16 October 1981 • Vol. 214 • No. 4518 $2.00

SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Instrument Issue

"The TJ-6 is an excellent product. We're delighted we have one." "It's centrifuge. Nothing ev with it." "You folks have the TJ-6. We're very happ the colorful tube adapters. and a welcome change fr It's a remarkably quiet-runn recommend a TJ-6 to any ." "The lift-out bowl alone e TJ-6 is an excellent p have one." "It's a very ing ever seems to to lks have done a fine ry happy with ours." "W adapters. They're easy to ange from previous types. quiet-running

The Beckman TJ-6 Centrifuge. Everyone says great things about it.

The TJ-6 is the most popular centrifuge ever introduced, whether it's the refrigerated or non-refrigerated version.

Users appreciate how quiet it is. They like the removable bowl that makes cleaning a snap. They like the colorful adapters which bring a new practicality and ease of handling to table-top centrifuges.

Owners are delighted with the TJ-6's excellent reliability. And if there is a problem, they know there are hundreds of Beckman service representatives nationwide—at least one in every major city in the U.S. and Canada.

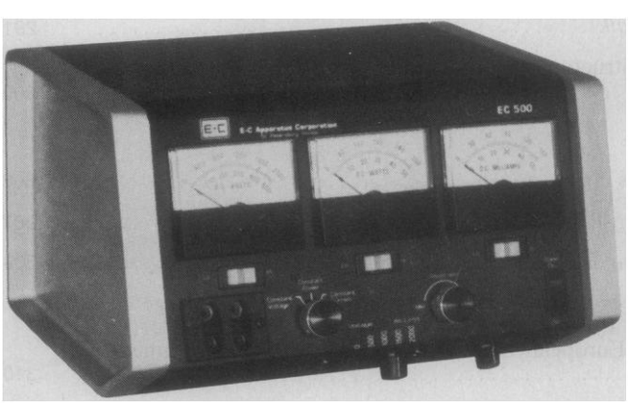
Send for Brochure SB-490 for a full description of this superior table-top centrifuge. Write to:

Beckman Instruments, Inc., Spinco Division, 1117 California Avenue, Palo Alto, CA 94304.

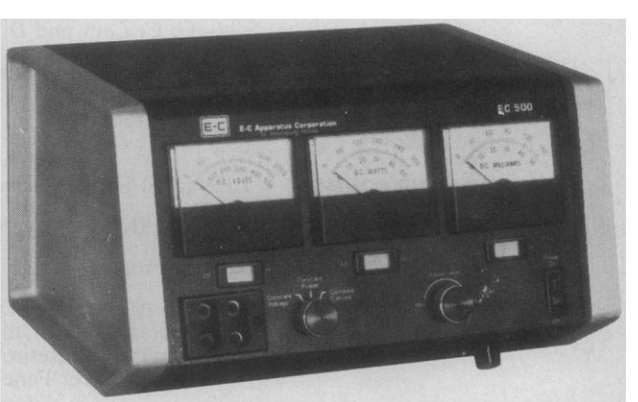
BECKMAN

Circle No. 96 on Readers' Service Card

The forgettables in constant power.



EC500VL with Voltage Limit Control . . . 2,000 volts . . . $1,295



EC500 . . . 2,000 volts . . . $1,195

EC400* . . . 1,000 volts . . . $895

If you're doing advanced separations work, dependable power supply ought to be the least of your problems.

It *can* be, too, with the new EC400 and EC500—both true constant power supplies which automatically compensate for changes in voltage or current.

The EC400, at $895, offers you up to 1,000 volts maximum, 200 mA maximum current, and 200 watts maximum power.

The EC500, at $1,195, gives you up to 2,000 volts maximum voltage—a must for highest resolution in techniques such as isoelectric focusing. Maximum current is 150 mA and maximum power is 300 watts.

Both E-C power supplies have dual-range meters, positive safety interlock, and dual electrical protection. Both adapt easily to any type of electrophoretic cell. Each is available with Voltage Limit Control at slightly higher cost.

Set and forget. Isn't that what you want and need in a laboratory power supply? For technical information call 813-344-1644 collect or write . . . E-C Apparatus Corporation, 3831 Tyrone Blvd. N., St. Petersburg, FL 33709.

A product of the Separations Specialists.

E-C

*also available with Voltage Limit Control as EC400VL . . . $995

Circle No. 178 on Readers' Service Card

ISSN 0036-8075

16 October 1981

Volume 214, No. 4518

SCIENCE

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**. 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

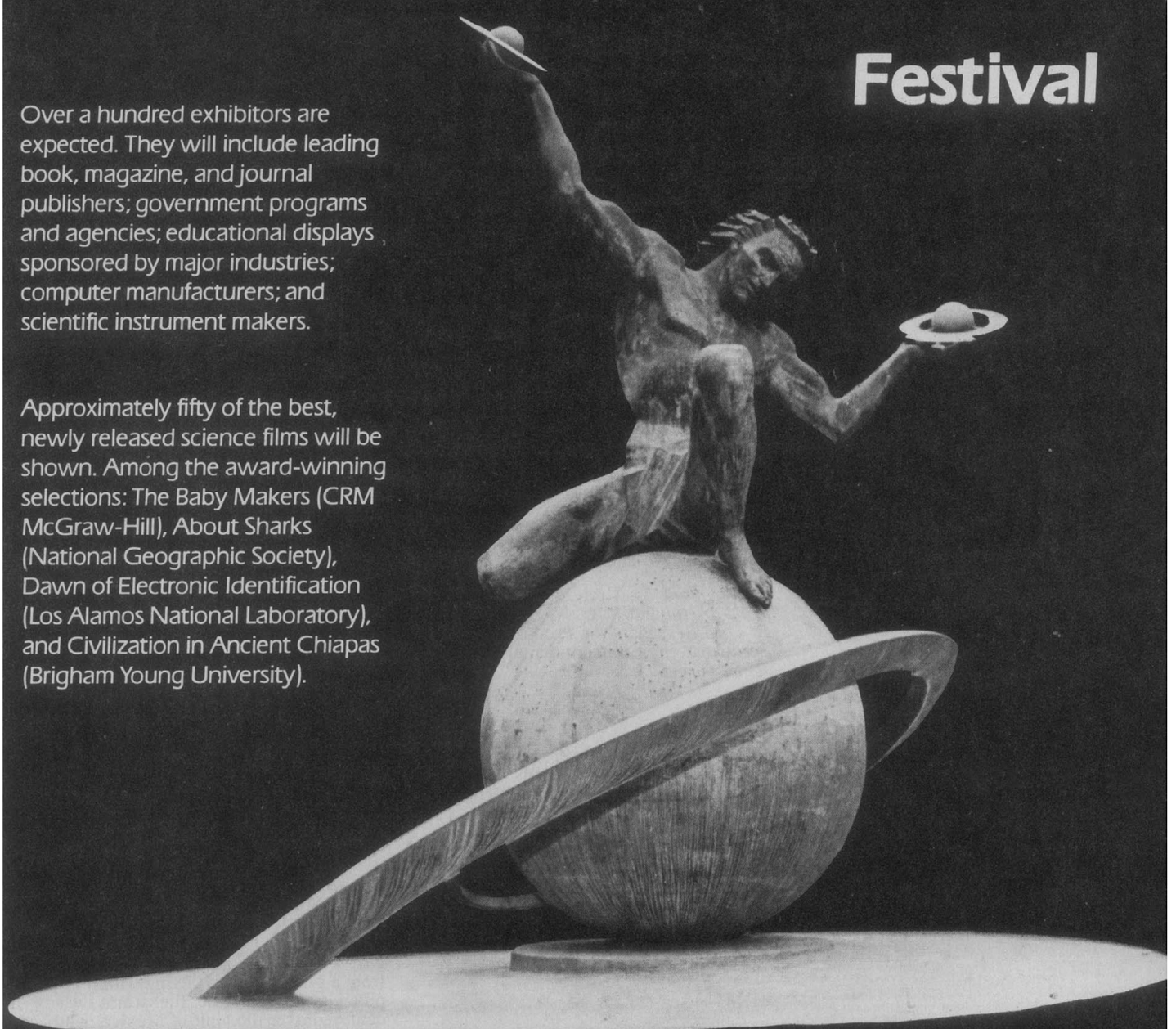
COVER

The inner eye structure of Hurricane Allen as seen from 10,000 feet, 7 August 1980. The photograph was taken from a NOAA aircraft flying within the outer eye wall while the storm was centered over the Gulf of Mexico. The characteristic spiral rain bands are wrapped around the inner eye (horseshoe-like form in center of picture). The inner eye is approximately 3 miles across. The main eye of the hurricane occupies the entire field of view and is cloud-covered below 8000 feet. Measurements of near-surface rain rate and wind velocity were made with microwave remote-sensing instruments carried by an aircraft flying safely above the cloud deck. See page 274. [C. B. Emmanuel, Research Facilities Center, NOAA, Miami, Florida 33151]

There's a world of science waiting for you at the AAAS Exhibit and Science Film Festival

Over a hundred exhibitors are expected. They will include leading book, magazine, and journal publishers; government programs and agencies; educational displays sponsored by major industries; computer manufacturers; and scientific instrument makers.

Approximately fifty of the best, newly released science films will be shown. Among the award-winning selections: The Baby Makers (CRM McGraw-Hill), About Sharks (National Geographic Society), Dawn of Electronic Identification (Los Alamos National Laboratory), and Civilization in Ancient Chiapas (Brigham Young University).



AAAS National Meeting 3-8 January 1982
Washington, DC

The essence of good photometry

It's in the simple economical SF Microscope Photometer

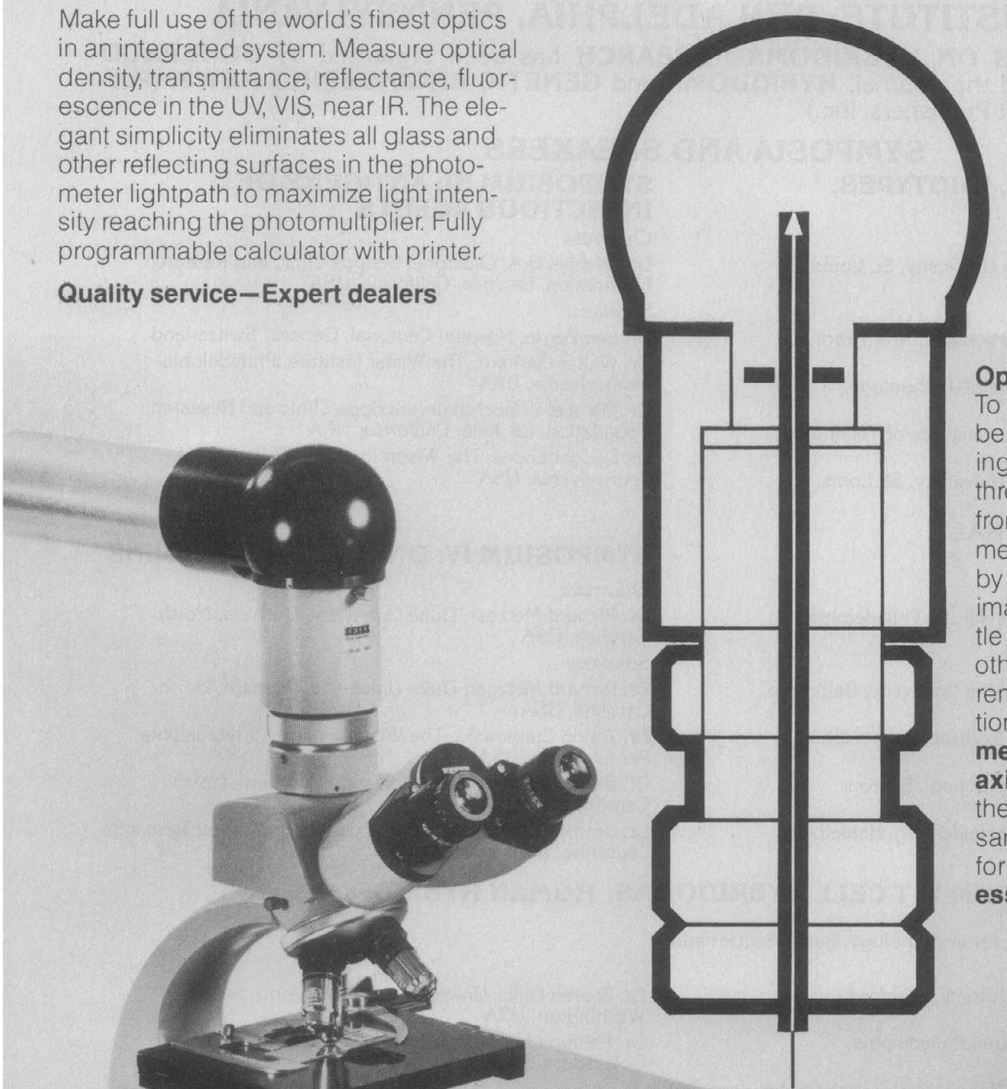
Make full use of the world's finest optics in an integrated system. Measure optical density, transmittance, reflectance, fluorescence in the UV, VIS, near IR. The elegant simplicity eliminates all glass and other reflecting surfaces in the photometer lightpath to maximize light intensity reaching the photomultiplier. Fully programmable calculator with printer.

Quality service—Expert dealers

The great name in optics

ZEISS

West Germany



Optical simplicity

To make measurements which can be meaningfully compared, nothing but the path the light takes through the specimen should differ from measurement to measurement. It is the scattering of the light by the specimen that causes an image to be formed. To detect subtle differences in this scattering, all other parts of the lightpath must remain the same. To keep conditions constant, **Zeiss makes all measurements on the optical axis.** The optics remain stationary, the detector does not move and the same part of the detector is used for each measurement. **This is the essence of good photometry.**

Carl Zeiss, Inc., 444 5th Avenue, New York, N.Y. 10018 (212) 730-4400. Branches: Atlanta, Boston, Chicago, Houston, Los Angeles, San Francisco, Washington, D.C. In Canada: 45 Valleybrook Drive, Don Mills, Ontario, M3B 2S6. Or call (416) 449-4660.

Circle No. 75 on Readers' Service Card

THE FIRST ANNUAL CONGRESS FOR
HYBRIDOMA RESEARCH
15-17 FEBRUARY, 1982, LOS ANGELES, CALIFORNIA
THE BILTMORE HOTEL

CO-CHAIRMEN
ZENON STEPLEWSKI • HILARY KOPROWSKI
WISTAR INSTITUTE, PHILADELPHIA, PENNSYLVANIA

The **FIRST CONGRESS ON HYBRIDOMA RESEARCH** has been organized by **SCHERAGO ASSOCIATES, INC.** and the Journal, **HYBRIDOMA** and **GENETIC ENGINEERING NEWS.** (Published by Mary Ann Liebert Publishers, Inc.)

SYMPOSIA AND SPEAKERS

SYMPOSIUM I: GENES, IDIOTYPES, ANTIIDIOTYPES

Chairman:

Dr. Joseph M. Davie; Washington University, St. Louis, Missouri, USA

Speakers:

Dr. Latham Claflin; University of Michigan, Ann Arbor, Michigan, USA

Dr. Leroy Hood, California Institute of Technology, Pasadena, California, USA

Dr. Malcolm Gefter; Massachusetts Institute of Technology, Boston, Massachusetts, USA

Dr. Brian Clevinger; Washington University, St. Louis, Missouri, USA

SYMPOSIUM II: TERMINAL DIFFERENTIATION

Chairman:

Dr. Giovanni Rovera; The Wistar Institute, Philadelphia, Pennsylvania, USA

Speakers:

Dr. J. Thomas August; John Hopkins University, Baltimore, Maryland, USA

Dr. Barbara Knowles, The Wistar Institute, Philadelphia, Pennsylvania, USA

Dr. Cox Terhorst, Harvard Medical School, Boston, Massachusetts, USA

Dr. Melitta Schachner; Universitat Heidelberg, Heldelberg, Federal German Republic

SYMPOSIUM III: ANTIGENS OF INFECTIOUS AGENTS

Chairman:

Dr. Michael B.A. Oldstone; Scripps Clinic and Research Foundation, La Jolla, California, USA

Speakers:

Dr. Luc Perrin; Hospital Cantonal, Geneva, Switzerland

Dr. Walter Gerhard; The Wistar Institute, Philadelphia, Pennsylvania, USA

Dr. Michael J. Buchmeier; Scripps Clinic and Research Foundation, La Jolla, California, USA

Dr. Dwight Lopes; The Wistar Institute, Philadelphia, Pennsylvania, USA

SYMPOSIUM IV: ONCOFETAL ANTIGENS

Chairman:

Dr. Richard Metzgar; Duke University, Durham, North Carolina, USA

Speakers:

Dr. Richard Metzgar; Duke University, Durham, North Carolina, USA

Dr. Zenon Steplewski, The Wistar Institute, Philadelphia, Pennsylvania, USA

Dr. Barton Haynes; Duke University, Durham, North Carolina, USA

Dr. Jean-Pierre Mach; Ludwig Institute for Cancer Research, Lausanne, Switzerland

SYMPOSIUM V: T CELL HYBRIDOMAS, HUMAN HYBRIDOMAS

Chairman:

Dr. Fritz Melchers; Basel Institute for Immunology, Basel, Switzerland

Speakers:

Dr. Henry S. Kaplan; Stanford University, Stanford, California, USA

Dr. Carlo Croce; The Wistar Institute, Philadelphia, Pennsylvania, USA

Dr. Tadamitsu Kishimoto; Osaka University Hospital, Osaka, Japan

Dr. Steven Gillis; University of Washington, Seattle, Washington, USA

Dr. Philippa Marrack; University of Colorado, Denver, Colorado, USA

Scientists interested in presenting **poster papers** may obtain abstract forms from Zenon Steplewski, Wistar Institute, 36th & Spruce, Philadelphia, PA 19104.

Regular Registration: $275 (includes Banquet and Subscription to the Journal, HYBRIDOMA SC
Student Registration: $175 (includes Banquet only). Must be verified in writing by Department Head.
Attendance will be limited. Make checks payable to: Scherago Associates, Inc.–Hybridoma.

☐ Please reserve _____ space(s): Registration fee must be included.
☐ Please send a Registration Application.
☐ Please send Exhibit Information.

Name _____

Dept. _____

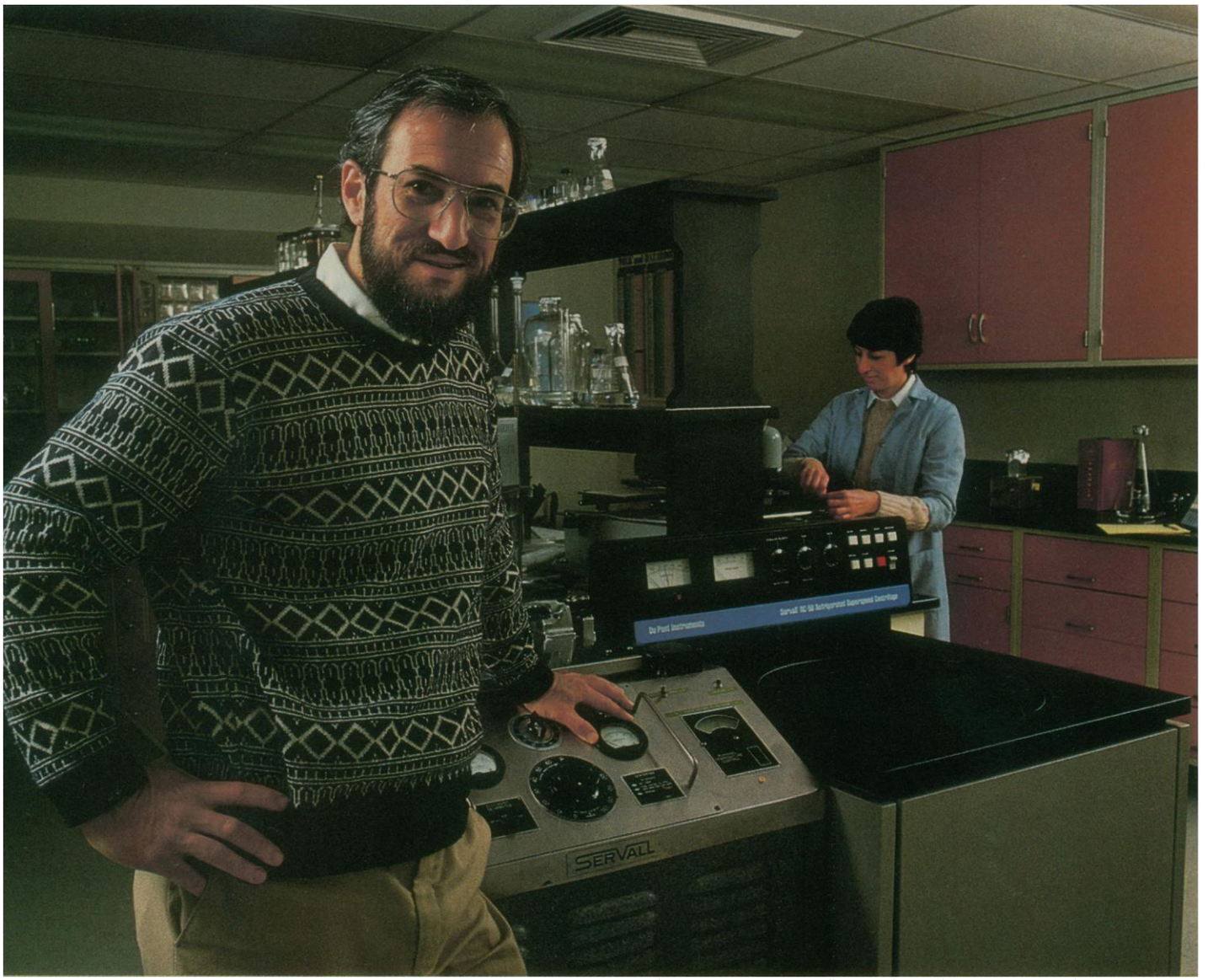
Organization _____

Street _____

City _____ State/Country _____ Zip _____

Telephone: ( ) _____

Return to: Hybridoma, c/o Scherago Associates, Inc. • 1515 Broadway, New York, N.Y. 10036 • Tel: (212) 730-1050



"Our 21-year-old Sorvall® Centrifuge worked so well for us we decided to buy another."

"Our older Sorvall® superspeed centrifuge performed very well for many years with virtually no maintenance or problems," said Dr. Mark H. Levner, Senior Microbiologist, Wyeth Laboratories. "Now we've donated it to a local college and replaced it with a new Sorvall® RC-5B Refrigerated Superspeed Centrifuge.

"Much of our work is concerned with the genetics and biochemistry of bacterial toxin production and it often depends on rapid cell fractionation. Reliability is important to us since unexpected delays can mean wasting a week's work. The new RC-5B is faster and quieter, which has eased considerably the pain of parting with our old machine," Dr. Levner concluded.

More than 30 years of experience and innovative engineering mean that you can expect the same reliability and outstanding performance from every centrifuge in the Sorvall® line—from tabletop to ultracentrifuges. To get the latest brochure on the RC-5B and other models you may need, call or write: DuPont Company, Biomedical Products Division, Room X38638, Wilmington, DE 19898.

Call DuPont for centrifuges you can rely on: 800-441-7493.

Sorvall® Centrifuges

DUPONT
REG U.S. PAT. & TM. OFF.

Circle No. 5 on Readers' Service Card


OHAUS
power
range
tare
OHAUS

GO WITH THE LEADER

Buy the American Weigh.

These new Brainweigh™ balances provide unmatched value and flexibility—in the school, in the laboratory, on the production line. They offer advanced microprocessor technology and the strict attention to quality that you've come to expect from Ohaus.

We have listened carefully to users, and designed in the most wanted operating features. You'll get precision that matches your task, and the convenience and operating simplicity you require—at a very affordable price.

Features of the Future—Now.

Advanced microprocessor circuitry makes these balances simple to operate; reliable in constant use. They have built in standard features that are costly options with others. Variable integration mode on all models allows you to choose extended weighing time to cancel out vibration or compensate for an active animal. And options for the balances offer greater flexibility for interfacing with computers or printers, more than any other comparable product.

Easy Reading.

Stop squinting at the competition and see what readability is all about. Ohaus features a big, bright LED display that's angled for easy reading—up close or across the lab. There's no glare, no guesswork. A bright red "g" illuminates to confirm a stable reading and the microprocessor will display "error" if the balance is overloaded.

Operation You'll Appreciate.

Positive, well-positioned control bars are easily reached for taring and range selection—yet out of the way to avoid accidental contact. There's no guessing what the controls do, or how they operate. Nothing to get in the way of convenient, precise operation. Even the calibration setting is up front, easily accessed and simple to adjust. With other balances you need a service call; with Ohaus you need only a screwdriver and calibration mass.

Traditional Ohaus Dependability—Standard

Nobody builds balances to last like Ohaus. Everything inside is a little better, tougher and stronger than it has to be. All the new Brainweigh balances are made with an appreciation of how demanding the real world is. They give you the sensitivity you need and the toughness you demand.

Ohaus—The American Weigh

Put any of the new Brainweigh electronic balances against any other balance regardless of price or manufacturer.

You'll be impressed with our brand of American ingenuity. Send today for complete descriptive literature on the full line of Brainweigh balances. Just call us and...**Ask for Ohaus.**

Ohaus Brainweigh Electronic Balances

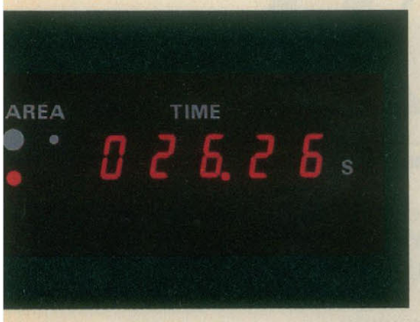
Model	Capacity x Readability	Price
B3000D	3000/300 g x 0.1/0.01 g	$1,895.
B1500D	1500/150 g x 0.1/0.01 g	$1,595.
B300D	300/30 g x 0.01/0.001 g	$1,795.
B5000	5000 g x 0.1 g	$1,695.
B1500	1500 g x 0.1 g	$1,395.
B500	500 g x 0.01 g	$1,695.
B300	300 g x 0.01 g	$1,395.

OHAUS®

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

Circle No. 98 on Readers' Service Card

NIKON VISIONS



NIKON REVOLUTIONIZES OPTICAL PERFORMANCE WITH THE FX PHOTOMICROGRAPHY SYSTEMS.

LED readout of precise, fully automatic, microprocessor-determined exposure from the UFX system control unit.

INSTRUMENTATION
Nikon's advanced UFX, HFX, AFX automatic exposure camera systems and PFX manual system.

SIGNIFICANCE
Nikon's exclusive FX direct projection design increases light transmission efficiency to greatly reduce exposure times, enhance lowlight metering sensitivity and dramatically improve image quality.

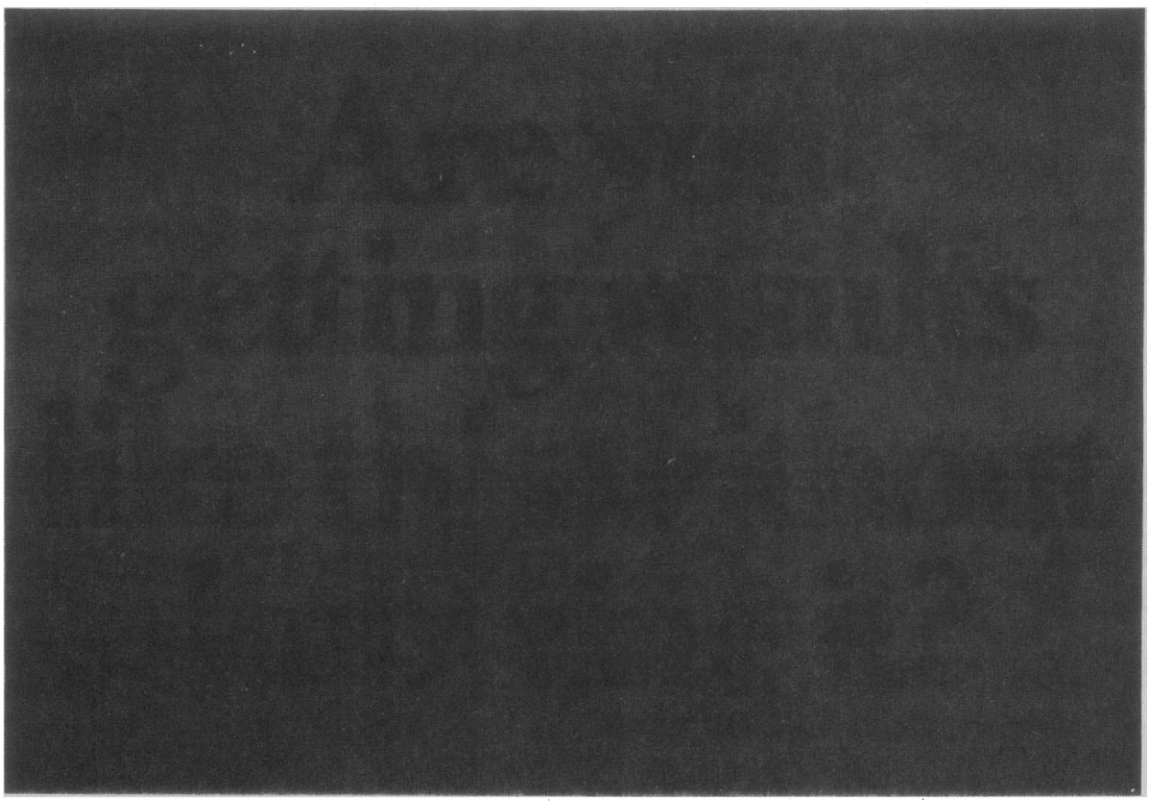
SPECIFICS
Nikon's remarkably affordable FX camera systems speed and simplify the photomicrographic process. High light transmission efficiency reduces typical exposure times by up to a factor of five. This is especially important for darkfield and fluorescence techniques.

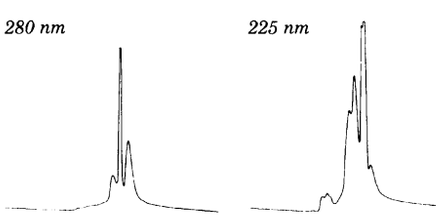
To aid ease of operation, the models UFX, HFX, and AFX offer fully automatic microprocessor exposure control and LED digital exposure readout. Model UFX features a highly sensitive photomultiplier system with choice of 1% spot or integrated average metering, exposure memory and motorized 35mm film advance. Models HFX and AFX employ Silicon Photo Diode metering.

All Nikon FX Camera Systems adapt to 35mm, Polaroid,® and 4x5 formats. Extend *your* vision. Write: Nikon Visions, Nikon Inc. Instrument Division 623 Stewart Avenue Garden City, NY 11530 (516) 222-0200.

Nikon
Extending Man's Vision

Circle No. 116 on Readers' Service Card





Photographers call it underexposure. We call it absorbance inability. The first you get from too little light, the second from the wrong kind of light. But the result is the same; there are things there but chances are you don't see them.

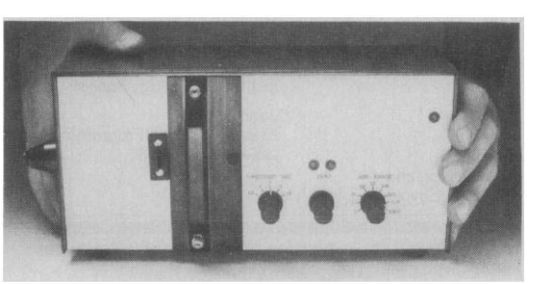
A good way to get around this problem is to use the Uvicord SII detector from LKB.

This new and improved version of one of the most widely used LKB products, (since 1958 we've sold a good twenty thousand Uvicord detectors) can monitor at 206, 225, 254, 280, 313, 365 or 405 nm. Just choose the wavelength that will give you the best result for your sample. If the 254 and 280 nm filters let you see nothing and 206 too much, the new 225 nm filter will be perfect. For peptides, for instance.

New Uvicord SII

Uvicord SII also has a unique high intensity lamp (av. life 6,000 hrs.) which, combined with the short wavelength filters, can give you up to two hundred times greater sensitivity.

Get in touch with LKB for a demonstration. We think you'd be interested in a couple of other new Uvicord SII features like the variable time constant filter and it's indicator for baseline adjustment.



LKB

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 23089682. UK sales office: LKB Instruments Ltd. 232 Addington Road, S. Croydon, Surrey CR2 8YD, England. Tel. 01-657 88 22, telex 264414. Other sales offices in: Athens (for Middle East), Copenhagen, Ghent, The Hague, Hong Kong, Munich, Paris, Rome, Turku, Vienna.

Circle No. 169 on Readers' Service Card

Monoclonal Antibody SCREENING SYSTEMS

for murine immunoglobulins

They save time –

The ELISA method employed yields a rapid and dramatic color development in the presence of positive clones. It's faster than conventional RIA and can be used with visual, manual spectrophotometric, or fully automated processing.

They avoid trouble –

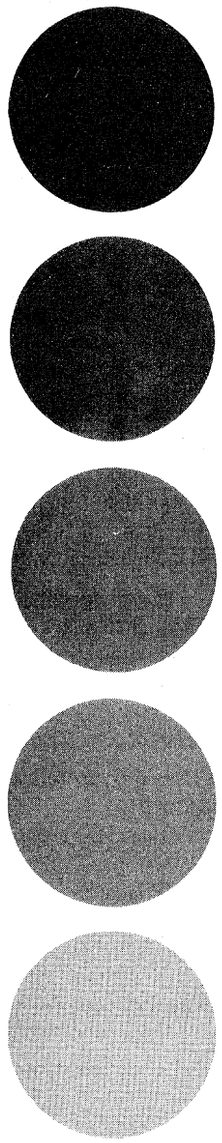
Our reagents are pretested and optimized in each screening system to prevent unwanted variables from spoiling your results.

They're complete and ready to use –

Detailed protocol and specific titer information are provided with the pretested components:

Enzyme-conjugated second antibody
Color development agent
Dilution buffer
Washing buffer
Substrate buffer

Our technical bulletin illustrates how easy it is to use the ELISA method. Send for it.



Horseradish Peroxidase

Sheep $F(ab')_2$ anti-mouse Ig – Horseradish peroxidase conjugated, 1ml
o-Phenylenediamine, lyophilized
Dilution, washing and substrate buffers
NEI-601 (~ 10,000 assays)

Goat anti-mouse Ig – Horseradish peroxidase conjugated, 1ml
o-Phenylenediamine, lyophilized
Dilution, washing and substrate buffers
NEI-602 (~ 20,000 assays)

Alkaline Phosphatase

Sheep $F(ab')_2$ anti-mouse Ig – Alkaline phosphatase conjugated, 1ml
p-Nitrophenyl phosphate, lyophilized
Dilution, washing and substrate buffers
NEI-603 (~ 10,000 assays)

Sheep anti-mouse Ig – Alkaline phosphatase conjugated, 1ml
p-Nitrophenyl phosphate, lyophilized
Dilution, washing and substrate buffers
NEI-604 (~ 20,000 assays)

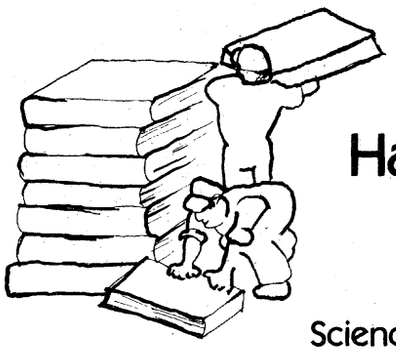
Not for use in humans or clinical diagnosis.

NEN® 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. 132 on Readers' Service Card



Half Price AAAS Book Sale

Science Compendia Series

Solar Energy in America
by William D. Metz and Allen L. Hammond
Evaluates research strategies in the development of solar energy, covering the power tower concept; photovoltaic cells and other collectors; and biomass, wind, ocean thermal, and other energy sources. Includes illustrations, a directory of solar energy companies and wind turbine generator manufacturers, and a federal budget summary for solar energy research, FY 1979.
256 pp. 1978 Illus.
ISBN: 0-87168-238-9 (paper) $4.25

Combating the #1 Killer: The Science Report on Heart Research
by Jean L. Marx and Gina Bari Kolata
Presents readable, in-depth looks at the epidemiology of heart disease, its diagnosis and relationship to lifestyle, the most promising current and projected treatments, research in progress, and ethical problems which may confound research results. The authors won the American Heart Association's Blakeslee Award for the Science articles on which this book is based. 224 pp. 1978 Illus.
ISBN: 0-87168-235-4 (paper) $3.75

The Science Centennial Review
Edited by Philip H. Abelson and Ruth Kulstad
192 pp. 1980 Illus.
ISBN: 0-87168-305-9 (cloth) $7.00
ISBN: 0-87168-250-8 (paper) $3.00

Advanced Technology
Edited by Philip H. Abelson and Mary Dorfman
168 pp. 1980 Illus.
ISBN: 0-87168-303-2 (cloth) $7.00
ISBN: 0-87168-249-4 (paper) $3.00

Electronics: The Continuing Revolution
Edited by Philip H. Abelson and Allen L. Hammond
224 pp. 1977 Illus.
ISBN: 0-87168-217-6 (cloth) $5.00
ISBN: 0-87168-230-3 (paper) $1.75

***Energy: Use, Conservation and Supply (Vol. 1)**
Edited by Philip H. Abelson
160 pp. 1974 Illus.
ISBN: 0-87168-213-3 (cloth) $5.00
ISBN: 0-87168-237-0 (paper) $1.75

***Energy: Use, Conservation, and Supply (Vol. 2)**
Edited by Philip H. Abelson and Allen L. Hammond
208 pp. 1978 Illus.
ISBN: 0-87168-300-8 (cloth) $6.00
ISBN: 0-87168-237-0 (paper) $2.50

Food: Politics, Economics, Nutrition, and Research
Edited by Philip H. Abelson
208 pp. 1975 Illus.
ISBN: 0-87168-215-X (cloth) $5.00

Health Care: Regulation, Economics, Ethics, Practice
Edited by Philip H. Abelson
262 pp. 1978 Illus.
ISBN: 0-87168-302-4 (cloth) $6.00
ISBN: 0-87168-240-0 (paper) $2.50

Materials: Renewable and Nonrenewable Resources
Edited by Philip H. Abelson and Allen L. Hammond
208 pp. 1978 Illus.
ISBN: 0-87168-216-8 (cloth) $5.00
ISBN: 0-87168-227-3 (paper) $1.75

Population: Dynamics, Ethics, and Policy
Edited by Priscilla Reining and Irene Tinker
208 pp. 1975 Illus.
ISBN: 0-87168-214-1 (cloth) $5.00
ISBN: 0-87168-225-7 (paper) $1.75

*Special two-volume price:
hardbound $10.00
paperbound $5.00

Please send me the following books:

# of Copies	Title	Price	Total

All orders must be received by November 1, 1981. No further discount to AAAS members with this order form.

TOTAL _____

☐ Bill me (all orders under $10.00 must be prepaid)

☐ Payment enclosed

Name _____

Address _____

City _____ State _____ Zip _____

Please allow 6-8 weeks for delivery.

Order from: AAAS, Dept. J-1-81A
1515 Massachusetts Ave., NW,
Washington, DC 20005

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. 174 on Readers' Service Card

No other oscilloscope offers this much in one package.

Large 16K Memory

See things you've never seen before with a time resolution of up to 16,000:1 and a dynamic range of up to 32,000:1. Zoom in on the smallest signal detail with expansion up to x256 on both axes. By using subsections of memory, you can display up to 32 stored waveforms simultaneously.

4-Channel Operation

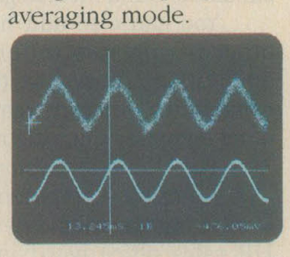
Capture, store and display four signals simultaneously using two plug-ins operating on the same, or totally independent, timebase and trigger. Compare live and stored waveforms in real time. Even compare interactive variables such as voltage/current or stress/strain using X-Y display of either live or stored signals.

Pre- and Post-Trigger Delay

Look into the past or future with a pre-trigger delay from 500 nanoseconds to 37 days or a post-trigger delay up to 106 years. Avoid accidental triggering by checking the threshold and sensitivity using the trigger-view mode.

Signal Averaging

Extract repetitive signals from noise using sweep averaging. Even smooth those slow, noisy, one-shot signals by using the unique point-averaging mode.



Alphanumeric Display

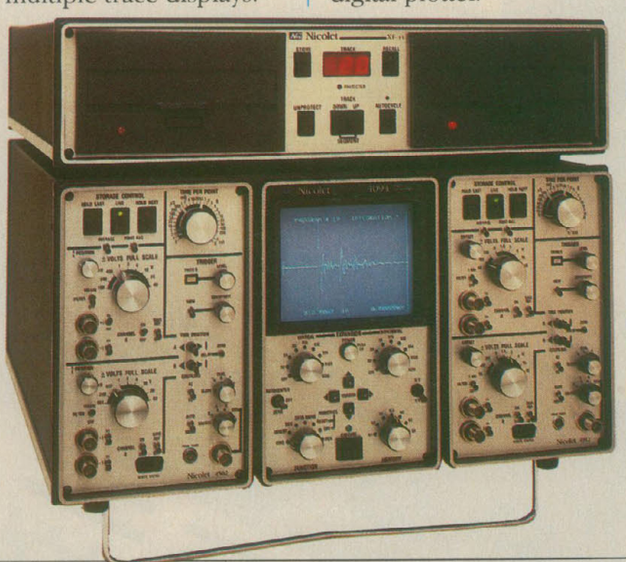
Get absolute or relative measurements from any portion of the waveform using the cursor-interactive time and voltage readout. The numerics include a channel identifier to climinate errors even on multiple trace displays.

Data Manipulation

As with all Nicolet scopes, manipulate stored data using the pushbutton functions of add, subtract or invert. With the 4094, continue to expand this capability with disk-extended functions of multiply, integrate, smooth, RMS and much more.

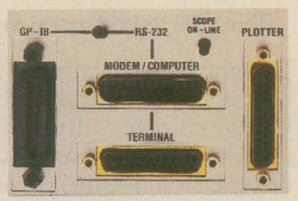
Permanent Data Storage

Store waveforms at the touch of a button on the optional floppy disk or capture and store automatically using the autocycle feature. Get report ready hardcopy records using the standard X-Y or Y-T recorder outputs, or obtain fully annotated plots automatically with the optional digital plotter.



IEEE-488 and RS-232 I/O

Integrate the 4094 into your digital measurement system with the fully bi-directional GP-IB and RS-232 digital I/O option.



One of a Family

Nicolet is the world's leading manufacturer of high resolution digital oscilloscopes. In addition to the 4094, Nicolet offers the 2090 range of 2-channel digital oscilloscopes with many advanced features including high-resolution, disk storage and digital I/O.

Find out how Nicolet can bring digital precision to *your* analog measurements. For more information, simply circle the reader service card or call 608/271-3333. Or write: Nicolet Instrument Corporation, Oscilloscope Division, 5225 Verona Road, Madison, WI. 53711.

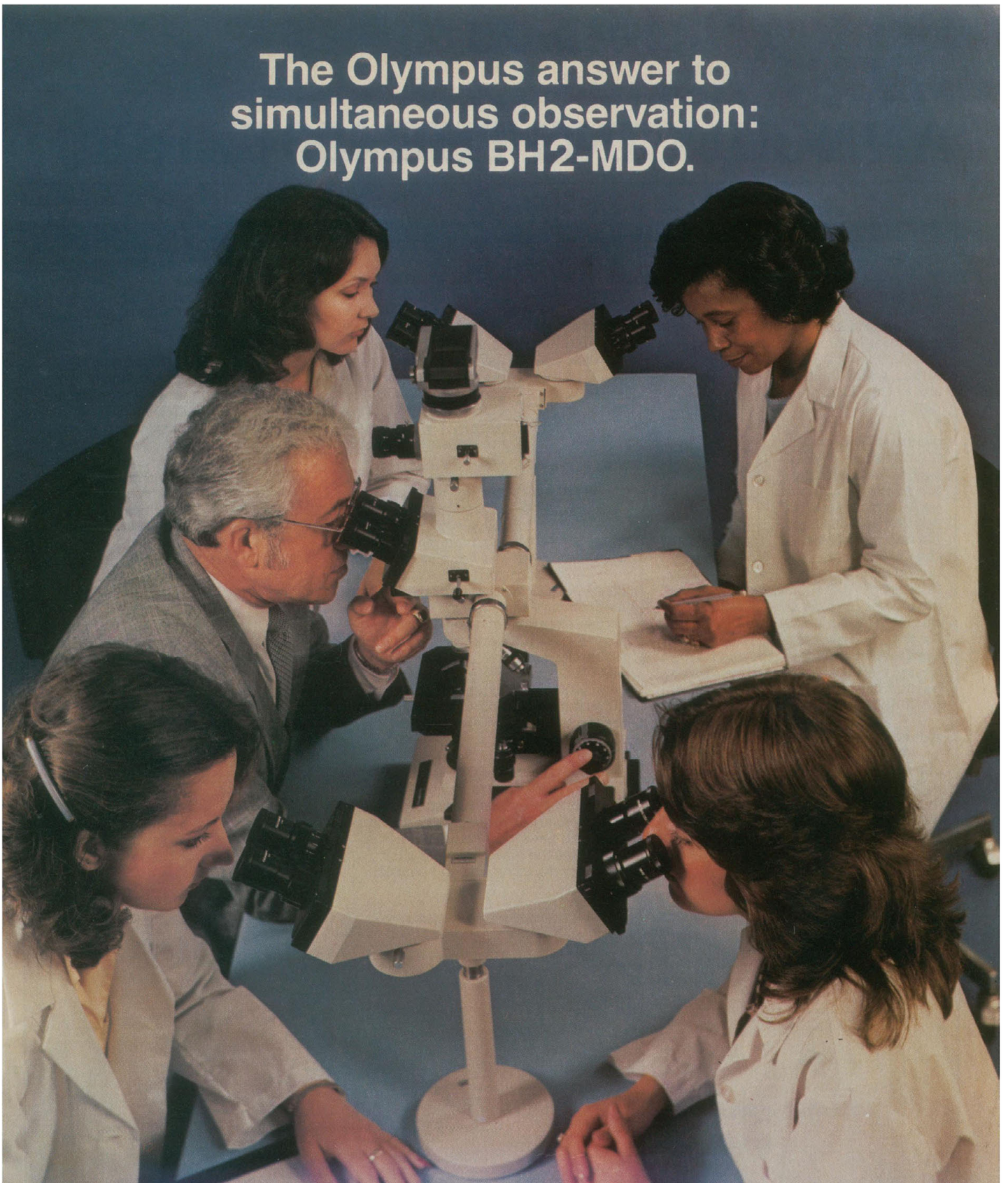
NICOLET INSTRUMENT CORPORATION
OSCILLOSCOPE DIVISION

Sales and Service Offices Worldwide

The Nicolet 4094.

Circle No. 90 on Readers' Service Card

The Olympus answer to simultaneous observation: Olympus BH2-MDO.



Olympus introduces the most advanced system for simultaneous viewing of a single specimen, with identical brightness, magnification, visual field and specimen orientation. It's the Olympus response to the growing need for superior training and consultation instrumentation. Totally versatile, the BH2-MDO permits the use of three to five observation stations and photomicrographic camera, with an illuminated transparent pointer that can be positioned anywhere in the field of view.

The Olympus BH2-MDO is part of the sophisticated new BH-2 System Microscope, worthy of your examination. To arrange a demonstration, contact the Olympus Microscope Dealer listed in your Yellow pages, or Olympus Corporation of America, 4 Nevada Drive, New Hyde Park, NY 11042.

In Canada: W. Carsen Co., Ltd., Ontario

OLYMPUS®

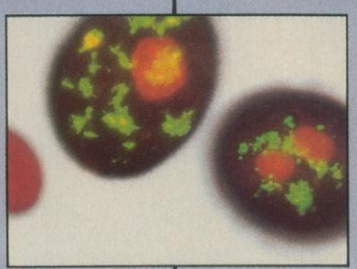
The Science Company

Circle No. 8 on Readers' Service Card

Becton Dickinson FACS Systems

ANNOUNCING THE 400 SERIES

The FACS 400 Series is the newest family in the FACS tradition of advanced Fluorescence Activated Cell Sorters. The FACS 440, incorporating the very latest instrumental advances, is the new designation of the FACS IV System which was introduced in 1978 as the world's first generally available computer-based cell sorter. It is now the flagship of the 400 Series, which includes the FACS 400, 420 and 440.



Modular Design

Major new capabilities are added *by modular upgrading* at each level of the FACS 400 Series. This versatile design enables the creation of the instrument best suited to research needs at any time. To a basic FACS 400 System at lowest cost, those options and accessories required in present work can be added. Later addition of other options will then involve minimum time lost. The design also enables future expansion, by modular upgrading, to create a FACS 420 or 440.

Advanced Applications

The Fluorescence Activated Cell Sorter (FACS™) has become a powerful means of identifying and separating cells and cell constituents according to distinctive properties of FLUORESCENCE and SIZE. FACS makes possible multiparameter measurement of individual cells, providing the distribution of these measurements in a sample. Evaluation against operator-selected criteria, at rates to 5,000 cells per second, forms the basis for physical separation of viable subpopulations. FACS measurements have been documented for sensitivity to as few as 3,000 fluorescein molecules per cell. Light-scatter measurements are sensitive to particles as small as 0.3 micron in diameter, and can be used to detect viability, without staining, in homogenous populations such as lymphocytes.

Since the introduction of the first FACS Cell Sorter, the number of instruments in use and their contributions to active research have steadily accelerated. FACS analysis is now a major research technique in cancer immunology, hematology, pathology, biochemistry, general immunology, and quantitative cytology. Potential research applications range over virtually all biology and medicine.

Proven Standard of Comparison

The instruments of the FACS 400 Series incorporate standard features of proven importance from earlier systems and have many newer features which are the direct result of user feedback during our eight years of experience. FACS instruments are accepted as the standard of comparison for quality, performance and reliability, and are in daily use in top research laboratories around the world—in the United States, Europe, Japan, Australia, and elsewhere.

New FACS Analyzer

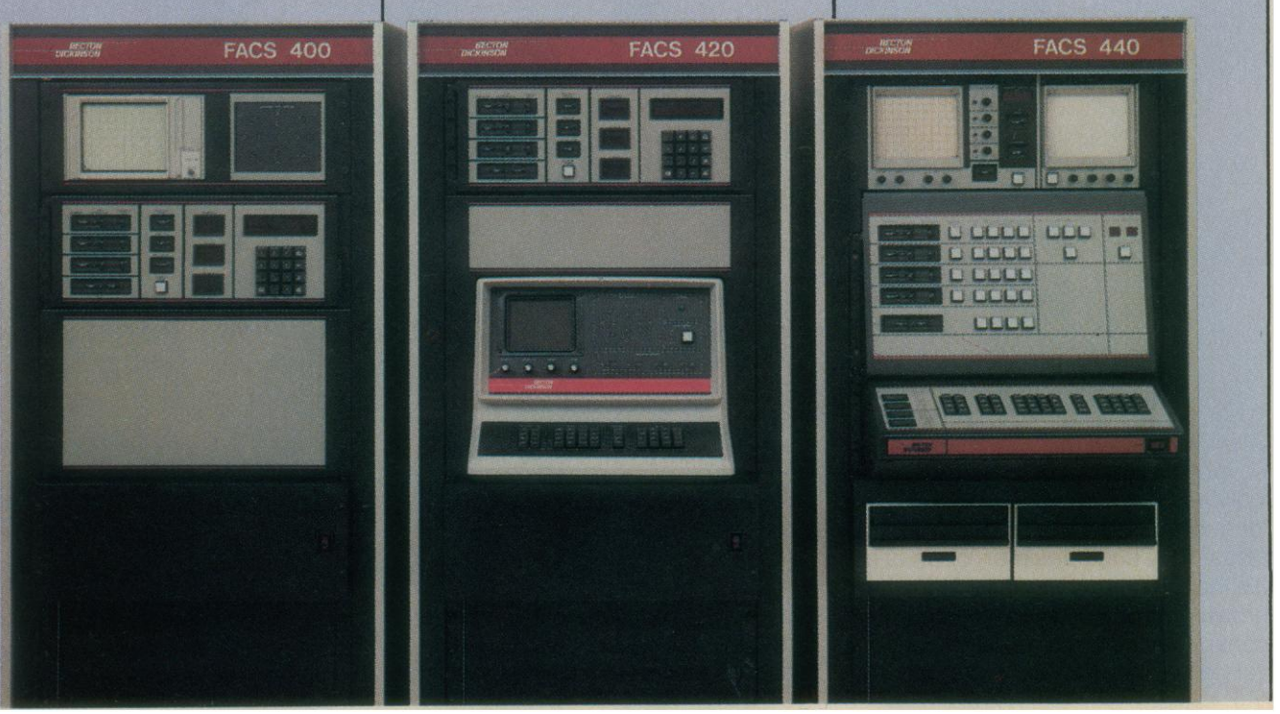
A companion instrument, the FACS Analyzer, is now available to measure individual cells simultaneously for FLUORESCENCE intensity and color (using mercury-arc illumination) and for SIZE (as measured by electronic volume). Although not a cell sorter, the Sensor Unit of the FACS Analyzer is available for use with any existing FACS electronics console and is an option to the FACS 400 Series.

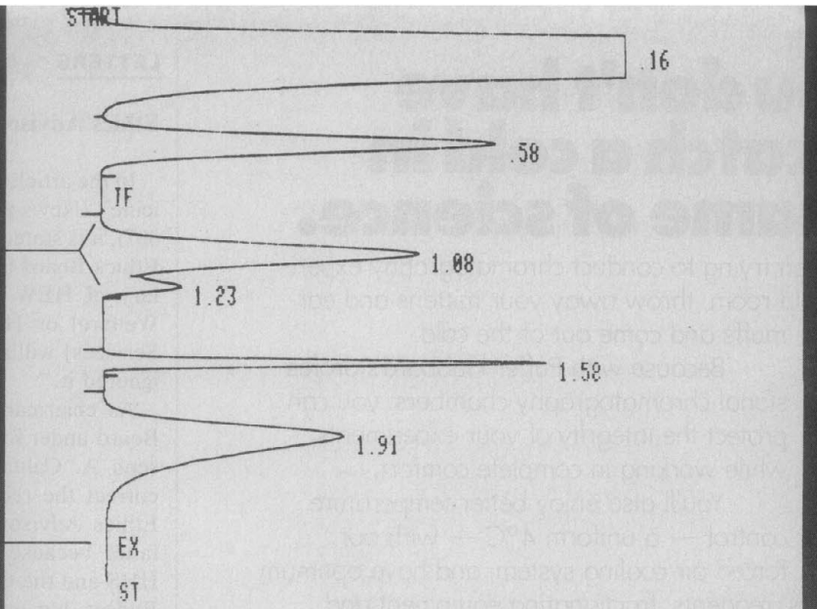
For additional information, including an extensive bibliography, please call or write Becton Dickinson FACS Systems.

BECTON DICKINSON
FACS Systems

490-B Lakeside Drive
Sunnyvale, California 94086
(408) 738-8558; TWX 910 338 2026

Antwerpse Steenweg 277
2800 Mechelen, Belgium
015/29.01.43; Telex 846 72096





Tailor quantitation to your instructions with integrator functions.

Control valves, relays, or solenoid with time programmable functions.

Peak codes inform you of resolution and integration method.

```
RUN #   16                OCT/14/81  11:52:23
ID   3390

ISTD
   RT          AREA TYPE  CAL#          AMOUNT
  0.58       4117500  TBP     1           5.001
  1.08       4225600  SBB     2           4.013
  1.23        342590  TBP     3           1.519
  1.58       1748800   BB     4&          3.000
  1.91       4674100   PB     5           6.992

TOTAL AREA= 1.5109E+07
  ISTD AMT= 3.0000E+00
MUL FACTOR= 1.0000E+00
```

Get the answers in the units you want. No hand calculation needed.

The price of automated results has never been so low. Just $2,600.

The HP 3390 Integrator lets you do away with tedious hand calculation for little more than the cost of a good strip chart recorder. It plots any 0-1 volt signal source, measures peak area and heights and performs all standard calculations. A valuable option allows you control of valves or your HP automatic sampler.

For complete information, write to Analytical Group, Hewlett-Packard Co., 1820 Embarcadero Road, Palo Alto, CA 94303. Or call and ask for an HP Analytical Products Representative.
EAST (215) 265-7000, WEST (408) 988-7000,
MIDWEST (312) 255-9800,
SOUTH (404) 955-1500,
CANADA (416) 678-9430,
EUROPE Geneva (022) 838111,
JAPAN (03) 331-6111.

suggested U.S. domestic price only.

Circle 176 on reader service number for literature
Circle 177 on reader service number to have an HP representative contact you.

When performance must be measured by results.

HEWLETT PACKARD

43103/AG

LETTERS

Ethics Advisory Board

In the article "Ethical risks in biomedicine" (News and Comment, 17 Apr., p. 307), it is stated that "the work of the old Ethics Board has not yet found a secretary of HEW [Health, Education, and Welfare] or HHS [Health and Human Services] willing to endorse it. Califano ignored it."

As chairman of the Ethics Advisory Board under former HEW Secretary Joseph A. Califano, Jr., I would like to correct the record. First, I believe the Ethics Advisory Board experiment did falter because of disinterest at HEW-HHS and the Office of Management and Budget, but only after Secretary Califano left office. Second, Secretary Califano did not to my knowledge ever ignore the Board or its work. Indeed, I believe, as I think all members of the Board do, that Secretary Califano felt it was extremely important for an independent body like the Board to advise the Secretary on the complex and important ethical issues arising in federal health policies and programs. Moreover, Secretary Califano acted positively upon all recommendations which the Board made to him except for some about in vitro fertilization, which he published for public comment before taking action. Final action was prevented not by disinterest but by departure from office.

JAMES C. GAITHER
One Maritime Plaza,
San Francisco, California 94111

Citation in Astronomy

A certain systematic parochialism is too often found in scientific literature—in the United States as well as in other countries. In the science I know best—astronomy—many review articles published in the United States contain few or no references to papers written in languages other than English or to groups of authors working outside the United States. Has science, in this field, been developing only in the United States? No one really thinks so.

J. Lequeux, editor of *Astronomy and Astrophysics* (a journal that, about 20 years ago, resulted from the merging of many important Western European astronomy journals), has found (*1*) that, in 1978, the "impact factor" worldwide (derived from the Science Citation Index) was 9.91 for the *Annual Review of Astronomy and Astrophysics*; 2.71 for

the *Monthly Notices of the Royal Astronomical Society*; 2.31 for *Astronomy and Astrophysics*; and less for other journals.

One concludes that, nowadays, American scientists quote only themselves; the process is dangerous. Languages other than English are discouraged. Young (or not so young) scientists elsewhere in the world publish in English, but sometimes in broken English, missing the opportunity to be clear. This usually does not help, however, as American scientists do not quote them.

This kind of parochialism is spreading, and it is leading to a new form of American intellectual colonialism: only Americans do well; American science is exported or good scientists are imported from abroad, where they are transformed into American scientists; foreign science is good only when submitted to American leadership. I am possibly darkening the picture; I have many good friends and colleagues in the United States, and elsewhere, who have always been extremely fair; and I cannot fail to pay here a due tribute to all I owe American science, and to American astronomers in particular. But in the present situation, I see severe threats to the universality of science and to the independence of non-American scientists in their choice of a language, a subject, and a channel for publication.

I hope my friends will pardon me, and I hope they will understand what I mean—in time.

JEAN-CLAUDE PECKER
Laboratoire d'Astrophysique
Théorique, Institut d'Astrophysique,
Collège de France,
98 bis, Boulevard Arago,
75014 Paris, France

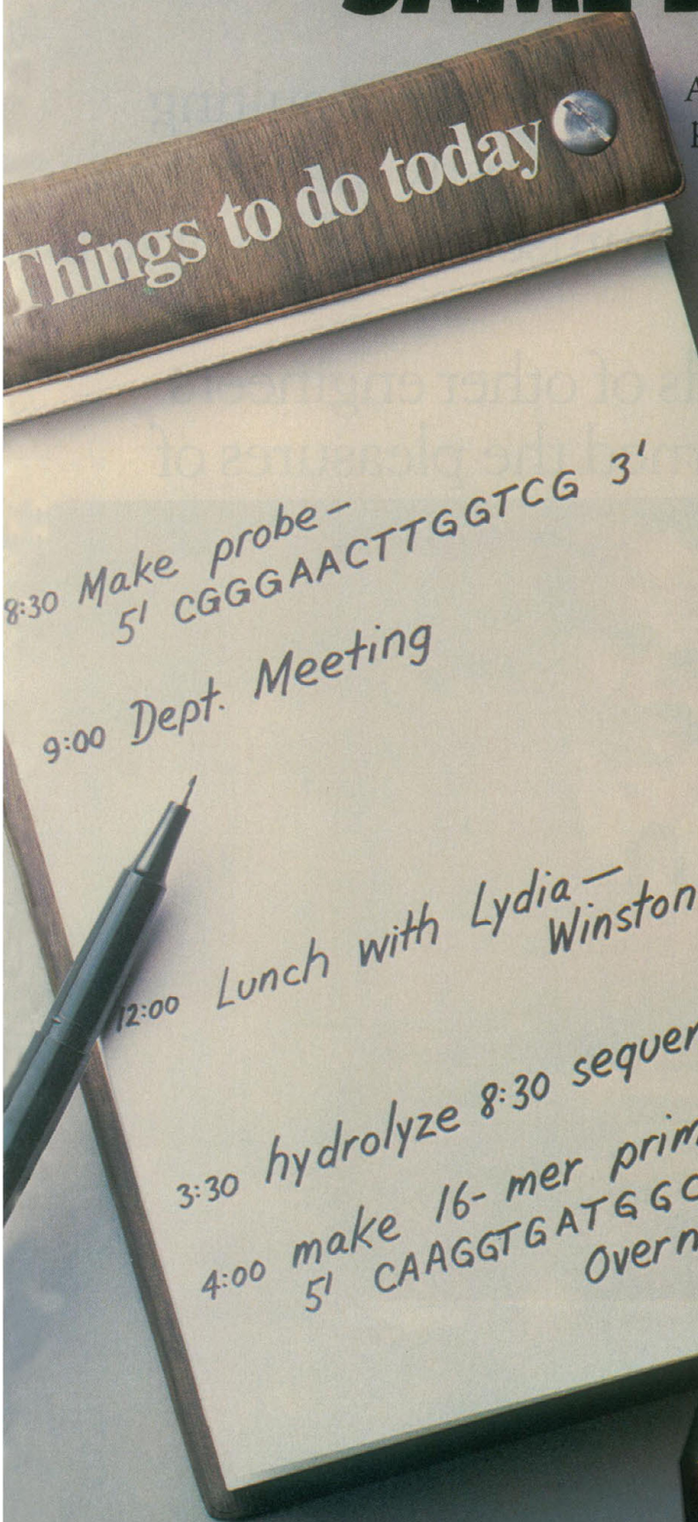
References

1. J. Lequeux, *J. Astron. Fr.* (No. 9), (June 1980).

Industrial Participation in Engineering Education

At the recent Sixth Annual AAAS Colloquium on R&D Policy, much consideration was given to the health of the science and engineering educational enterprise. Particular attention was focused on the cutbacks in the Reagan Administration's budget for science and engineering educational support within the National Science Foundation. Many speakers suggested that the industrial world pick up some of the slack created by federal funding cutbacks. Since Seat-

BIO LOGICALS BRINGS YOU SAME DAY DNA



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

Circle No. 189 on Readers' Service Card

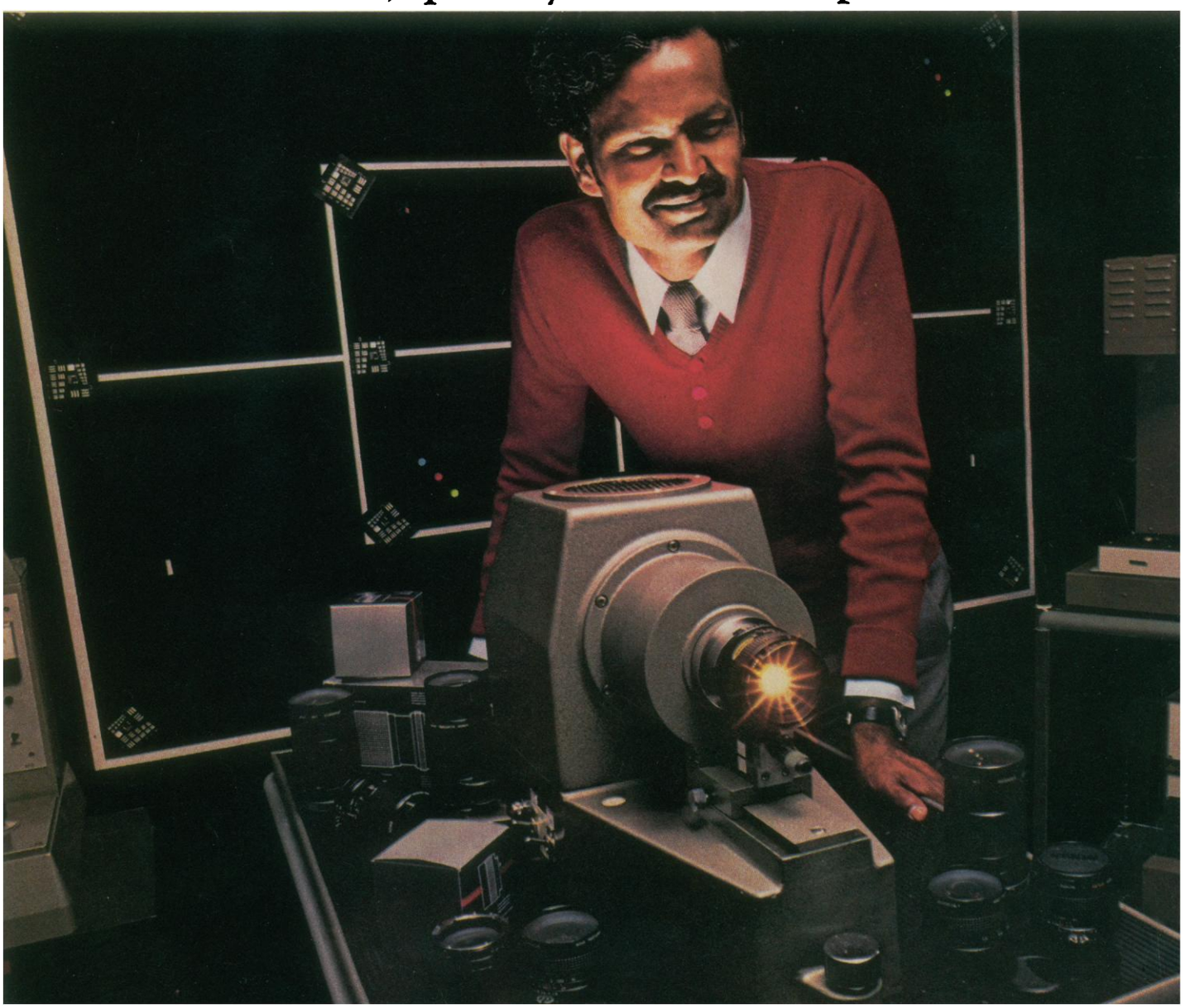
1-4-4

Reddy Chirra improves his vision with an Apple.

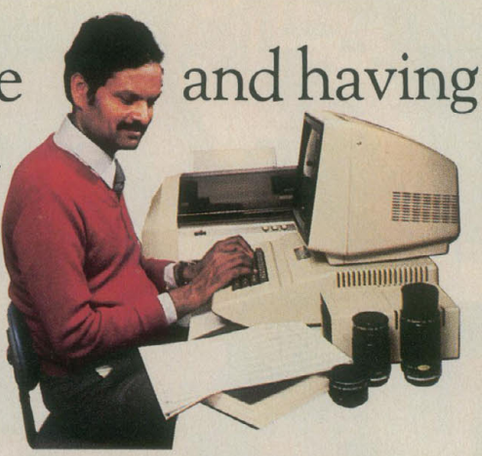
Reddy is an optical engineer who's used to working for big companies and using big mainframes.

But when he started his own consulting business, he soon learned how costly mainframe time can be. So he bought himself a 48K Apple II Personal Computer.

And, like thousands of other engineers and scientists, quickly learned the pleasures of



cutting down on shared time and having his own tamper-proof data base.



His Apple can handle formulas with up to 80 variables and test parameters on 250 different optical glasses.

He can even use BASIC, FORTRAN, Pascal and Assembly languages.

And Apple's HI-RES graphics come in handy for design.

Reddy looked at other microcomputers, but chose Apple for its in-depth documentation, reliability and expandability.

You can get up to 64K RAM in an Apple II. Up to 128K RAM in our new Apple III. And there's a whole family of compatible peripherals, including an IEEE-488 bus for laboratory instrument control.

Visit your authorized Apple dealer to find out how far an Apple can go with scientific/technical applications.

It'll change the way you see things.

The personal computer. apple®

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.

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. 161 on Readers' Service Card

16 October 1981, Volume 214, Number 4518 **SCIENCE**

New Cuts in Agency Budgets

President Reagan's announcement on 24 September that the fiscal year 1982 budget for most government agencies was to be reduced a further 12 percent sent a wave of apprehension through our national laboratories and major research universities. The earliest impact will be felt in the national laboratories. Hundreds of scientists and technicians will be dismissed during the next several months in anticipation of budgetary reductions yet to come. The concern on university campuses is no less in degree, even though the impact will be less precipitate. Prospects for FY 1983 are still worse, if a balanced FY 1985 budget remains an Administration goal. Alarm is deep and pervasive.

Previous cuts by the Reagan Administration in the R&D budget, although damaging to social science research and science education in particular, were of a different order than what may now follow. Those cuts were more surgical in nature, protecting the hard sciences and cutting back on large demonstration projects, with the belief that these would be more appropriately taken up by industry. The Administration accepted the principle that federal support was warranted to preserve the strength of the national effort in basic research. But if an across-the-board cut of 12 percent is now imposed, with even deeper cuts in succeeding years, it is clear that the nurturing relationship between science and government may be changing in a manner quite different from the oscillations of the past. Science and government may be approaching a moment of decision in which the health of both is at risk.

The Reagan Administration believes that a new austerity in government spending is warranted and that it has a popular mandate to that end. But there remains a general responsibility, which the scientific community certainly shares, to point up the consequences of specific cuts and to ensure that the remaining federal resources are allocated wisely and to maximum effect. What avenues are open to the scientific community to make its case? Indeed, what kind of case does it have?

- It must point out more effectively—with documentation, if necessary—that the nation's economic strength and military security (both goals of the Administration) are tightly coupled to achievements in high technology and that, in turn, high technology is dependent upon scientific accomplishment. It must continue to point out that less than 15 percent of the $38 billion in the federal budget for R&D goes to basic research; the bulk is spent on development. The required cuts could be made in the overall R&D budget, while allowing for modest growth in fundamental research.
- It may have to take its case to the authorization and appropriations committees of Congress, hoping to find support through public rather than quiet diplomacy.
- It might also direct its attention inward, offering to reexamine the national research enterprise—including academic research, national laboratories, and industrial research—to learn whether new institutional relationships and other structural changes can preserve our scientific strengths in a period of financial stringency. All sectors of the scientific community must be prepared to set aside the shibboleths of the past and perhaps propose new modes of research just as effective yet less costly. There has been no truly comprehensive examination of the relationship between the federal government and the scientific community since shortly after World War II. Out of this time of trial may emerge a totally new environment for science in the United States, perhaps even a better one.

It is clear that present circumstances require broad and informed consideration at the highest level. Accordingly, the National Academy of Sciences is calling a national convocation of scientific and engineering leaders to meet with government officials for a clarification of the prospects for science and technology in the light of proposed federal budgets and, if consensus permits, to suggest a course of action.—FRANK PRESS, *President, National Academy of Sciences, Washington, D.C. 20418*

With a range of 0–4000 g, the Sartorius 1203 Balance meets large capacity requirements for weighing to an accuracy of 0.1 g. At only $1495, this combination of precision, capacity and fully electronic weighing puts the 1203 in a class by itself.

Other important features include: instant electronic taring memory; large bright 7-segment digital display; reading stability indicator; all-metal balance housing –all these advanced features are part and parcel of the 1203.

At a slight additional cost, the 1203 can be equipped with BCD output to accept Keyboard Programmers, Data Printers or to connect with Data Processing Equipment.

For lower capacity requirements the Sartorius 1206 (1200g capacity/0.1 g accuracy) at only $995 or the Dual-Range Sartorius 1213 (300 g/0.01 g and 3000 g/0.1 g) at only $1595 offer similar exceptional value.

For literature, write Sartorius Balances Division, Brinkmann Instruments, Inc., Subsidiary of Sybron Corporation, Cantiague Rd., Westbury, NY 11590; or call 516/334-7500.

Those remarkable yellow balances

sartorius

Circle 101 for more information
Circle 102 for demonstration