No. 4526

\$2.00

# SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





# How do you make the best high-speed centrifuge better? Add microprocessor control and a new drive.

The quiet, efficient J2-21 has earned a reputation as the world's finest high-speed centrifuge. Now, Beckman has added special features to give you an even better centrifuge—the Model J2-21M.

Microprocessor control makes centrifugation in the J2-21M more automated and more flexible than ever. You push the touch switches to set up run parameters. You may store up to ten programs in the memory, so you can repeat runs exactly at a later time.

Temperature control is simpler and more accurate—just enter the rotor designation and desired temperature: the J2-21M does the rest. The bright digital display continuously shows actual run conditions—or you can display the original parameters you set. And there are built-in diagnostics, too.

The Ultra-Smooth drive, adapted for the J2-21M from

advanced ultracentrifuge technology, has no brushes to wear out or to replace. Its frequency-controlled induction motor has plenty of power to accelerate rotors smoothly and fast. You can select from nine acceleration and ten deceleration rates, to get maximum efficiency without disturbing even the most delicate separations.

The J2-21M is as rugged and reliable as the J2-21, and accepts all eleven J2-21 rotors. It is backed by Beckman sales and service around the world. To find out more about how the J2-21M is better, write Beckman Instruments, Inc., Spinco Division, 1117 California Avenue, Palo Alto, CA 94304.



## BECKMAN

Circle No. 349 on Readers' Service Card



# MATCHMAKER



## Constant Power for Electrophoresis

- Constant Voltage to 4000V
- Constant Power to 200W
- Constant Current to 200mA

Now, there is a power supply to match the most critical needs in Constant Power separations. The new EC600!

The 3-mode power supply (constant voltage, constant power, or constant current), provides precise readings from a 3-range voltmeter, 2-range wattmeter, and 6-range milliammeter. Output regulation  $\pm 1\%$  from zero to full load.

Voltage and current output limit controls for automatic crossover for a programmed run.

More safety features than ever with low level ground leakage detection,

manual start button, automatic safety shut down on cell disconnect, and a CMOS logic memory device which restores programmed operation up to 3 hours after a power interruption.

If your work involves DNA sequencing, isoelectric focusing, isotachopheresis, and general electrophoresis, you need the best power supply available. The EC600...few applications test its full capabilities; no other power supply can match it!

**110V Input . . . . . \$1,995.00**

**220V Input . . . . . \$2,095.00**

For more information, call Technical Service collect at 813-344-1644 or write:



**E-C Apparatus Corporation**  
3831 Tyrone Boulevard N.  
St. Petersburg, Florida 33709

Circle No. 307 on Readers' Service Card

# SCIENCE

<b>LETTERS</b>	Economic Recovery and Scientific Research: <i>A. F. Hofmann</i> ; The Language Problem: <i>J. D. Mulholland</i> ; <i>A. A. Feldmann</i> ; <i>J. Arditti</i> ; Opportunities for the Handicapped: <i>S. P. Stearner</i> ; <i>R. E. Rehwooldt</i> ; <i>S. Malcom</i> .....	1194
<b>EDITORIAL</b>	Transition at the EPA: <i>J. Schmandt</i> .....	1199
<b>ARTICLES</b>	Solar Chemistry of Metal Complexes: <i>H. B. Gray</i> and <i>A. W. Maverick</i> .....	1201
	Determination of Nucleotide Sequences in DNA: <i>F. Sanger</i> .....	1205
	Science, Technology, and the Limits of Judicial Competence: <i>S. Jasanoff</i> and <i>D. Nelkin</i> .....	1211
<b>NEWS AND COMMENT</b>	OTA Predicts Growing Soviet Energy Trade.....	1216
	Scientist Convicted for Monkey Neglect .....	1218
	Cline Loses Two NIH Grants .....	1220
	Medfly Continues to Bug California.....	1221
	<i>Briefing</i> : U.S. Announces Pullout from IIASA in Vienna; Engineers Flee Academia; Aliens on the Campus .....	1222
	New Creationism Bill Already Drafted .....	1224
<b>RESEARCH NEWS</b>	A New Wave of Antibiotics Builds .....	1225
	Cephalosporins Are Not the Only Answer.....	1227
	New Heart Attack Treatment Discussed .....	1229
<b>ANNUAL MEETING</b>	AAAS Exhibit 1982 .....	1231

## BOARD OF DIRECTORS

FREDERICK MOSTELLER  
Retiring President, Chairman

D. ALLAN BROMLEY  
President

E. MARGARET BURBIDGE  
President-Elect

ELOISE E. CLARK  
EDWARD E. DAVID, JR.

NANCIE L. GONZALEZ  
DAVID A. HAMBURG

## CHAIRMEN AND SECRETARIES OF AAAS SECTIONS

MATHEMATICS (A)  
Ralph P. Boas  
Ronald Graham

PHYSICS (B)  
Maurice Goldhaber  
Rolf M. Sinclair

CHEMISTRY (C)  
Robert W. Parry  
William L. Jolly

ASTRONOMY (D)  
Owen Gingerich  
Donat G. Wentzel

PSYCHOLOGY (J)  
George A. Miller  
Meredith P. Crawford

SOCIAL, ECONOMIC, AND POLITICAL SCIENCES (K)  
James G. March  
Gillian Lindt

HISTORY AND PHILOSOPHY OF SCIENCE (L) ENGINEERING (M)  
Harry Woolf  
Diana L. Hall  
Michael Michaelis  
Donald E. Marlowe

EDUCATION (Q)  
Ann C. Howe  
Roger G. Olstad

DENTISTRY (R)  
Maynard K. Hine  
Harold M. Fullmer

PHARMACEUTICAL SCIENCES (S)  
Anthony P. Simonelli  
Robert A. Wiley

INFORMATION, COMPUTING, AND COMMUNICATION (T)  
George W. Tresselt  
Madeline M. Henderson

## DIVISIONS

### ALASKA DIVISION

Vera Alexander  
President

T. Neil Davis  
Executive Secretary

### PACIFIC DIVISION

Robert I. Bowman  
President

Alan E. Leviton  
Executive Director

### SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

Max P. Dunford  
President

M. Michelle Bak  
Executive Office

SCIENCE is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. Second-class postage (publication No. 484460) paid at Washington, D.C., and at an additional entry. Now combined with *The Science Monthly*. Copyright © 1981 by the American Association for the Advancement of Science. Domestic individual membership and subscription (51 issues): \$43. Domestic institutional subscription (51 issues): \$80. Foreign postage extra: Canada \$24, other (surface mail) \$27, air-surface via Amsterdam \$55. First class, airmail, school-year, and student rates on request. Single copies \$2 (\$2.50 by mail); back issues \$3 (\$3.50 by mail); classroom rates on request. **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. **Postmaster:** Send Form 3579 to *Science*, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005. *Science* is indexed in the *Reader's Guide to Periodical Literature* and in several specialized indexes.



# AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

<b>BOOK REVIEWS</b>	Genes, Radiation and Society, reviewed by D. J. Kevles; Mammalian Genetics and Cancer, M. Potter; Interferons, J. Vilček; Aging, J. W. Rowe; The Dynamics of Technical Controversy, R. H. Salisbury; Books Received.....	1232
<b>REPORTS</b>	Paleognathous Carinate Birds from the Early Tertiary of North America: P. Houde and S. L. Olson .....	1236
	Adenosine 3',5'-Monophosphate Modulates Thyrotropin Receptor Clustering and Thyrotropin Activity in Culture: A. Avivi et al. ....	1237
	Type III Hyperlipoproteinemia Associated with Apolipoprotein E Deficiency: G. Ghiselli et al. ....	1239
	Intestinal Diffusion Barrier: Unstirred Water Layer or Membrane Surface Mucous Coat?: K. W. Smithson et al. ....	1241
	Integration and Stable Germ Line Transmission of Genes Injected into Mouse Pronuclei: J. W. Gordon and F. H. Ruddle .....	1244
	High Levels of Intracellular Bombesin Characterize Human Small-Cell Lung Carcinoma: T. W. Moody et al. ....	1246
	Novel Peptide Neuronal System in Rat Brain and Pituitary: E. Weber et al. ....	1248
	Autoimmune Encephalomyelitis: Simultaneous Identification of T and B Cells in the Target Organ: U. Traugott et al. ....	1251
	Slow-Wave Sleep: A Recovery Period After Exercise: C. M. Shapiro et al. ....	1253
	Retroactive Interference in Discrimination Learning: E. G. Heinemann, J. Sage-Day, N. Brenner.....	1254
	Disappearance of Stabilized Chromatic Gratings: D. H. Kelly .....	1257
	Reversible Chemical Modification of the Scrapie Agent: M. P. McKinley, F. R. Masiarz, S. B. Prusiner .....	1259
	Neuroleptic Drug-Induced Dopamine Receptor Supersensitivity: Antagonism by L-Prolyl-L-Leucyl-Glycinamide: S. Chiu, C. S. Paulose, R. K. Mishra.....	1261
<b>PRODUCTS AND MATERIALS</b>	Hot Plate Oven; Laboratory Computer; Human Interferon; Balances; Pump; Image Analysis Software for Data Base Management; Gel Destainer/Agitator; Literature .....	1264

J. HARRISON  
ER E. MASSEY

RUSSELL W. PETERSON  
HARRIET ZUCKERMAN

WILLIAM T. GOLDEN  
Treasurer

WILLIAM D. CAREY  
Executive Officer

OGY AND GEOGRAPHY (E)  
A. Simon  
mas Dutro, Jr.

CAL SCIENCES (N)  
n D. Bogdonoff  
M. Lowenstein

ISTICS (U)  
on E. Fienberg  
Blaser

BIOLOGICAL SCIENCES (G)  
John A. Moore  
Walter Chavin

AGRICULTURE (O)  
Martin A. Massengale  
Coyt T. Wilson

ATMOSPHERIC AND HYDROSPHERIC  
SCIENCES (W)  
Julius London  
Glenn R. Hilst

ANTHROPOLOGY (H)  
Alan R. Beals  
Priscilla Reining

INDUSTRIAL SCIENCE (P)  
John Diebold  
Robert L. Stern

GENERAL (X)  
Herman Pollack  
S. Fred Singer

## COVER

Skull of a palcognathous bird from the early Eocene of Wyoming, about 50 million years old. Somewhat older fossils from Montana also belong to this previously unknown group of medium-sized, flying birds. The ostrich-like palate of these birds is primitive and therefore cannot be used to define the ostrich-like birds (ratites) as a monophyletic group. See page 1236. [V. Krantz, Smithsonian Institution, Washington, D.C. 20560]

merican Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, rove the effectiveness of science in the promotion of human welfare, and to increase public understanding and ciation of the importance and promise of the methods of science in human progress.

# Much

"The EM 10:  
High resolution...ease of operation...  
the essentials of a good, basic  
electron microscope. Plus..."



## **1.23Å: High resolution with analytic capability**

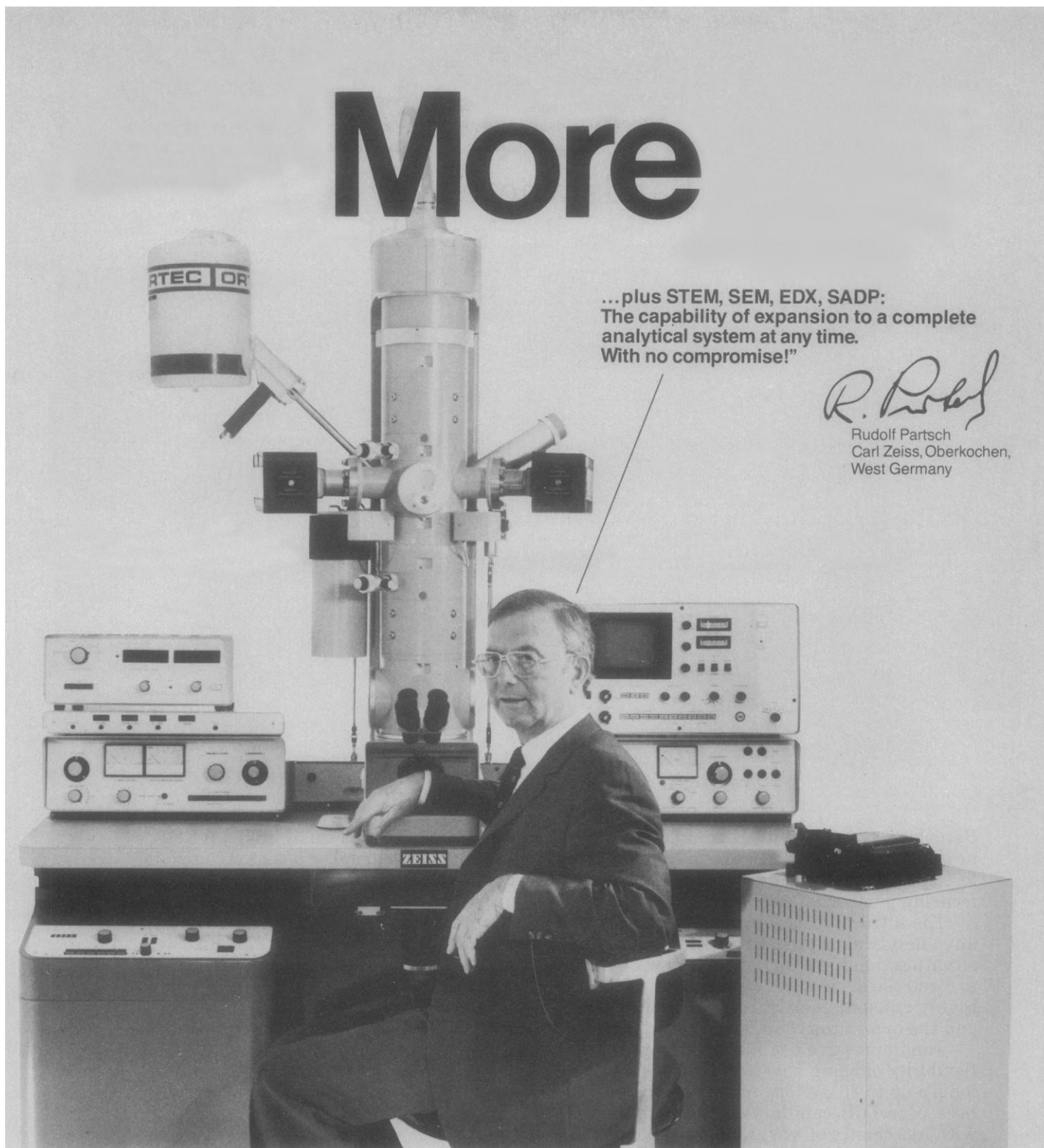
The Zeiss EM 10 is actually four instruments in one... with no compromise! It's all you need in an electron microscope. 3Å point-to-point resolution is guaranteed; 1.23Å lattice is obtainable. Even at low magnification the electron optical resolution is **better than film can record** (200Å at 170x)! And it's famous for ease of operation.



# More

...plus STEM, SEM, EDX, SADP:  
The capability of expansion to a complete  
analytical system at any time.  
With no compromise!"

*R. Partsch*  
Rudolf Partsch  
Carl Zeiss, Oberkochen,  
West Germany



## The expandable EM 10: Always state of the art.

Zeiss is the easiest choice to make: you're never locked out of the state of the art. Every EM 10 ever sold can be expanded to a complete analytical system at any time without disturbing its integrity. What's more, any major innovations such as differential ion-getter pumping and micro-dose-focusing, now standard with Zeiss, are always field-retrofittable.

Circle No. 286 on Readers' Service Card

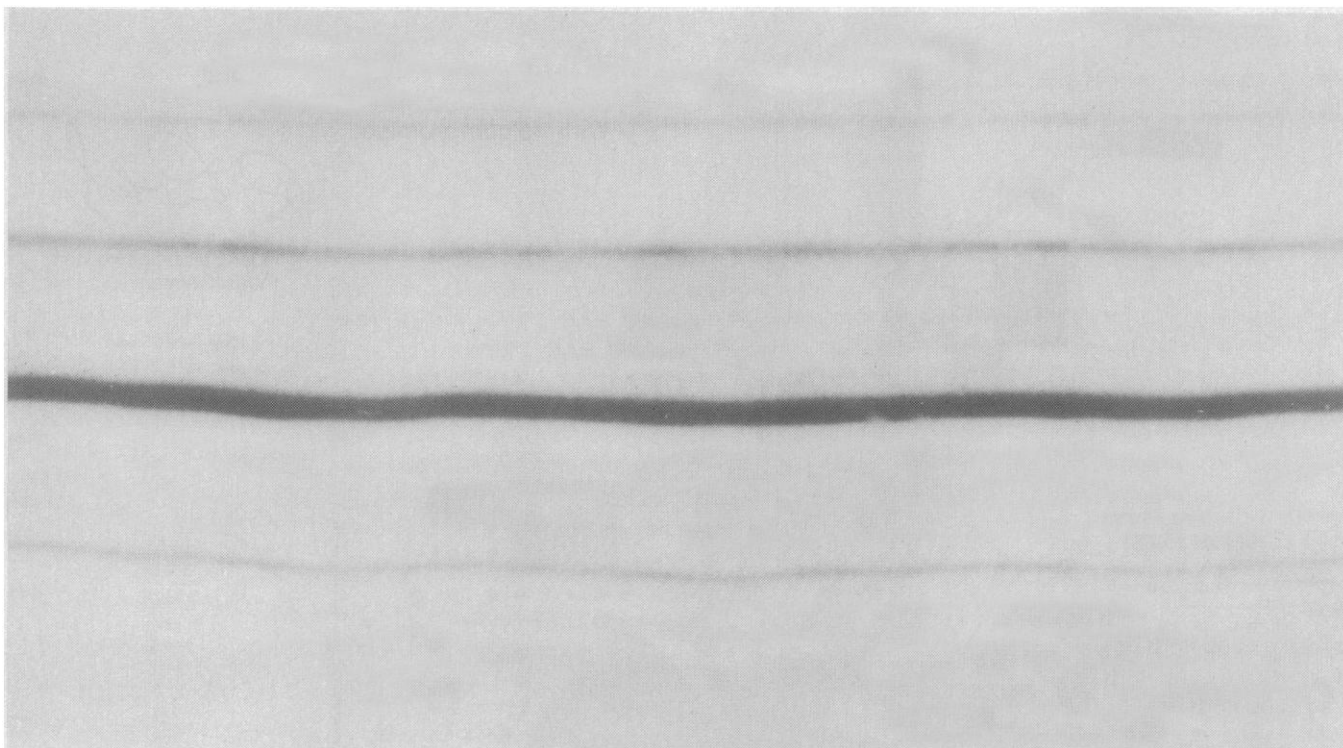
The great name in optics



Don Mills, Ontario, M3B 2S6. Or call (416) 449-4660. **Carl Zeiss, Inc., 444 5th Avenue, New York, N.Y. 10018 (212) 730-4400.**

# ULTROPHOR

Put wavy bands where they belong.  
Among yesterday's problems.



Banish wavy bands with Ultrophor, a unique new instrument designed exclusively for professional electrofocusers by LKB, electrofocusing pioneers since 1960.

The ultracompact Ultrophor will cope with any analytical or preparative electrofocusing situation thanks to its radically new approach to electrode design, the construction of the highly efficient glass/aluminum cooling plate and the opportunity for atmospheric control.

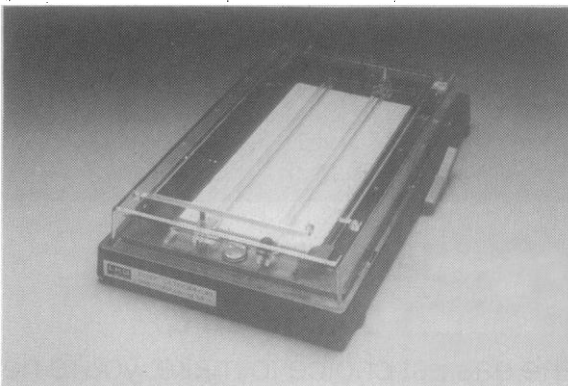
The impressive list of bonuses include the flexibility of being able to run gels of any length up to 26 cm long or gels of any thickness, especially capillary-cast ultrathin gels, with less chance of wavy or skewed bands. The Ultrophor also has an unmatched capability to run high pH gels for sharp separations of alkaline samples as well as handle oxygen-sensitive or other labile samples.

Not only do you save valuable lab space with the compact Ultrophor but you save on time too because it's so fast and convenient to

use and super-easy to clean. Like all LKB units, the new Ultrophor boasts a complete backup system and comprehensive technical support.

Contact your nearest LKB representative today for full information.

Ultrophor – the straight choice for professional electrofocusers.



**LKB**

Circle No. 291 on Readers' Service Card

Pacesetting pioneers in Scientific Tools for the World Laboratories.

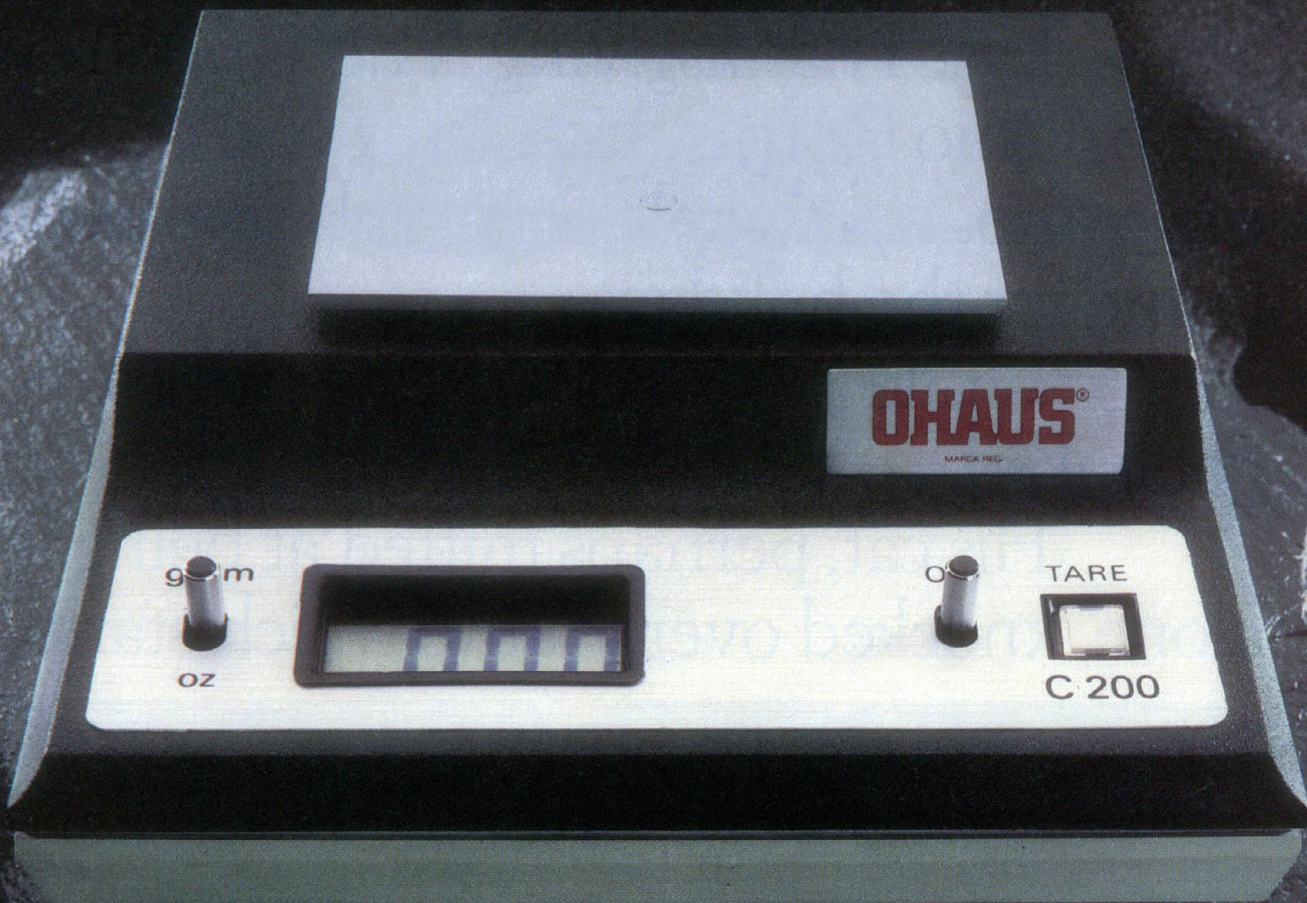
**Head office:** LKB-Produkter AB, Box 305, S-161 26 Bromma, Sweden. Tel. 08-98 00 40, telex 10492

**Main US sales office:** LKB Instruments, Inc. 12221 Parklawn Drive, Rockville, MD 20852. Tel. 301-881 25 10, telex 230 89 682

**UK sales office:** LKB Instruments Ltd., 232 Addington Road, S. Croydon, Surrey CR2 8YD, England. Tel. 01-657 8822, telex 264414

**Other sales offices in:** Athens (for Middle East), Copenhagen, Ghent, The Hague, Hong Kong, Munich, Paris, Rome, Turku, Vienna





Actual size

# ANYWHERE. ANY WEIGH.

Anyway you look at it, the new Ohaus® Port-O-Gram™ electronic balance will do almost any weighing job—anywhere. It's economical. Fast reading. Portable. Ruggedly built. And it offers dual weight selection in a design that's as attractive as it is practical.

Port-O-Gram balances are available in five compact, battery-operated models starting at only \$395 suggested list. Models C200 and C2000 provide low-cost weighing in either grams or ounces for checkweighing, portion control or compounding. Select models C200M or C2000M for metric-only applications. Or choose Model C200P for weighing gold and other precious metals in either grams or pennyweight.

All five models feature: convenient tare control to compensate for container weights; large, easy to read display with quick response time, readings in seconds; and a rigid die cast case which stands up to repeated use.



**\$395**

No matter which model you select, you'll be getting the combination of reliability, economy and quality

Model	Capacity	Readability
C 200	199.9 g / 7 oz	0.1 g / 0.01 oz
C 2000	1999 g / 70 oz	1 g / 0.1 oz
C 200M	199.9 g	0.1 g
C 2000M	1999 g	1 g
C 200P	199.9 g / 199.9 dwt	0.1 g / 0.1 dwt

you always expect from Ohaus, the leading U.S. manufacturer of precision balances. And any other weigh, anywhere, has a tough time measuring up to that.

Contact Ohaus or your nearby Ohaus dealer for a demonstration. Or call toll-free 1-800-821-2280, Ext. 106, day or night. In Missouri, 1-800-892-7655, Ext. 106.

Ohaus Scale Corporation, 29 Hanover Road, Florham Park, NJ 07932. (201) 377-9000.

Ohaus and Port-O-Gram are registered trademarks of Ohaus Scale Corporation. Specifications and prices subject to change without notice.

**OHAUS**  
**PORT-O-GRAM ELECTRONIC BALANCES**

Circle No. 365 on Readers' Service Card

Copyright 1981 Ohaus Scale Corporation.



## Baked Apple.

Last Thanksgiving, a designer from Lynn/Ohio Corporation took one of the company's Apple Personal Computers home for the holidays.

While he was out eating turkey, it got baked.

His cat, perhaps miffed at being left alone, knocked over a lamp which started





a fire which, among other unpleasantries, melted his TV set all over his computer. He thought his goose was cooked.



But when he took the Apple to Cincinnati Computer Store, *mirabile dictu*, it still worked.

A new case and keyboard made it as good as new.

Nearly 1,000 Apple dealers have complete service centers that can quickly fix just about anything that might go wrong, no matter how bizarre.

So if you're looking for a personal computer that solves problems instead of creating them, look to your authorized Apple dealer.

You'll find everything well-done.

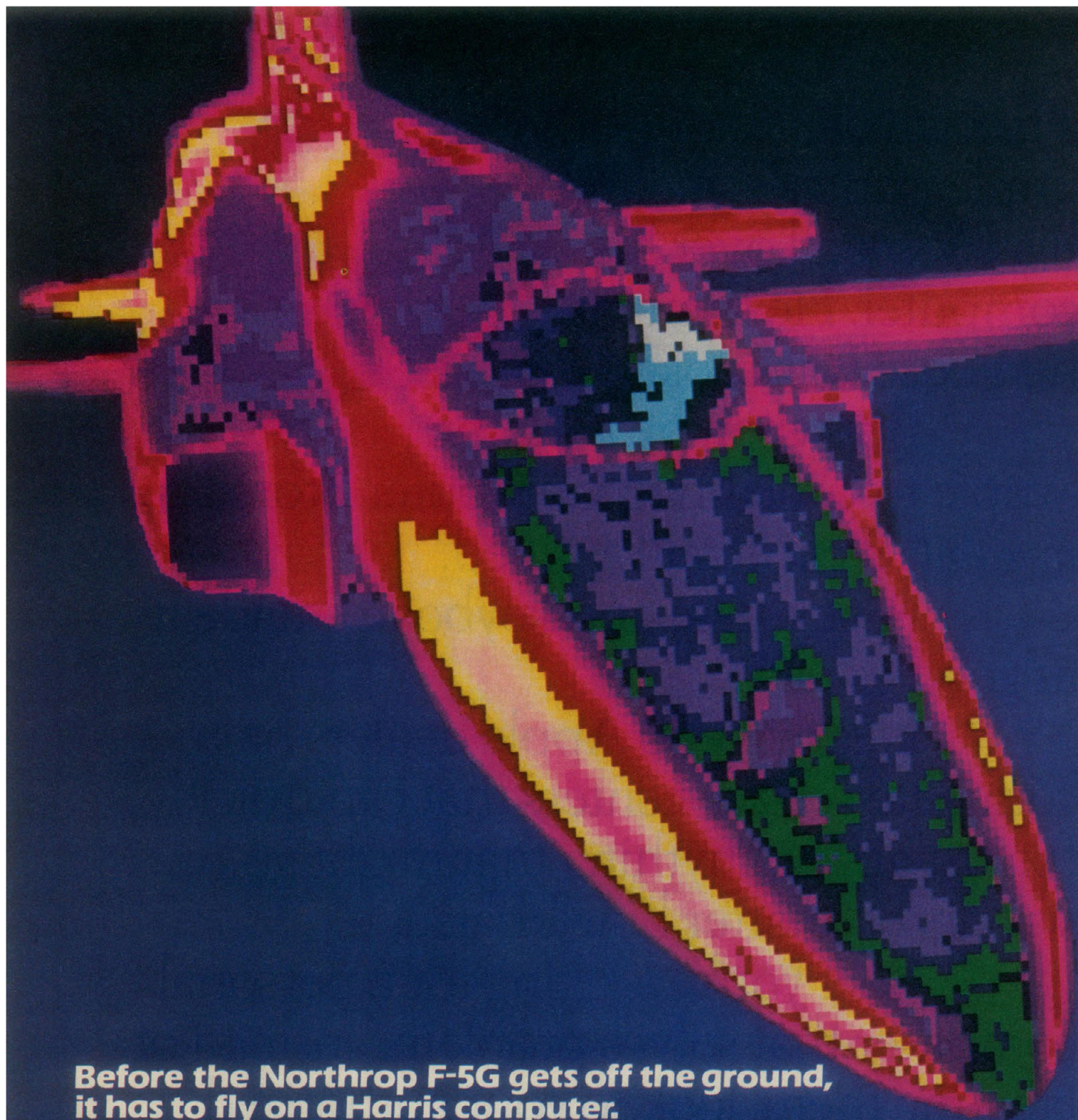
The personal computer.



For the authorized dealer nearest you, call (800) 538-9696. In California, call (800) 662-9238. Or write: Apple Computer Inc., 10260 Bandley Dr., Cupertino, CA 95014.

Circle No. 323 on Readers' Service Card





**Before the Northrop F-5G gets off the ground,  
it has to fly on a Harris computer.**

Northrop's high performance F-5 tactical fighters are the most widely deployed fighter aircraft in the free world. A refined version of the F-5, the F-5G "Tigershark," will be delivered in 1983.

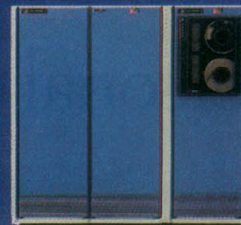
A pair of Harris 800 computers, in concert with twelve other Harris computers, are playing a key role in the development of this aircraft by driving Northrop's two development simulators, as well as being used for interactive

program development.

What does Northrop know that you may not? Simply that Harris computers offer the fastest, most powerful and flexible super-mini systems available. Harris computers offer 48-bit system architecture that delivers significantly higher productivity than competitive 32-bit systems.

To arrange a benchmark by our local sales representative, call or write Ralph Mele, National Sales Manager, Harris Computer

Systems Division, 2101 West Cypress Creek Road, Fort Lauderdale, Florida 33309 (305) 974-1700.

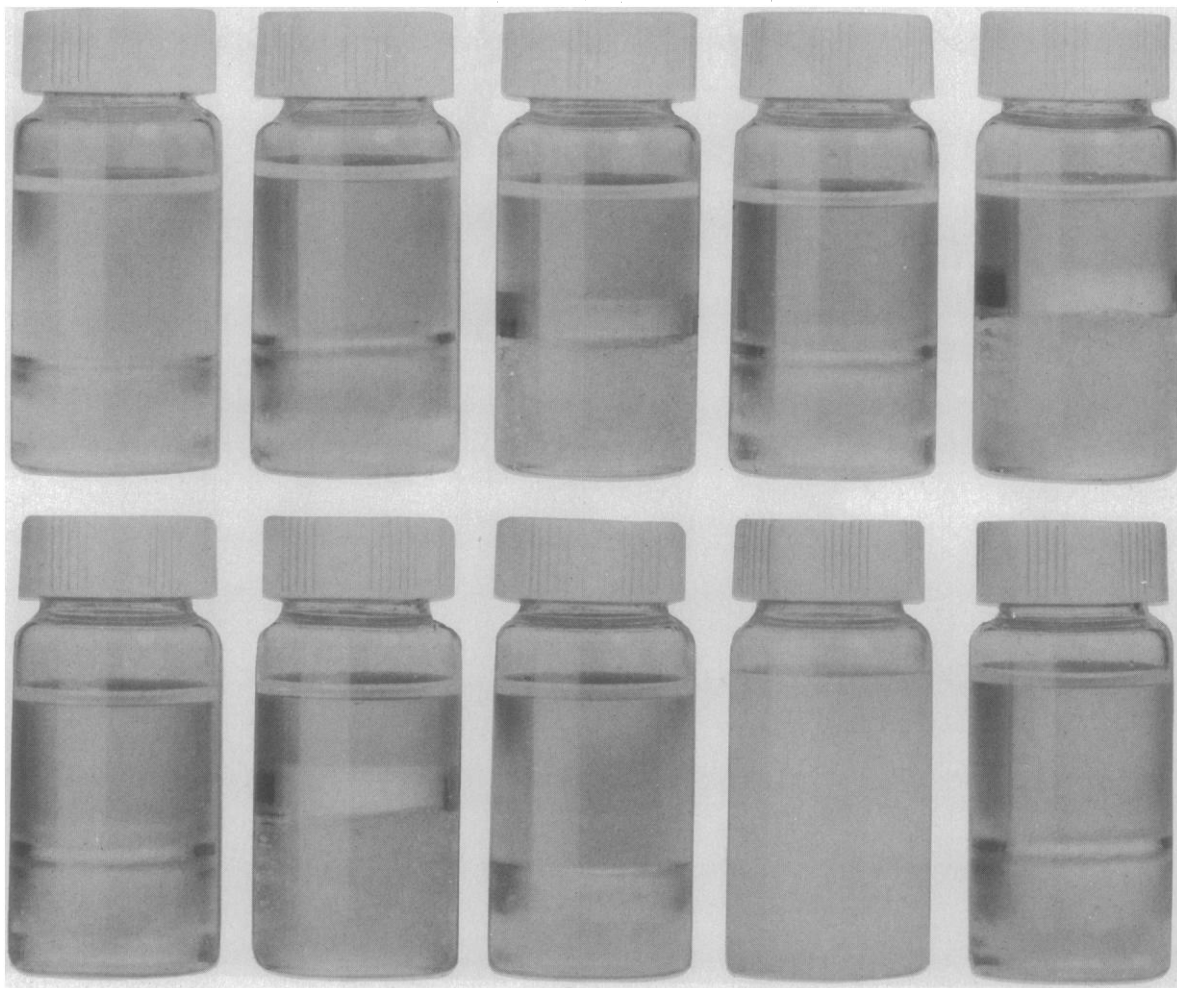


 **HARRIS**

Circle No. 359 on Readers' Service Card



# Can you find the ScintiVerse™ II scintillation cocktail?



**Hint: It's the one that didn't two phase.**

It's also the one that:

- Gives consistently high counting efficiencies for aqueous systems.
- Forms a stable milky emulsion with **higher efficiencies** than the same formulation using traditional clear ethoxylated alkyl phenols, such as Triton-X-100 (test results are on file at our reagent development laboratories). And, it maintains this homogeneous mixture for up to 2 weeks without two phasing — regardless of percent sample.
- Has a safer, higher flash point (112°F/44°C) than xylene-based or toluene-based cocktails.
- Is specially purified to eliminate contaminants that can quench energy, increase background or induce chemiluminescence.

ScintiVerse II is also the one with the large family. The Fisher family of reagents and products specially suited to liquid scintillation counting. For example, ScintiVerse Bio-HP — a ready-to-use cocktail that's perfect for work with low volume biological fluids. Or individual reagents to mix your own cocktails. Plus vials, pipets and other scintillation necessities. For a free bulletin describing the whole family, circle the number below on the Reader Service Card. Or call (412) 562-8543.

**Fisher Scientific** 

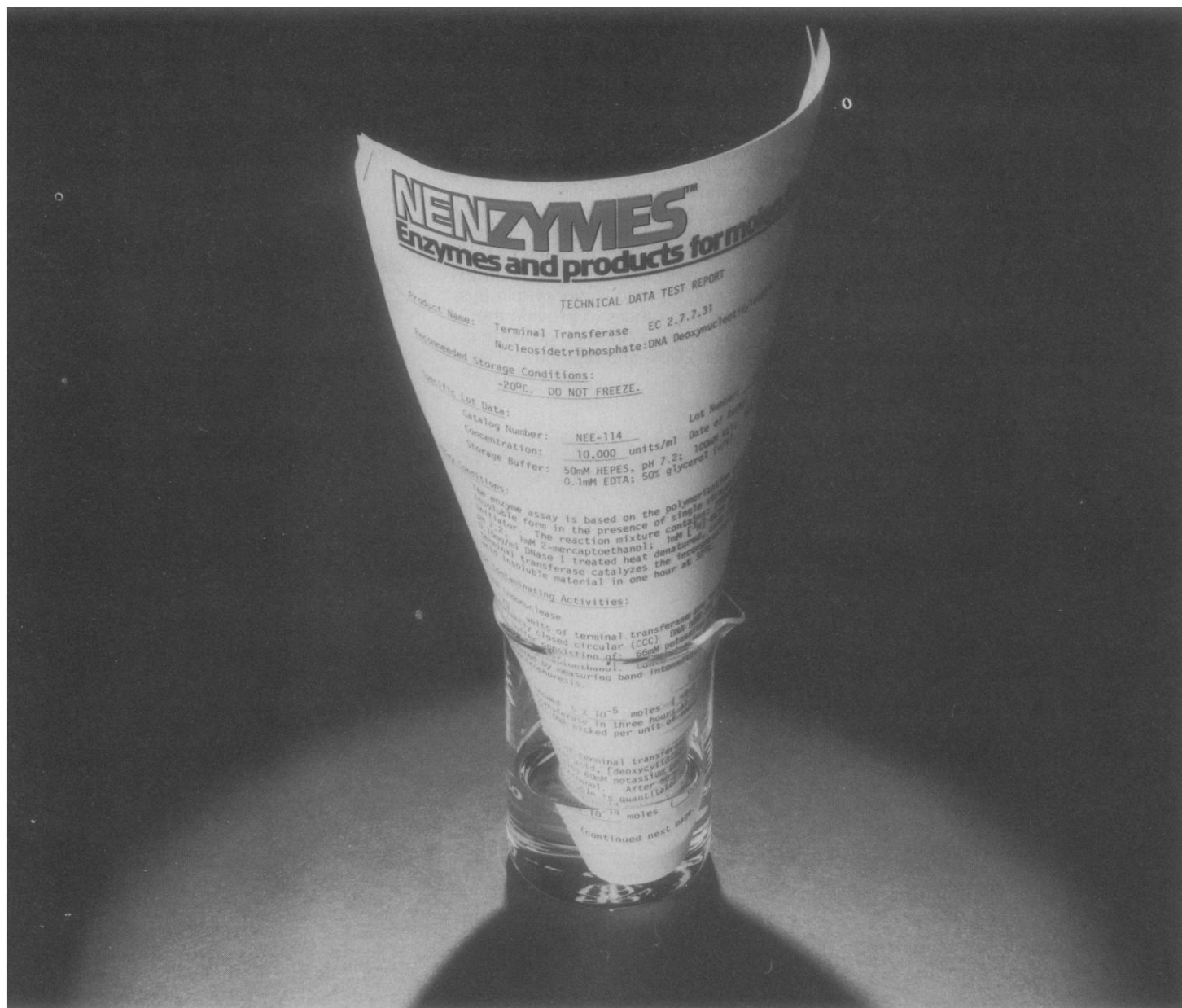


## Washington Tapes

AAAS Annual Meeting and Exhibit  
Washington, DC 1982

For a list of those sessions taped at this year's Annual Meeting and Exhibit visit the  
Mobiltapes Sales Desk  
AAAS Registration Area  
Washington Hilton

(Program abstract included with each title)



## Before we call them ultra-pure, they have to get their feet wet.

NENZYMES™ is not simply a title bestowed on our ultra-pure enzymes and related products for DNA-RNA research. It is an award for performance.

NENZYMES must perform as standards in our routine biological testing programs for <sup>32</sup>P- and <sup>3</sup>H-labeled nucleotides, as integral components in our nick translation and end labeling systems, and as standard tools in our cloning laboratory. Even to qualify for this work each lot

is first subjected to numerous specific assays (which are recorded for customer inspection).

So if NENZYMES weren't biologically pure we'd soon find out. We're just as insistent on trouble-free system performance as you are.

That's why it makes sense to buy your enzymes from systems people. Call us for complete NENZYMES specifications and ordering information.



®

**New England Nuclear**

549 Albany Street, Boston, Massachusetts 02118

Call toll-free: 800-225-1572 Telex: 94-0996

(In Massachusetts and International: 617-482-9595)

**In Europe:** NEN Chemicals GmbH, D-6072 Dreieich, W. Germany, Postfach 401240, Tel. (06103) 85034, Telex 4-17993 NEN D

**NEN Canada:** 2453 46th Avenue, Lachine, Que. H8T 3C9, Tel. 514-636-4971, Telex 05-821808

Circle No. 328 on Readers' Service Card



# How Amoco uses an evolving science to help search for new oil and natural gas.

The earth science known as geochemistry is helping Amoco scientists determine the thermal maturity of organic matter in the earth's crust. Oil and natural gas can be present and discovered only in those regions where source beds have been properly matured with the correct ratios of heat and time.

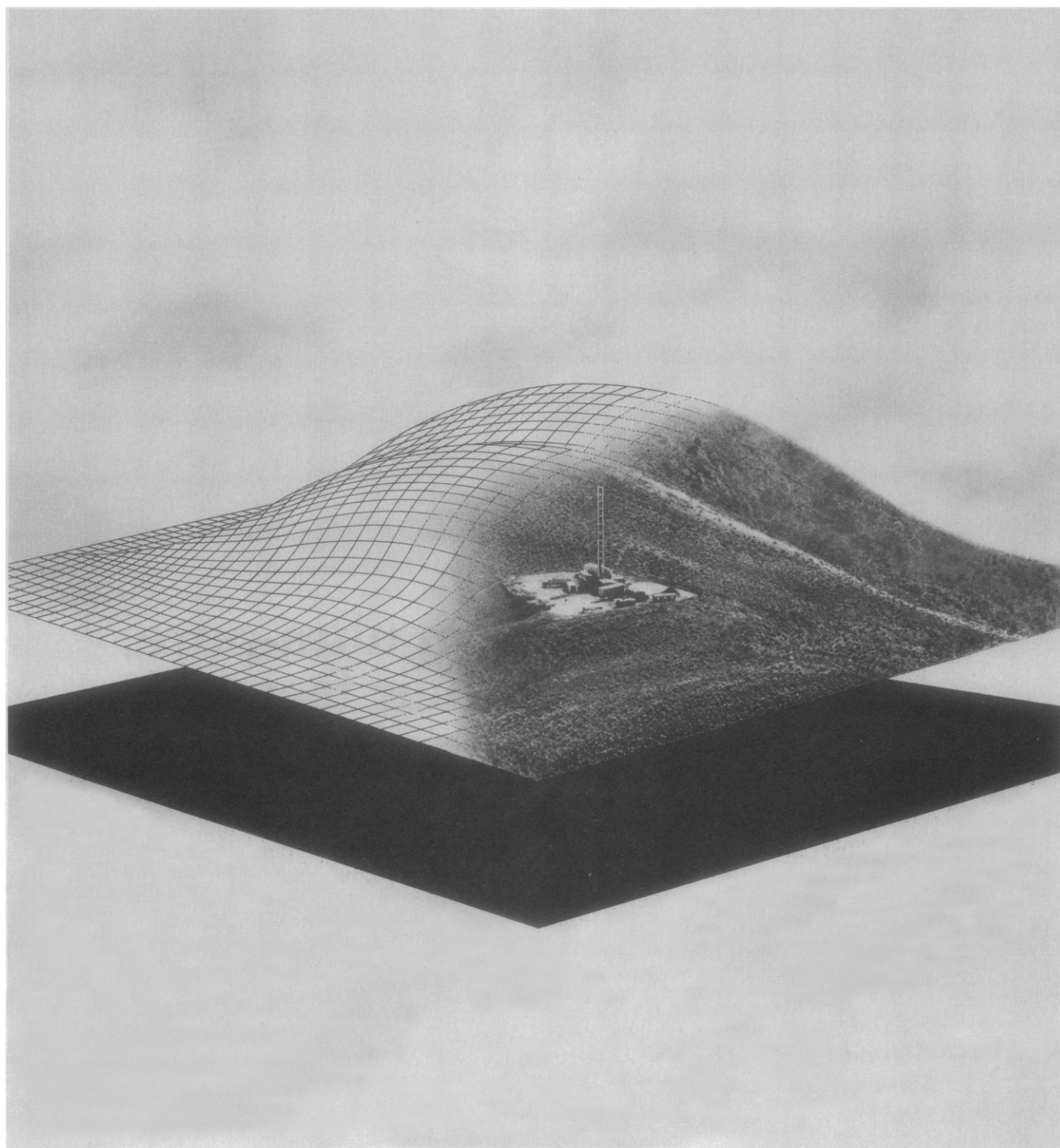
Geochemists use a variety of techniques on rock samples, including

pyrolysis and solvent extraction to determine where and when the source beds have expelled their oil.

These techniques and others have aided Amoco in understanding the potential of discoveries such as those in the Overthrust Belt in Utah and Wyoming. Amoco is working in this science and others to provide the energy to keep America growing in the year 2000 and beyond.



You expect more from a leader.





# THREE CHOICE ORANGES

Pick our straight neck for precise surface area work. Try the orange plug cap for a positive seal in the neck.

Opt for a quick rim seal with the hard black phenolic cap. (It's really an orange at heart.) Spin it on and off with ease.

There are graduations alongside for quick filling.

There's a marking spot on each shoulder for easy identification.

All Corning 75 cm<sup>2</sup> flasks have big mouths for easier comings and goings in your culturing systems.

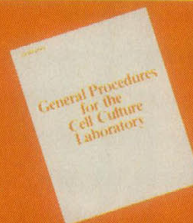
Choose our canted neck for easier access in and out. It's a Corning original.

You get to pick the type that suits you best with Corning 75 cm<sup>2</sup> disposable tissue culture flasks.

Continuing innovations from Corning. Since 1915.

**CORNING**  
**cellware**

Circle Reader Service No. 352 for Salesman to call.  
Circle Reader Service No. 351 for Literature.



## FRESH ADVICE

Read up on some fresh ideas about good procedures for your cell culture laboratory. They're in a new brochure commissioned for you by Corning and developed at the W. Alton Jones Cell Science Center. Send for your free copy today.

**Plus Free Oranges.** We'll also pack you a free sampling of Corning flasks for your lab. Pick one.

- ☐ **25115-75** Straight neck with plug seal cap    ☐ **25116-75** Straight neck with phenolic cap    ☐ **25110-75** Canted neck with plug seal cap

Send this coupon on your letterhead.  
Corning Medical and Scientific,  
Mail Station 18, Attention KAW, Corning  
Glass Works, Corning, New York 14830

**CORNING**

SE-12-81-FL



# Small computer friendliness vs. big computer power.

## HP's new computer systems end the compromise.

Whether it's sophisticated experimentation or data reduction and analysis, Hewlett-Packard's newest technical computer systems put high-powered scientific performance into easy-to-configure, easy-to-use workstations. So you can solve your applications problems just the way *you* want to. And a lot sooner than you might have thought possible.

### The HP 9826 for complex experiment control.

Designed specifically for I/O-intensive instrument and control applications, the 9826 uses the powerful new MC 68000 chip for ultra-fast data transfer and number crunching. It also has a variety of I/O ports and built-in drivers, so you're free to concentrate on testing, not on system configuration. Which means you can get your solutions up and running in days, instead of weeks or months.

But the 9826 makes it even easier still. Because you can develop your programs in any of three languages: HP-enhanced BASIC, HPL, or PASCAL. And with a CRT display and advanced graphics built right into the system, you can see and interpret your data almost as soon as you get it.

The HP 9826. System prices start at \$8950.

### The HP 9845 for high-performance computation.

With a broad range of advanced capabilities (including new options offering three times the computational speed of the basic system), the HP 9845 can be configured to meet your precise needs—from finite element analysis to simulations and modeling. And almost anything in between.

You can also add hard discs, printers, plotters and other peripherals to further tailor the system to your application. And with the 9845's advanced datacomm capabilities, you can even share technical information with other computers in a distributed processing environment.

The HP 9845. System prices start at under \$20,000.

All of our computers are backed by HP's worldwide service organization. For more information, call your local HP sales office listed in the White Pages. Or write to Hewlett-Packard, Attn: Pat Welch, Dept. 35109, 3404 E. Harmony Rd., Ft. Collins, CO 80525.

Prices U.S.A. list: subject to change without notice.

40107

*When performance must be measured by results.*

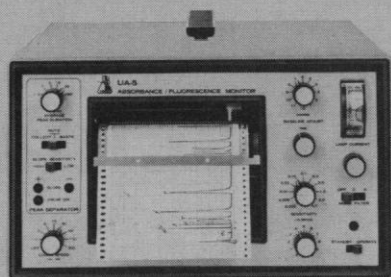


**HEWLETT  
PACKARD**

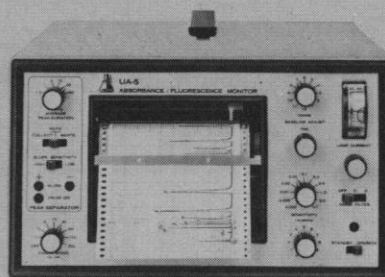
Circle No. 366 on Readers' Service Card



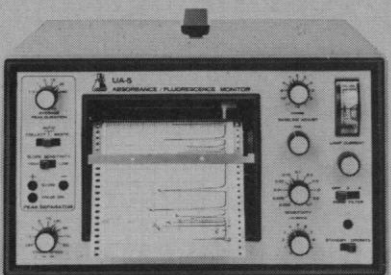




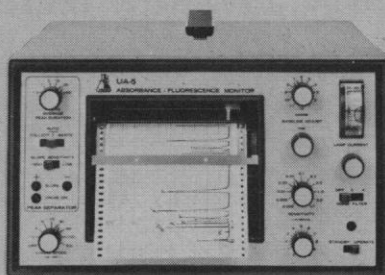
**UV absorbance detector**



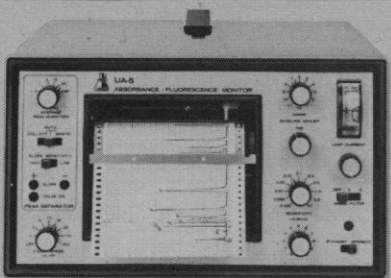
**visible absorbance detector**



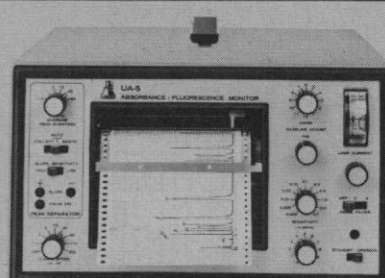
**fluorescence detector**



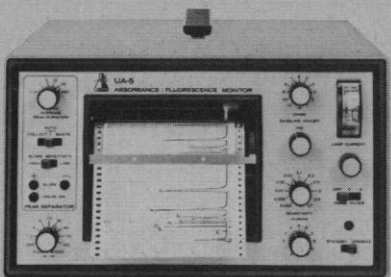
**peak collector**



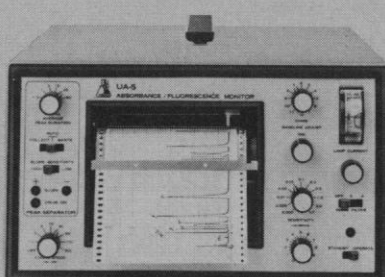
**dual column/wavelength detector**



**gel scanner**



**density gradient scanner**



**cuvette photometer**

**If you're still using  
an LC detector  
without these capabilities  
you need an ISCO UA-5.**

Send the coupon now to receive our  
new catalog of innovative instruments.  
Or phone free: [800] 228-4250.

**ISCO** Box 5347  
Lincoln, NE 68505

- ☐ Please send a catalog  
☐ Please send a catalog and have a salesman call

Name, Dept. \_\_\_\_\_

Institution \_\_\_\_\_

Address \_\_\_\_\_

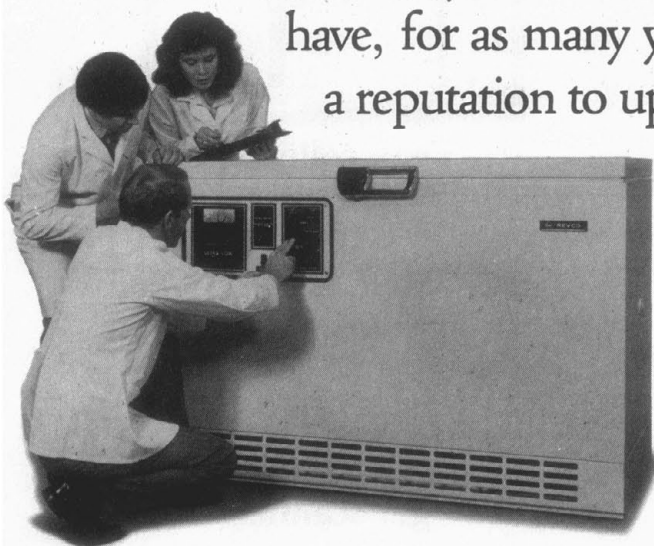
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_

# Our freezers are so much in demand because we demand so much of our freezers.

Only a Marine recruit in boot camp goes through more inspections than a Revco laboratory freezer.

After all, when you've been building as many freezers as we have, for as many years as we have, you've got quite a reputation to uphold. Which may explain why our quality control people take their jobs so seriously.



In addition, Revco is the only company in the industry whose *products* — not just a few electrical components — are listed by Underwriters Laboratories, Inc.

We not only establish rigid engineering and design standards, but we also make sure that those standards are applied at every phase of production, in every freezer we make.

And that's the way it should be. Because in work as important as yours, it's imperative for the lab equipment you use to meet high standards. And for more than 40 years, Revco has been the standard by which the industry measures performance and quality.

So send for our new catalog on our complete line of chest and upright freezers. They're available from 3 to 20 cubic feet and from 0°C to -100°C. And we're sure they'll live up to *your* demands, because they've already lived up to *ours*.

**REVCO**  
**REVCO**  
**REVCO**  
**REVCO**  
**REVCO**  
**REVCO**  
**REVCO**  
**REVCO**  
**REVCO**  
**REVCO**

The World's  
Leader in  
Ultra-Low  
Temperature  
Equipment

Rheem Manufacturing Company  
Scientific Products Division  
Aiken Road Rt.1 Box 275  
Asheville, N.C. 28804  
Telephone 704 658-2711



# BIO LOGICALS BRINGS YOU SAME DAY DNA

Things to do today

o Make probe -  
5' CGGGAACCTTGGTCG 3'

9:00 Dept. Meeting

12:00 Lunch with Lydia -  
Winstons!

3:30 hydrolyze 8:30 sequence

4:00 make 16-mer primer  
5' CAAGGTGATGGCGGGA 3'  
Overnight

At the push of a button, in your own lab, you can produce sequences of DNA with BIO LOGICALS' fully automated DNA/RNA Synthesizer. You can synthesize sequences of up to 20 bases in length in less than 10 hours. No longer will your experiments be limited by the availability of probes, primers, promoters and other sequences.

Everything you need to produce oligonucleotides is available in one package. All bases and reagents are prepared and prepacked. You simply connect two manifolds to the instrument, program your sequence and the DNA/RNA Synthesizer makes it automatically without error.

You have heard and read about the new 'gene machines'. The only fully automated DNA/RNA Synthesizer is available now from BIO LOGICALS. Our instrument employs proprietary state-of-the-art phosphite triester chemistry.

Our DNA/RNA Synthesizer is reliable. To back that up: if your instrument is down during its one year warranty period we will deliver sequences to you for just the price of the reagents.

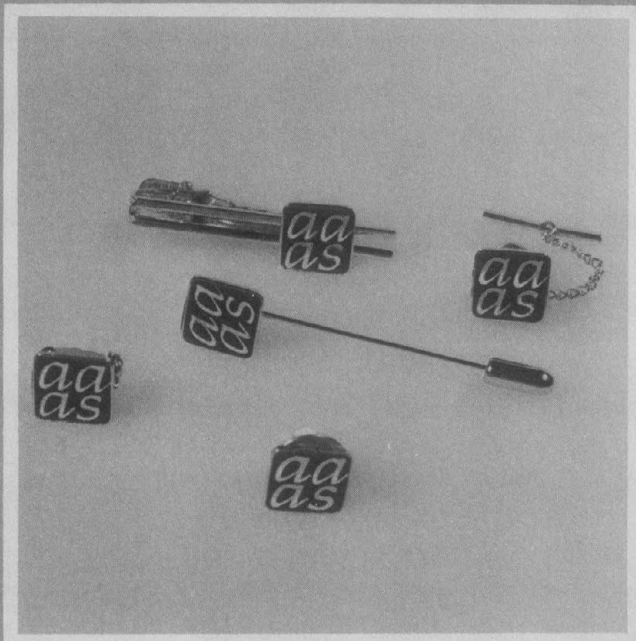
**SAME DAY DNA!™**

For additional information, contact BIO LOGICALS.  
20 Victoria Street #304, Toronto,  
Ontario, Canada M5C 2N8.  
Tel: 416-364-8460, Telex: 06-218746,  
Cable: LOGBIO



## BIO LOGICALS





# AAAS Emblem Jewelry

*Your personal symbol  
of membership*

*Declare your membership  
in the world's leading general  
science association*

AAAS emblem jewelry identifies you as a member of this prestigious scientific group. The official AAAS emblem is handsomely reproduced in polished, dark-blue cloisonné enamel and gold plate and is available in five different styles.

Choose from tie bar, tie tac (clutch-back), lapel button (military-back), lapel pin, or stick pin.

## Special Offer

Order the complete five-piece set for \$29.00. You save \$7.50.

### Order Form

\_\_\_\_\_ tie bar(s) @\$7.50

\_\_\_\_\_ stick pin(s) @\$7.50

\_\_\_\_\_ tie tac(s) @\$7.50

\_\_\_\_\_ five-piece set(s) @\$29.00

\_\_\_\_\_ lapel pin(s) @\$7.00

\_\_\_\_\_ TOTAL

\_\_\_\_\_ lapel button(s) @\$7.00

Name \_\_\_\_\_ Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Mail order to AAAS Sales, Dept. MJF, 1515 Massachusetts Avenue, NW,  
Washington, D.C. 20005

Please allow 6-8 weeks for delivery. All orders under \$10.00 must be prepaid.



# ZIP BACK THE SACK ON OUR NEWEST ORANGE

Slip a sterile new Corning Cell Wells™ 96 well plate clean from its sack.

You don't need teeth or scissors to open.

Distribute your cell line throughout the 96 wells. Superb for hybridoma/monoclonal antibodies, titrations, toxicity testing, and more.

Every well bottom is on the same plane for quick, accurate microscopic scan. You don't have to readjust constantly.

See how the lid nestles over the plate. Its shape makes certain it only fits one way.

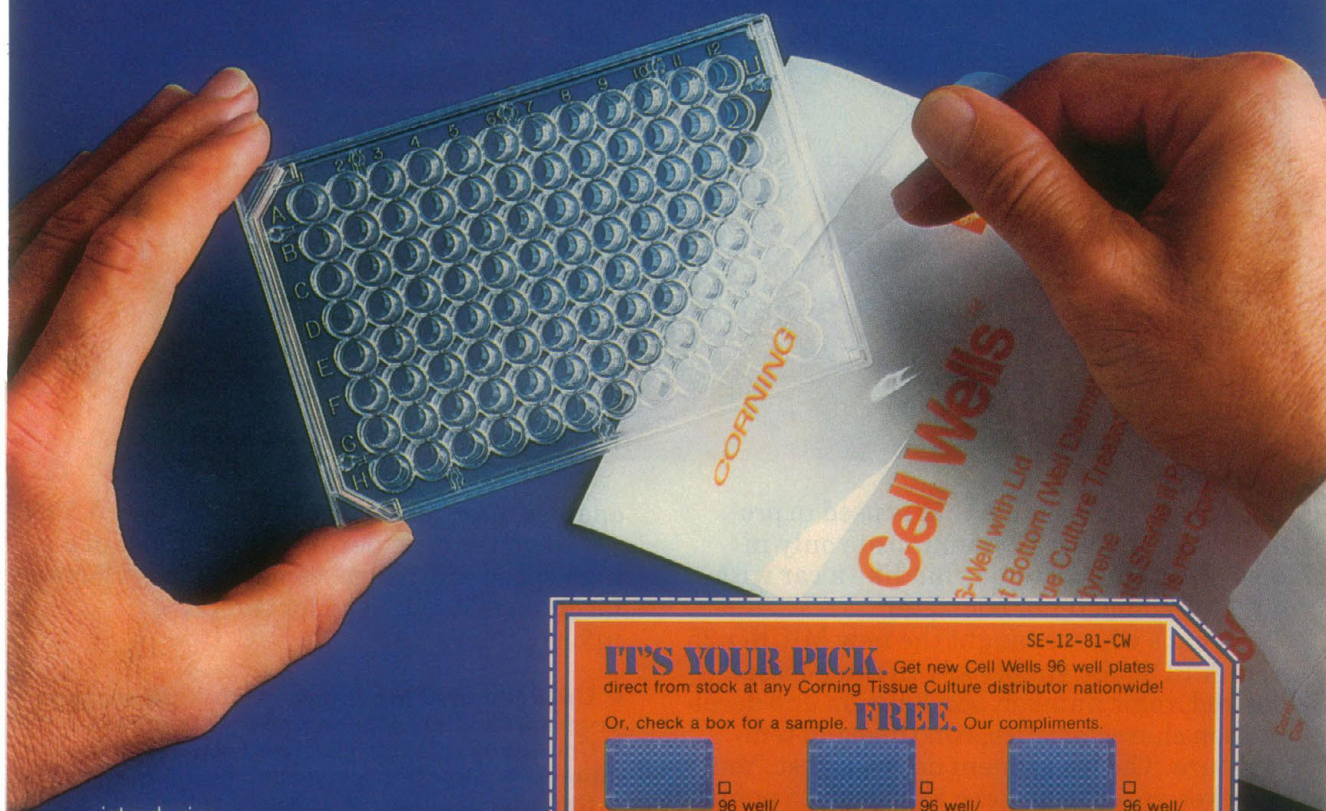
Rings on the lid encircle each well. They collect condensation and keep it from contaminating other wells when you put the lid back on.

Each well on the plate is raised to further reduce contamination from spills seeping into wells nearby.

We letter every rank and number every file boldly on the plate for reference. Between each well is a number and letter to tell you where you are.



Cell Wells 96 well plates, the latest orange. That's disposable labware from Corning.



introducing  
**CORNING**  
**Cell Wells**™  
96-well plates

## IT'S YOUR PICK.

SE-12-81-CW  
Get new Cell Wells 96 well plates direct from stock at any Corning Tissue Culture distributor nationwide!

Or, check a box for a sample, **FREE**. Our compliments.



☐ 96 well/  
flat bottom/ T.C.  
treated/ sterile/ lid  
Corning no. 25860-96



☐ 96 well/  
round bottom/ T.C.  
treated/ sterile/ lid  
Corning no. 25850-96



☐ 96 well/  
round bottom/ non-  
treated/ sterile/ no lid  
Corning no. 25855-96

Send us this coupon on your letterhead with full mailing instructions.

☐ Please have a Sales Representative call.

Corning Medical and Scientific  
Attn: CW MS-21510  
Corning Glass Works  
Corning, New York 14831

**CORNING**

For literature circle reader service number 361  
For sales representative to call circle reader service number 362



*Introducing*

# THE CENTRIFUGAL FORCE MACHINE



To 110,000 x g (25,000 RPM)

Let's face it. A machine that is used to produce force shouldn't communicate only in terms of RPM. It's somewhat like a car without a speedometer or odometer.

That's why we taught the new MICRO-25 to talk RCF. You simply key in the g-force desired, rotor number, acceleration and deceleration characteristics, run time and temperature. The instrument does the rest. You can even specify the force at any given point in your sample tube. And the continuously displayed  $G \times \text{minute}$  parameter gives you a direct readout of the entire centrifugal field applied during the run, enabling straightforward experimental replication.

The MICRO-25's computer and its many operational and computational features are just part of the story. There are significant mechanical innovations as well. Like a speed control system with  $\pm 5$  RPM accuracy. And an infrared temperature detector that

enables *rotor* temperature control to  $\pm 0.5^\circ\text{C}$ .

If you're considering the purchase of a high speed centrifuge, consider a high force machine instead. Send for complete information.

- Up to 50 stored programs ■ Multiple segment program capability for stepped centrifugation
- Continuous display of set and actual run conditions ■ Superior speed control,  $\pm 5$  rpm
- Rotor recognition ■ Infrared rotor temperature detector,  $\pm 0.5^\circ\text{C}$  control ■ Safety cover interlock system ■ Automatic overspeed protection ■ Delayed start feature ■ Absolute containment



INTERNATIONAL EQUIPMENT COMPANY  
A DIVISION OF DAMON

300 Second Ave., Needham Hts., MA 02194  
Tel: (617) 449-0800, Telex: 92-2499, INTLEQUIP NEDM.

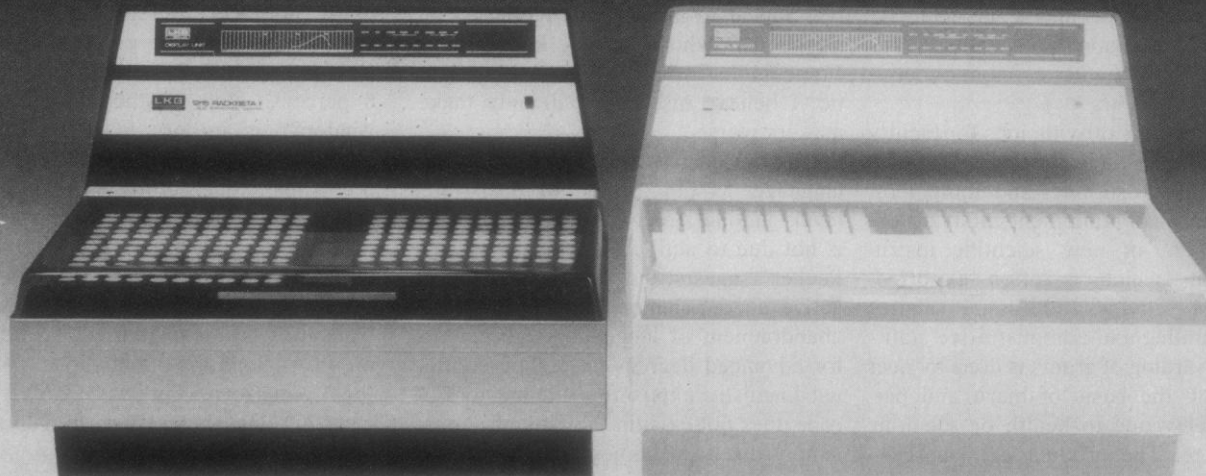
DAMON/IEC (UK) LTD.,  
Unit 7, Lawrence Way, Brewers Hill Road, Dunstable, Bedfordshire,  
LU6 1BD, England. Tel: (0582) 604660

Circle Reader Service No. 346 for Salesman to call.  
Circle Reader Service No. 347 for Literature.



# LKB RackBeta®

The small, versatile way to double capacity.



## LKB RackBeta liquid scintillation counters offer programmable versatility and higher capacity at significant savings.

LKB's traditional excellence in instrumentation is now available in liquid scintillation counters. Evaluate the LKB RackBeta. Designed with user input, its modern modular design doubles sample capacity while conserving valuable bench space.

This versatile instrument programs easily to your specific needs. Just type your values on the teleprinter and the RackBeta will set the parameters requested. The RackBeta can also interrupt a program without upsetting other samples and a clear printout records what occurred.

### Twice the capacity.

Choose from two models. The normal vial version (1215 RackBeta) takes 300 samples, ten samples to a rack. The miniature vial version

(1216 RackBeta) takes 660 samples, fifteen samples to a rack. That's *twice the capacity* of competitive models—all in an instrument that's *half the size*.

In addition to providing high counting efficiency, the RackBeta also offers unrivalled reproducibility. Its patented spectrum stabilizer calibrates the instrument continuously to ensure constant, reproducible, efficient count results at all times with 60% minimum tritium efficiency.

### MiniBeta models for economical versatility.

The two MiniBeta models offer most of the features of the RackBeta—at very affordable prices. Select the version that fits your workload.

Rethink your options carefully. Before you purchase any liquid scintillation counter, study the LKB RackBeta and MiniBeta. They offer solid advantages over competitive models.



LKB INSTRUMENTS, INC.  
12221 Parklawn Drive  
Rockville, MD 20852

S-12/11/81

**Yes,** I want to count on LKB.

- ☐ Please have a representative contact me.  
☐ Please arrange a demonstration in my area.  
☐ My purchase needs are ☐ immediate  
☐ 3 months ☐ 6 months ☐ 1 year  
☐ Please send me more information on  
☐ 1215 RackBeta ☐ 1211 MiniBeta  
☐ 1216 RackBeta ☐ 1212 MiniBeta

Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Institution \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_  
 Zip \_\_\_\_\_ Phone \_\_\_\_\_

# NEW

RESTRICTION  
ENDONUCLEASES  
FROM  
NEW ENGLAND BIOLABS

**ClaI** 5' ... ATCGAT ... 3'  
#197 3' ... TAGCTA ... 5'

**Xmn I** 5' ... GAANNNTTC ... 3'  
#194 3' ... CTTNNNNAAG ... 5'

**EcoRV** 5' ... GATATC ... 3'  
#195 3' ... CTATAG ... 5'

*Price Reduction on...*

**Nae I** 5' ... GCCGGC ... 3'  
#190 3' ... CGGCCG ... 5'

**Eco RI** 1,000 units\* \$ 44  
#101 5,000 units \$176  
25,000 units \$500  
\*15 minute units

**Nar I** 5' ... GGCGCC ... 3'  
#191 3' ... CCGCGG ... 5'

MODIFICATION METHYLASE  
**Hpa II Methylase** #214

**Nci I** 5' ... CC<sup>C</sup>GG ... 3'  
#196 3' ... GG<sup>C</sup>CC ... 5'

CH<sub>3</sub>  
5' ... CCGG ... 3'  
3' ... GGCC ... 5'  
CH<sub>3</sub>

**Nco I** 5' ... CCATGG ... 3'  
#193 3' ... GGTACC ... 5'

#400-8 M13mp8 RFI DNA  
#400-9 M13mp9 RFI DNA

**Not I** Recognition sequence unknown  
#189

Over 65 Restriction Endonucleases—  
all of the highest purity.

**Nru I** 5' ... TCGCGA ... 3'  
#192 3' ... AGCGCT ... 5'

Send for our 1981 catalog.

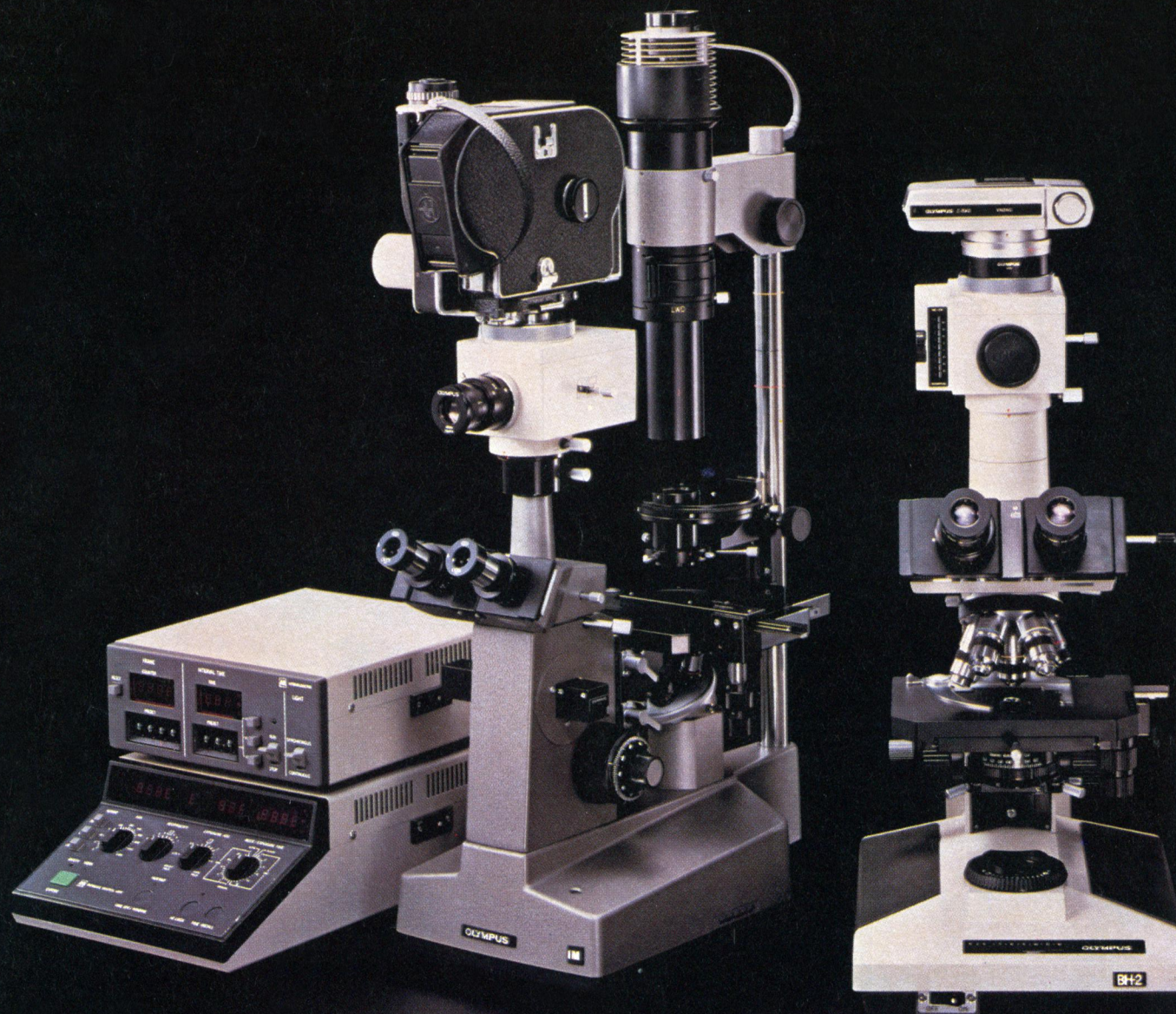


32 TOZER ROAD, BEVERLY, MA 01915, USA  
(617) 927-5054 • (617) 922-5349 • TELEX 95-1057

**New England Biolabs GmbH**  
**Postfach 2750**  
6231 Schwalbach bei Frankfurt  
West Germany Tel. (06196) 3031  
Circle No. 364 on Readers' Service Card



# Olympus introduces the universal system for automatic exposure photomicrography: Olympus PM-10AD.



Photomicrography takes a quantum leap forward, with the introduction of PM-10AD, a fully automated camera system incorporating a built-in microcomputer, for photomicrography and cinemicrography.

Utilizing the latest advances in microelectronics, the PM-10AD offers a universal, fully integrated multi-format system with automatic controls for precision exposures with read-out, reciprocity failure correction, film and specimen characteristics and color temperature. And only from Olympus, a time lapse unit for both 35mm photomicrography and 16mm cinemicrography.

For a fascinating demonstration of this state-of-the-art system, contact the Olympus Microscope Dealer listed in your Yellow Pages, or Olympus Corporation of America, 4 Nevada Drive, New Hyde Park, NY 11042.

**OLYMPUS**  
The Science Company



In Canada: W. Carsen Co., Ltd., Ontario  
Circle No. 306 on Readers' Service Card



# Our expanded line of Nalgene<sup>®</sup> filters and accessories will make your work easier.

**Nalgene 500 mL Unit.**  
New, larger upper chamber  
lets you filter 500 mL  
with just one fill. Ideal  
for filtration (cold)  
sterilization.

**New Pressure Adapter and Filter Cap.**  
Permits use of both Nalgene 115-mL Filter Units  
in a closed positive pressure system to  
eliminate the problems that go with vacuum  
filtration of proteinaceous materials.

**Type S Filter Unit,  
115 mL.**

**New In-line  
Filter Holders.**

**New Syringe Filter.**  
Two-way filtration  
for small volumes.

**New Membrane Filters.**  
Available in two materials, six  
porosities. Pre-filter now available  
separately to fit any Nalgene sterilization unit.

If you've ever used our proven Type S sterilization filter units, you'll know why others just don't compare. There's no time wasted in preparation because Nalgene filters are pre-assembled, pre-sterilized and disposable.

Now, we've added new filters and accessories that will save you more time and make your work easier.

And you can order any Nalgene filter or accessory from a single source, your labware dealer. Another

way Nalgene filter products can save you time and money.

**Free** We have new *analytical* filterware, too. For full details, ask for our latest Nalgene filterware literature. Contact your labware dealer, or circle the Reader Service Number. Nalge Company,

Nalgene Labware Department,  
P.O. Box 365, Rochester,  
New York 14602.

**SYBRON | Nalge**

Circle No. 273 on Readers' Service Card

Nalgene filter products are intended for laboratory use only. Not for *in vitro* diagnosis or parenterals.



## AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

*Science* serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

### Editorial Board

1981: PETER BELL, BRYCE CRAWFORD, JR., E. PETER GEIDUSCHEK, EMIL W. HAURY, SALLY GREGORY KOHLSTEDT, MANCUR OLSON, PETER H. RAVEN, WILLIAM P. SLICHTER, FREDERIC G. WORDEN

1982: WILLIAM ESTES, CLEMENT L. MARKERT, JOHN R. PIERCE, BRYANT W. ROSSITER, VERA C. RUBIN, MAXINE F. SINGER, PAUL E. WAGGONER, ALEXANDER ZUCKER

### Publisher

WILLIAM D. CAREY  
Associate Publisher: ROBERT V. ORMES

### Editor

PHILIP H. ABELSON

### Editorial Staff

Assistant Managing Editor: JOHN E. RINGLE

Production Editor: ELLEN E. MURPHY

Business Manager: HANS NUSSBAUM

News Editor: BARBARA J. CULLITON

News and Comment: WILLIAM J. BROAD, LUTHER J. CARTER, CONSTANCE HOLDEN, ELIOT MARSHALL, COLIN NORMAN, R. JEFFREY SMITH, MARJORIE SUN, NICHOLAS WADE, JOHN WALSH

Research News: RICHARD A. KERR, GINA BARI KOLATA, ROGER LEWIN, JEAN L. MARX, THOMAS H. MAUGH II, ARTHUR L. ROBINSON, M. MITCHELL WALDROP

Administrative Assistant, News: SCHERRAINE MACK;  
Editorial Assistants, News: FANNIE GROOM, CASSANDRA WATTS

Senior Editors: ELEANORE BUTZ, MARY DORFMAN, RUTH KULSTAD

Associate Editors: SYLVIA EBERHART, CAITILIN GORDON, LOIS SCHMITT

Assistant Editors: MARTHA COLLINS, STEPHEN KEPPLER, EDITH MEYERS

Book Reviews: KATHERINE LIVINGSTON, Editor; LINDA HEISERMAN, JANET KEGG

Letters: CHRISTINE GILBERT

Copy Editor: ISABELLA BOULDIN

Production: NANCY HARTNAGEL, JOHN BAKER; ROSE LOWERY; HOLLY BISHOP, ELEANOR WARNER; JEAN ROCKWOOD, LEAH RYAN, SHARON RYAN, ROBIN WHYTE

Covers, Reprints, and Permissions: GRAYCE FINGER, Editor; GERALDINE CRUMP, CORRIE HARRIS

Guide to Scientific Instruments: RICHARD G. SOMMER  
Assistants to the Editors: SUSAN ELLIOTT, DIANE HOLLAND

Membership Recruitment: GWENDOLYN HUDDLE

Member and Subscription Records: ANN RAGLAND  
EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Area code 202. General Editorial Office, 467-4350; Book Reviews, 467-4367; Guide to Scientific Instruments, 467-4480; News and Comment, 467-4430; Reprints and Permissions, 467-4483; Research News, 467-4321. Cable: Advancesci, Washington. For "Information for Contributors," write to the editorial office or see page xi, *Science*, 25 September 1981.

BUSINESS CORRESPONDENCE: Area Code 202. Membership and Subscriptions: 467-4417.

### Advertising Representatives

Director: EARL J. SCHERAGO

Production Manager: GINA REILLY

Advertising Sales Manager: RICHARD L. CHARLES

Marketing Manager: HERBERT L. BURKLUND

Sales: NEW YORK, N.Y. 10036: Steve Hamburger, 1515 Broadway (212-730-1050); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHICAGO, ILL. 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-337-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772); DORSET, VT. 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581).

ADVERTISING CORRESPONDENCE: Tenth floor, 1515 Broadway, New York, N.Y. 10036. Phone: 212-730-1050.

## Transition at the EPA

A year after the elections the future of the Environmental Protection Agency (EPA) and its priorities remain unclear. However, some indications may be gleaned from impending decisions by the EPA administrator on implementation of an agencywide strategy for the control of toxic substances. The strategy was developed over the course of the past year and is designed to be both scientifically sound and economically reasonable. The outcome will be of general interest, since the direction of environmental policy and the role of science in regulatory decision-making are at stake.


The need to place a higher priority on control of toxic pollutants in the environment was recognized by the Carter Administration. At the end of his term as EPA administrator, Douglas Costle spoke of a transition in environmental policy from control of conventional to toxic pollutants; this change would provide the major challenges for the agency in the 1980's and 1990's. Shortly before the elections, and prodded by the Office of Management and Budget, EPA began to analyze the regulatory and management implications of such a shift in priorities. The new Reagan team at EPA signaled initial approval of this approach and encouraged further development of the agencywide toxics strategy. For the first time in EPA's history, a scientist-engineer was appointed to the number two command spot.

Focusing attention and resources on risks from toxic substances will move EPA more directly into the orbit of public health policy. This makes it necessary to work closely with other public health agencies of the government on assessing risks and determining the relative seriousness of exposure from different sources, such as environment, workplace, diet, and other life-style factors. Work on an EPA cancer policy, which has been under way for some time, calls for cooperation of this kind.

Internally, the agency will need to move from a medium-specific and engineering perspective to a broad scientific and public health orientation. This will be difficult, partly because of the scientific and regulatory complexities of toxics control, partly for institutional reasons. Throughout EPA's history, individual program offices, in particular those responsible for air and water, have been the real power centers. Their principal regulatory approach was based on establishing pollutant standards. By contrast, the offices for pesticides and industrial chemicals are responsible for licensing commercial products once they have been found acceptable. Both strategies will have to be used as part of an integrated toxics control program; others will need to be developed, such as control programs for entire sectors of industry or geographic regions. Toxics control must, therefore, be organized as an agencywide function, establishing priorities for action, choosing the most appropriate intervention alternative, and making decisions in light of program views but not dominated by them.

A key ingredient for a successful toxics strategy is a vastly improved linkage between policy-making and science in the agency. The Office of Research and Development oversees a large research program and plays an important role in the preparation of science and health assessments. Some program offices have relied on the Office of Research and Development for these services, others conduct their own science assessments and bypass the agency's central science advisory mechanism. The result has been considerable duplication of effort, delays, and internal conflicts. The new toxics strategy emphasizes the importance of developing consistent procedures for collecting and analyzing scientific data and for submitting science assessments to outside peer review. Much of EPA's research will need to be more directly linked to regulatory needs. Policy-makers, on their part, need to engage in more sustained substantive dialogue with the experts.

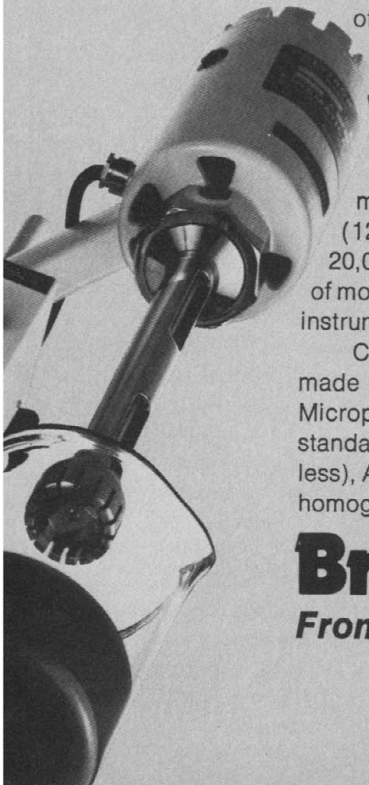
In sum, an EPA-wide toxics strategy needs more central policy direction and oversight, less program independence, more cooperation with public health agencies, less emphasis on open-ended data collection, and more policy-relevant science.—JURGEN SCHMANDT, *Professor of Public Affairs, University of Texas, Austin 78712*



**With a  
Brinkmann  
Homogenizer,  
you can  
homogenize  
samples  
under 1 ml**

**...homogenize  
anaerobically**

**...and  
without  
cross  
contamination.**



When it comes to breaking down and homogenizing virtually any type of tissue, small organs, bones, muscle, cartilage, or even an entire mouse, the Brinkmann Homogenizer is in a class by itself.

Consider its power. A 600W motor develops up to 30,000 rpm (1200W on PT-45 model, with up to 20,000 rpm) to assure complete homogenization of most samples within 30 to 60 seconds (other instruments may require 15 minutes or more).

Consider the wide choice of generators, all made entirely of stainless steel. It includes a Microprobe Generator small enough to fit into a standard cuvette (for samples as small as 1 ml or less), Anaerobic Generators for aerosol-free homogenization, a Mechanical Seal Generator to

minimize contamination and cleaning problems, even an in-line bench-top unit that homogenizes without admitting air.

Consider its unique method of tissue destruction, a combination of ultrasonic energy and mechanical shearing action, based on the Willems High Frequency Principle.

Consider the optional electronic speed control unit, with its sensor that continually monitors the actual speed and keeps it constant, regardless of load.

From any standpoint, nothing compares with a Brinkmann Homogenizer. For literature, write Brinkmann Instruments, Inc., Subsidiary of Sybron Corporation, Cantiague Road, Westbury, N.Y. 11590 or call toll-free 800/645-3050. In Canada: Brinkmann Instruments (Canada), Ltd.

**Brinkmann Homogenizers**  
*From tissue to homogenate in 30 seconds!*

**SYBRON | Brinkmann**

For information circle No. 313 on Readers' Service Card  
For a demonstration circle No. 314 on Readers' Service Card



scientific expertise is inherently removed from value considerations and that scientists are therefore political celi-bates is an anachronistic and even dangerous one. Expert forums may limit the role of dissent by giving a dominant place to establishment views on controversial topics. Such consensus-building procedures may also perpetuate misconceptions about the relation between facts and values in controversial areas where questions of value are difficult to distinguish from questions of fact. Furthermore, the need for urgent action in controversial areas may lead to undue reliance on expert opinion. When policy-makers and the courts need quick answers, tentative scientific judgments may be treated as definitive conclusions and the qualifications intended by scientists may be lost (20).

In the end, proposals to bolster judicial competence in technical areas fall short, for the problems faced by the courts in dealing with controversies in these areas cannot be attributed simply to lack of judicial expertise. They also reflect the failure of the policy process to recognize fully the public and multifaceted character of modern scientific and technological development. In the ab-

sence of controlling policy principles, broad questions that follow from scientific and technological activities will continue to reach the courts in the artificial guise of two-party adversarial litigation. Equipping the courts with scientific and technical support may facilitate the adjudication of these issues; however, it may also divert attention from the public responsibility for major policy decisions and encourage the conversion of moral and political questions into technical debates among experts. As our strongest institution for defending fragile values, the courts should guard against such overextension of scientific expertise. However, the fundamental choices involved are not simply matters to be resolved by adjudication; they call for setting priorities and evaluating the public will, clearly a political, not a judicial, role.

#### References and Notes

1. G. Ahrens, paper presented at the annual meeting of the American Bar Association, New York, 4 August 1978.
2. D. Bazelon, "Coping with Technology Through the Legal Process," address at Cornell University Law School, 29 November 1976.
3. H. Leventhal, in *Ethyl Corp. v. Environmental Protection Agency*, 541 Fed. Rep., 2nd ser. 1 (1976).
4. T. Powlledge, *Hastings Cent. Rep.* 8 (No. 5), 15 (1978).
5. *Superintendent of Belchertown State School v. Saikewicz*, 373 Mass. 728 (1977); G. J. Annas, *Hastings Cent. Rep.* 8 (No. 1), 21 (1978).
6. G. J. Annas, *Hastings Cent. Rep.* 8 (No. 3), 16 (1978).
7. *Patent Law Assoc.* 7 (Nos. 3 and 4) (1979); this is a special issue devoted entirely to the question of patenting of new life forms.
8. U.S. District Court, Middle District of Tennessee, No. 78-3371. See *Honicker v. Hendrie, a Lawsuit to End Atomic Power* [A. Bates, Ed. (Book Publishing Co., Seattle, Wash., 1978)] for a review of the documents in the case.
9. *Administrative Procedure Act*, 5 U.S. Code, sect. 706.
10. *Natural Resources Defense Council v. U.S. Nuclear Regulatory Commission*, 547 Fed. Rep., 2nd ser. 633, 653 (D.C. Cir. 1976).
11. R. J. Smith, *Science* 207, 1189 (1980).
12. H. R. Piehler, A. D. Twerski, A. S. Weinstein, W. A. Donaher, *ibid.* 186, 1089 (1974).
13. H. Leventhal, *Univ. Pa. Law Rev.* 122, 509 (1974).
14. See proposal in Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500, sect. 9) for special courts having jurisdiction over environmental matters.
15. This and other proposals were discussed at a Conference on the Use of Scientific and Technical Evidence in Formal Judicial Proceedings, Washington, D.C., September 1977 [see Working Paper by J. D. Nyhart, Sloan School, Massachusetts Institute of Technology (mimeographed)].
16. A. Kantrowitz, *Am. Sci.* 63, 505 (September-October 1975).
17. See, for example, J. C. Glick, *Ann. N.Y. Acad. Sci.* 265, 189 (1976).
18. *Calvert Cliffs' Coordinating Committee, Inc. v. United States Atomic Energy Commission*, 449 Fed. Rep., 2nd ser. 1109, 1118 (D.C. Cir. 1971).
19. L. H. Tribe, *When Values Conflict*, L. H. Tribe, C. S. Schelling, J. Voss, Eds. (Ballinger, Cambridge, Mass., 1975), pp. 61-92.
20. For a review of critiques of the science court concept, see A. Mazur, *Minerva* 15, 1 (spring 1977); D. Nelkin, *Sci. Technol. Hum. Values* No. 18 (January 1977), pp. 20-31.

## R&D Money Doesn't Grow on Trees

So, whether you're working in the public or private sectors, for a university or national laboratory, in government or business, it's up to you to find out where the R&D dollars are hiding and how to go about getting them after you've found them.

The books in the *Research and Development: AAAS Report Series* can help you do this in two ways.

1. *Annual R&D Reports*—written by experts in the field—explore federal policies, budgetary concerns, the economy, and international and domestic developments as they relate to R&D policy making for the coming fiscal year.
2. *Subsequent R&D Colloquium Proceedings*—featuring leaders from government, industry, universities, and other parts of the scientific community—give you the texts of presentations, question-and-answer periods, and discussions from annual AAAS Colloquia on R&D Policy.

Order the *Research and Development: AAAS Report Series* today. In these money-hard times, it's an investment you can't afford to miss.

### Special Offer

6-volume set of either the **Reports** or the **Colloquium Proceedings**, \$27.00. Entire 12-volume series, \$54.00. AAAS Sales Dept. L-2H-81, 1515 Mass Ave., NW, Washington, DC 20005. Orders under \$10.00 must be prepaid. No further discount to AAAS members with Special Offer prices.

R&D: AAAS Report VI, 1982	paper, \$7.50
R&D: AAAS Report V, 1981	paper, \$5.00
R&D: AAAS Report IV, 1980	..
R&D: AAAS Report III, 1979	..
R&D: AAAS Report II, 1978	..
R&D: AAAS Report I, 1977	..

R&D Colloquium Proceedings, 1981	paper, \$7.50
R&D Colloquium Proceedings, 1980	paper, \$5.00
R&D Colloquium Proceedings, 1979	..
R&D Colloquium Proceedings, 1978	..
R&D Colloquium Proceedings, 1977	..
R&D Colloquium Proceedings, 1976	..

**AAAS wishes to thank these organizations,**  
all of whom are exhibitors at the 1982 AAAS  
Annual Meeting & Exhibit. We invite you  
to join us and them at the Meeting.

**Come to the Exhibit Hall** at the Washington  
Hilton and see the materials on display and  
meet the representatives of each of these  
outstanding organizations.



Addison-Wesley Publishing Co.  
Allanheld, Osmun & Co.  
American Anthropological  
Association  
American Association of Physics  
Teachers  
American Friends Service Committee/  
Fellowship of Reconciliation  
American Institute of Chemical  
Engineers  
American Mathematical Society  
American Nature Study Society  
American Psychiatric Association  
American Psychological Association  
American Society of Hospital  
Pharmacists  
American Society for Microbiology  
American Type Culture Collection  
American University Press Services,  
Inc.  
Association of American  
Geographers  
Association of Science-Technology  
Centers  
Association for Women in Science  
Battelle Memorial Institute/Office  
of Nuclear Waste Isolation  
BIOSIS (BioSciences Information  
Services)  
Birkhauser Boston  
Book Examination Center  
Breeder Reactor Corp.  
Canadian Broadcasting Corp.  
Carolina Biological Supply Co.  
CIBA-GEIGY Corp.  
The Combined Book Exhibit  
COMSAT  
Conference Book Service, Inc.

Consejo Nacional de Ciencia y  
Tecnologia, Mexico—CONACYT  
Cornell University Press  
DIALOG Information Service  
*Discover Magazine*  
Encyclopaedia Britannica  
Elsevier Science Publishers  
Entomological Society of America  
Environment Canada/Environnement  
Canada  
W.H. Freeman and Co.  
Graduate Women in Science  
Harper & Row, Publishers, Inc.  
Hemisphere Publishing Corp.  
Heyden & Son, Inc.  
History of Science Society  
Illuminating Engineering Society  
Imported Publications, Inc.  
Institute for Scientific Information  
Institute of International Education  
Institute on Religion in an Age of  
Science  
International Association for Dental  
Research  
International Science Film Collection  
Joint Oceanographic Institutions,  
Inc.  
William Kaufmann, Inc.  
Lanier Business Products  
Lea & Febiger  
MCPS Video Industries, Inc.  
National Academy Press  
National Association of Academies  
of Science

National Association of Biology  
Teachers  
National Energy Foundation  
National Institute of Science  
National Science Teachers  
Association  
National Society of Professional  
Engineers  
Oak Ridge Associated Universities  
Pergamon Press  
Phillips Petroleum Co.  
Prentke Romich Co.  
Resources for the Future  
*Science 82*  
Science and Technology Political  
Action Committee  
*Science Books & Films*  
Science Council of Canada  
*Science Digest*  
Sigma Xi, The Scientific Research  
Society  
Smeltzer Films  
Society for General Systems Research  
Society of Economic Paleontologists  
and Mineralogists  
Society of Exploration Geophysicists  
*Technology Magazine*  
UNIPUB  
U.S. Geological Survey  
United States Pharmacopeial  
Convention  
University of California Press  
U.S. News Books  
Verlag Chemie International, Inc.  
Westview Press  
World Future Society

**AAAS Exhibit 1982**  
4-7 January



**Annual Meeting  
Washington**  
3-8 January