9 July 1982 • Vol. 217 • No. 4555

$2.50

SCIENCE

How do you make the best large-capacity centrifuge better? Add microprocessor control and a new drive.

There never has been a 6000-rpm large-capacity centrifuge like the new J-6M. It's microprocessor-controlled and has an induction drive based on technology developed for Beckman ultracentrifuges.

The microprocessor makes centrifugation virtually automatic. Just program into the memory the operating conditions of the runs you do most often. You can repeat a program at will by pressing just two controls. Or you can use the touch/tone keyboard to manually select run conditions.

With the J-6M Ultra-Smooth drive, you can take advantage of maximum acceleration/deceleration rates to save time or select other rates for special separations. And you'll never have to change brushes because there are none.

The J-6M also provides a new degree of temperature control with automatic temperature compensation for each rotor and automatic over-temperature protection. The rotor speed control systems are miles ahead too with automatic overspeed protection and microprocessor control to within 20 rpm of set speed.

The J-6M continues in the quiet-running tradition of its J-6 and J-6B predecessors and can spin a total of 17 Beckman rotors, including the new JS-2.9 which holds up to 12 blood bags. Elutriator Rotor capabilities too!

To find out more about how the J-6M is better, contract Beckman Instruments, Inc., Spinco Division, 1117 California Ave., Palo Alto, CA 94304.

BECKMAN

Circle No. 115 on Readers' Service Card

Monoclonal Antibodies: Quality to match the quantity

To give you choices, we are building the most comprehensive line of monoclonal antibodies and immunological reagents. To give you performance, we are bringing 25 years of quality control experience to bear on every product in the line.

Monoclonal Anti-Mouse

Anti-mouse Thy 1.2 (IgM)
Anti-mouse Thy 1.2, fluorescein labeled
Anti-mouse Thy 1.2, biotin labeled
Anti-mouse Thy 1.1
Anti-mouse Lyt 1.1 (IgG_{2b})
Anti-mouse Lyt 1.2 (IgG_{2b})
Anti-mouse Lyt 2.1 (IgG_{2b})
Anti-mouse Lyt 2.2 (IgM)
Anti-mouse Lyt 3.2 (IgM)
Anti-mouse Lyb 2.1 (IgG_2)
Anti-mouse Lyb 2.3 (IgG_2)
Anti-mouse Ly 5.1 (IgG_{2a})
Anti-mouse Ly 5.2 (IgG_{2a})
Anti-mouse TL (IgG_{2a})
Anti-mouse β_2-Microglobulin (IgG_{2a})

Monoclonal Anti-Human

Anti-human Ia (IgG_{2b})
Anti-human Lyt 1 (IgG_{2a})
Anti-human Lyt 2 (IgG_{2a})
Anti-human Lyt 3 (IgG_{2b})
"Pan T Cell" antibody
Anti-human IgE (IgG_1)

Monoclonal Rat Anti-Mouse

Rat anti-mouse (IgG_{2a})
Rat anti-mouse (IgG_2)
Rat anti-mouse (IgA)
Rat anti-mouse (IgG_{2b})

Screening Reagents and Systems

T and B Cell Typing System

FIA

Sheep F(ab')$_2$ anti-mouse Ig, Fluorescein Conj.

Protein A Binding Assays

Protein A,[^{125}I]-
Protein A, HRP Conj.

Isotope Release Assays

Ultra Pure Chromium-51
Indium Oxine, [^{111}In]-

RIA

Goat anti-mouse Ig,[^{125}I]-
Goat anti-rabbit IgG,[^{125}I]-
Goat F(ab')$_2$ anti-rabbit IgG, [^{125}I]-
Goat anti-human IgG,[^{125}I]-
Sheep anti-mouse Ig,[^{125}I]-
Sheep F(ab')$_2$ anti-mouse Ig,[^{125}I]-
Rabbit anti-mouse IgG,[^{125}I]-

Avidin

Avidin,[^{125}I]-

ELISA

Available as components or systems.
Anti-HRP
HRP Conj. Goat anti-mouse Ig
HRP Conj. Sheep F(ab')$_2$ anti-mouse Ig
Alk. Phos. Conj. Goat anti-mouse Ig
Alk. Phos. Conj. Sheep anti-mouse Ig
Alk. Phos. Conj. Sheep F(ab')$_2$ anti-mouse Ig
β-Gal. Conj. Goat anti-mouse Ig
β-Gal. Conj. Sheep F(ab')$_2$ anti-mouse Ig

Not for use in humans or clinical diagnosis

New England Nuclear, 549 Albany Street, Boston, MA 02118
Call toll free: 800-225-1572, Telex: 94-0996
Mass. and Internat'l: 617-482-9595
Europe: NEN Chemicals GmbH, D-6072, W. Germany
Postfach 401240, Tel. (06103) 803-0, Telex 4-17993 NEN D
NEN Canada: 2453 46th Avenue, Lachine, Que H8T 3C9
Tel. 514-636-4971, Telex 05-821808

NEN New England Nuclear®
a Du Pont company

ISSN 0036-8075

9 July 1982

Volume 217, No. 4555

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): $48. Domestic institutional subscription (51 issues): $85. 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 $2.50 ($3 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

Packy, a 19-year-old Asian elephant (*Elephas maximus*) at the Washington Park Zoo, Portland, Oregon, is one of two mature bulls utilized in a unique bioassay procedure coupled to the chemical fractionation of female sex pheromones present in estrous urine and urogenital sinus secretions. This bioassay involves semiquantitative Flehmen-like responses to extracted components. See page 159. [Lois E. Rasmussen, Oregon Graduate Center for Study and Research, Beaverton, Oregon 97006]

Lanier introduces the No Problem™ typewriter for your technical typing.

Want to get your typing back faster than ever before? **NO PROBLEM**

Want to type Greek and math symbols right on the screen? **NO PROBLEM**

Want to type and edit multi-level equations with typewriter simplicity? **NO PROBLEM**

Want to add line drawings and charts to the page? **NO PROBLEM**

Most typewriters—even many of the latest electronic models—are limited to basic typing.

But the Lanier No Problem Electronic Typewriter is multi-use, with extraordinary powers for technical and scientific typing.

No Problem typing—
a better way to type.

The No Problem concept

To begin with, the No Problem typewriter speeds up the typing of your proposals, manuals, and reports like no ordinary typewriter can.

It eliminates typing rough drafts on paper. Pages are prepared on a TV-like screen instead.

Changes and corrections are made right on the screen. So no whiteouts. No retyping. No false starts. Whole paragraphs can be moved with the touch of a few keys.

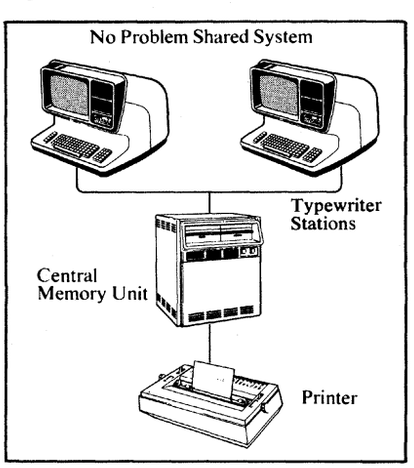
Letter quality printing is done at up to 540 words per minute.

With the No Problem typewriter, one typist can now do work as fast as 3 or 4 people using ordinary electric typewriters.

Plus, the basic intelligence for the No Problem typewriter is contained on No Problem Smart Discs.™ So future functions and improvements can be added with new Smart Discs as they are developed.

One typewriter or a shared system

The No Problem Shared System™ offers you even greater typing capabilities.



The No Problem Shared System™ adds new capabilities to the already versatile No Problem concept.

The heart of the system is the Central Memory Unit. It can store up to 30,000 pages, giving you lower storage costs per page, and eliminating the need for typists to handle numerous discs.

You can start with one or two typewriter stations connected to the Central Memory Unit, and add typewriter stations or printers as your needs increase.

There is also an attractive economic factor in sharing printers and other equipment.

Advanced features

Consider the old method of incorporating complex mathematical equations into your copy: leave the space blank, then hand letter them in after the page was typed. Or, you could run to the photocopier, then "cut and paste."

With the No Problem Shared System, you can incorporate *and edit* virtually any equation you may encounter—*right on the screen.* It will display *256 different characters,* including Greek and math symbols.

Line drawings can be constructed on the No Problem screen, too.

The No Problem Shared System automatically selects left, right or center page position for numbers, and chapter names on even and odd pages. Repagination automatically updates section numbers to accommodate your additions and deletions.

Advanced editing automatically positions footnotes on the proper page.

And the printing of the No Problem Shared System approaches typeset quality and flexibility. Proportional and bold printing, to fit any format or width, is easily done. Even in two typestyles and two colors on the same page at the same time.

Most of all, the No Problem Shared System can improve your cost/performance ratio dramatically with its increased workpower.

Modular design protects your investment

You can add Shared System typewriter stations, standalone No Problem typewriters, printers and Smart Discs to your office at will.

So your investment will *continue* to be a money-making problem solver as long as you own the equipment.

The No Problem demonstration

Your Lanier representative won't waste your time with a memorized sales pitch.

We would rather show you how No Problem typing can solve *your* problems.

Send us this coupon and we'll call immediately to set up an appointment. Or call toll free **(800) 241-1706.**

Except in Alaska or Hawaii. In Georgia, call collect (404) 321-1244.

The No Problem Electronic Typewriter from LANIER®

LANIER BUSINESS PRODUCTS, INC.

It does more than just type.

When paperwork problems pile up, the answer is word processors from Lanier. Circle #75 on reader service card for a demonstration

Circle No. 75 on Readers' Service Card

Want to see Lanier No Problem typing in action? NO PROBLEM.

Send us the information below and a Lanier representative will call for an appointment.

Name_____ Title_____

Phone_____

Best Time To Call_____

Firm Name_____

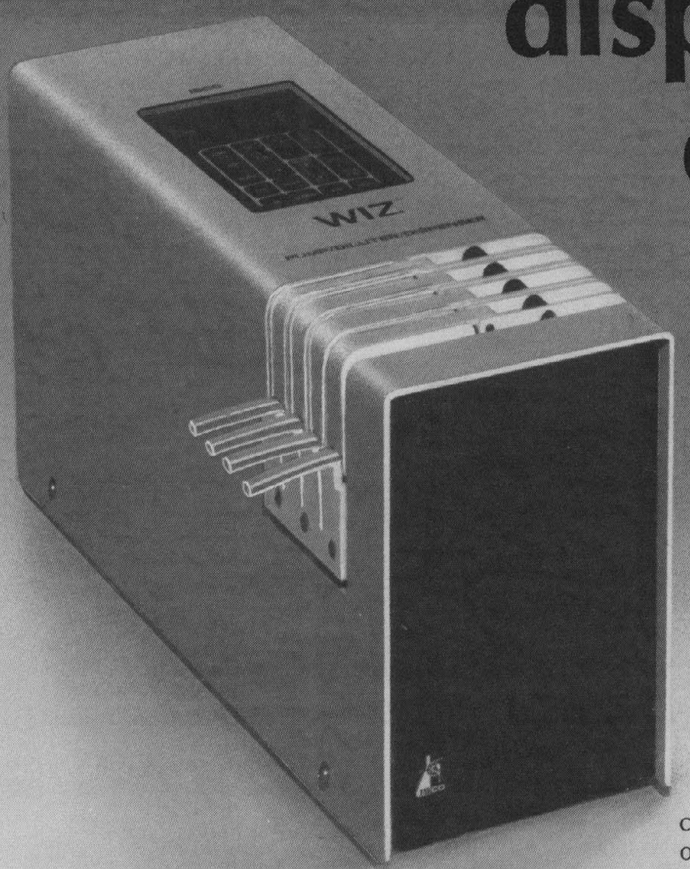
Address_____ County_____

City_____ State_____ Zip_____

What kind of typing or word processing system are you using now?_____

Lanier Business Products, Inc.
1700 Chantilly Dr. NE, Atlanta, GA 30324
7/9/82 Science Mag.
 439-E-62

WIZ™ is ISCO's new smartpump. It's a dispenser and diluter, too.

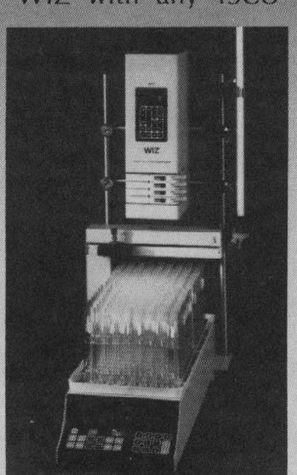


ISCO's WIZ is more than an ordinary peristaltic pump. Spend two minutes calibrating it when you first set it up—from then on, just key in any flow rate you want, directly in ml/hr. The output will be within 1% of your selected value.

As a dispenser, you can key in any volume—that's what you'll get every time you press the button. Or use it for a diluter: push a button to take up any desired volume of sample; push it again to dispense the sample followed by any volume of diluent.

WIZ has four channels, an LED display, and tubing cassettes that require no pressure adjustment and can be slipped in and out even while running. It also has design and construction quality features not found in most other pumps: microprocessor control, ball bearings, an all-metal frame and cabinet, and gear driven counter-rotation on the rollers. That means it's easy on pump tubing, reliable, and long lived.

It's a smartpump. WIZ is suitable for eluting chromatographic columns, circulating buffers and coolants in electrophoresis apparatus, and for many other laboratory applications. WIZ gives you quick system setup—you know immediately what the flow rate will be without measuring effluent or performing any calculations. You can key in any flow rate from 0.02 to 500 ml/hr/channel, combining channels to get a total of up to 2000 ml/hr. When you use WIZ with any ISCO fraction collector, you can select the fraction volume directly on the fraction collector controller. If you want 12 ml fractions, you set "12" on the fraction collector and that's what goes into each tube, regardless of selected flow rate. You can't do this with any other pump.



Wiz mounts on an ISCO FOXY fraction collector to give you the most sophisticated low pressure LC system you can put together.

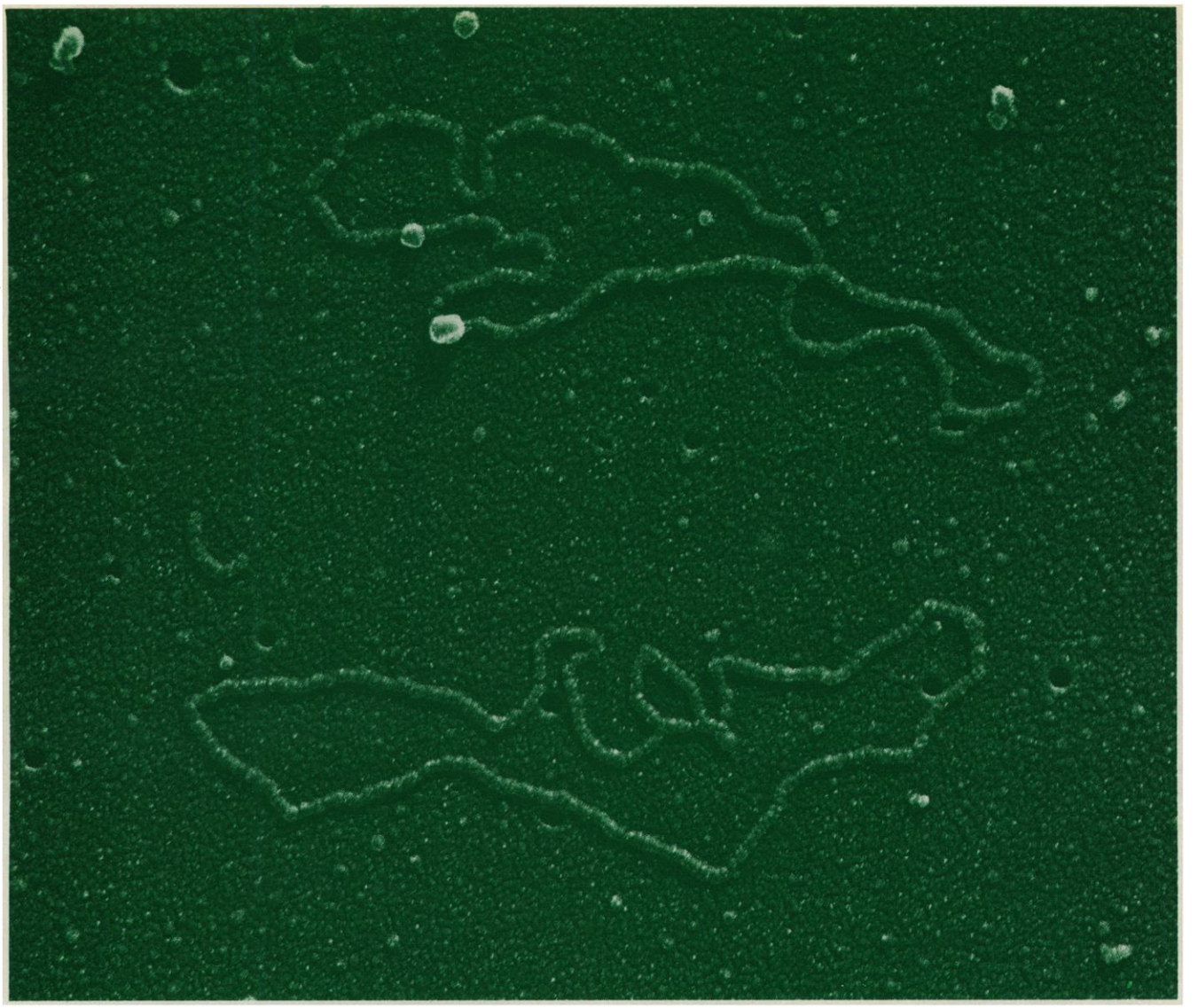
It's a dispenser. Use WIZ for pipetting stock solutions, adding nutrient to culture tubes, filling ELISA plates, and for other batch assay applications. An optional dispenser handle makes the job easy.

It's a diluter. WIZ is suitable for preparing samples and standards for many analytical instruments, making serial dilutions for RIA and enzyme assays, dispensing a sample with a nutrient solution for culture assays, etc. A separating air bubble can be added after each cycle if desired.

WIZ can also be an important part of your custom automation design: use it with an ISCO ISIS AutoSampler to automate reagent addition, dilutions, and other lab processes. Send now for literature on this unique new pump, or phone toll-free: [**800**] **228-4250.** ISCO, P.O. Box 5347, Lincoln, Nebraska 68505.

ISCO

Circle No. 113 on Readers' Service Card



GEN

Gen — the Greek root of the word gene, the hereditary blueprint for protein synthesis.

The ability to direct the expression of individual genes is no longer a dream. It is now feasible to create new bioproducts and produce significant quantities of existing products at greatly reduced cost using genetic engineering technology.

Unigene is a contract oriented research corporation developed to provide a wide range of genetic engineering and biochemical support services. We are financially and professionally independent. This independence assures our clients of the complete confidentiality which they require.

Our new custom designed laboratory in Fairfield, New Jersey, is staffed with distinguished scientists who possess extensive experience in recombinant DNA, hybridoma technology and protein chemistry.

For further information about how Unigene can serve your research needs, write for a descriptive brochure.

unigene™

Unigene Laboratories, Inc.
110 Little Falls Road
Fairfield, NJ 07006
N.Y. Tel: (212) 923-2600

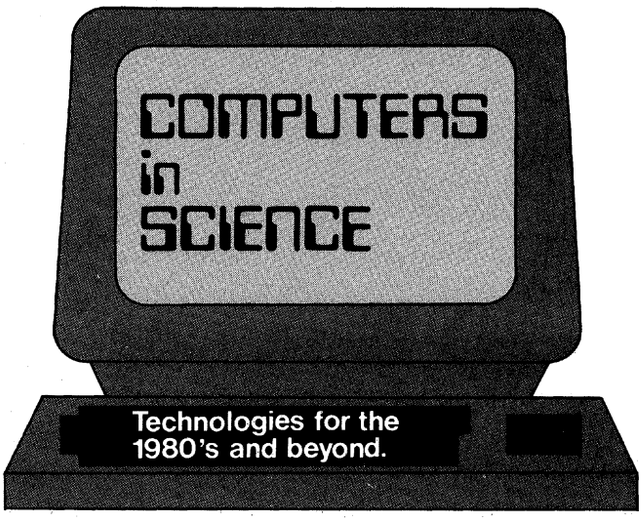
Circle No. 120 on Readers' Service Card

Science Magazine in cooperation with Scherago Associates announces The First Annual Conference on: COMPUTERS IN SCIENCE

December 6-9, 1982
Conrad Hilton, Chicago, Illinois

Chairman: Dr. Dennis Smith, Group Leader, Discovery Research Systems, Lederle Laboratories

Vice Chairman: Dr. Peter Friedland, Research Associate, Dept. of Computer Science, Stanford University



The conference's primary objective is to provide information on how changing computational technologies will influence future scientific research. Sessions will examine state of the art applications of existing technologies to specific areas of research as well as the impact of new developments on scientific research in the decades ahead.

Each conference day is devoted to a specific topic with lectures and presentations providing in-depth coverage of the subject:

- **Tuesday, December 7th — Products of the Technological Revolution: Building Blocks of Future Computer Systems.** A look at the underlying technology of future computer systems, emphasizing hardware developments and their role in providing powerful, distributed systems.
- **Wednesday, December 8th — Computational Systems: Man/Machine Synergism and the Conduct of Scientific Research.** Discussion on building useful research and development systems, focussing on the interaction of scientists with computers.
- **Thursday, December 9th — Scientific Communication and Collaboration: Conducting Research in the New Computational Environment.** An examination of influence of computers, on how research is conducted, covering scientific collaboration, communication, resource sharing and the sociology of research in a new computational environment.

On Monday, December 6th the day immediately proceeding the main conference, the Tutorials will be presented on the subjects of hardware, software, and communication technology. The Tutorials will provide intense instruction on these subjects to provide a background for the main conference sessions to follow.

In addition, Comprehensive exposition of equipment and software used in scientific computer applications will run concurrently with the conference. Company technical personnel will be on hand to assist attendees and to give demonstrations. Contributed papers in the form of posters or demonstrations are invited. Please check registration form to receive Tutorial information and/or Abstract forms where indicated.

Tuesday, December 7th — Morning Lectures:

Microelectronics — Dr. Gordon Moore, Chairman of the Board/CEO, Intel Corp.

Personal Computers — Dr. Adele Goldberg, Principal Scientist/Area Manager, Software Concepts Group, Xerox Palo Alto Research Center

Local Area Networks — Dr. Robert M. Metcalfe, Chairman of the Board, 3COM Corp.

Shared Resources — Dr. C. Gorden Bell, Vice President of Engineering, Digital Equipment Corp.

Wednesday, December 8th — Morning Lectures:

Symbols and Software for Science — Prof. Edward A. Feigenbaum, Dept. of Computer Science, Stanford University

Methodology of Programming — Dr. Ira Goldstein, Manager, Application Technology Dept., Computer Research Center, Hewlett-Packard

Expert Systems/Artificial Intelligence — Prof. Bruce G. Buchanan, Dept. of Computer Science, Stanford University

Computer Graphics — Prof. Robert Langridge, Dept. of Pharmaceutical Chemistry, University of California, San Francisco

Thursday, December 9th — Morning Lectures:

General Perspectives — Dr. Ralph E. Gomory, IBM Vice President and Director of Research

Evolution of Computer Networks — Dr. Robert Kahn, Director, Information Processing Techniques, Defense Advance Research Projects Agency

Scientific Collaborations — Lynn Conway, Research Fellow/Manager, VLSI System Design Area, Xerox Palo Alto Research Center

Sociological Impact of Computing — Prof. J.C.R. Licklider, Laboratory for Computer Science, MIT

CONFERENCE REGISTRATION FORM

☐ Conference registration fee: $200
☐ Send Information on Tutorials
☐ Send Abstract Forms

Attendance will be limited.
Please reserve _____ space(s). Registration fees must be enclosed. Please make checks payable to "Computers in Science".

☐ Please send exhibit space prospectus.

Name _____
Affiliation _____
Street _____ City _____
State _____ Zip _____ Telephone _____

Return to: Computers in Science; Scherago Associates, Inc.; 1515 Broadway; New York, New York 10036.

...Over one megabyte of user available RAM for your HP9845! *

Yes, you read it right! Over 1 megabyte of user available RAM for your 9845! The Infotek AM 45B memory consists of two circuit boards, each containing 524K bytes of memory. The boards are form, fit and function interchangeable with the 131K byte boards designed for your machine. The installation can be made in minutes and does not involve any modification of your HP 9845.

Just imagine what you can do with a diskette of data IN RAM. Data-base routines, sorts and searches can run many times faster. No need to buy a second disk drive just to make backup disks—copy from memory and do it much faster. And how about those real-time instrumentation applications where data is generated faster than you can dump to disk.

Now for the best part, the price:

$3,500 per **524K** byte board.

Availability is now!

For a demonstration in your machine, call collect in California, (714) 956-9300.

Nationwide call toll free, 1 (800) 854-3469.

Or return the coupon.

Infotek Systems

INFOTEK SYSTEMS
1400 North Baxter Street
Anaheim, CA 92806
(714) 956-9300 Telex: 182283

European users contact:
INFAX
Computer Products GmbH
Neustrasse 9, 6231 Schwalbach/Ts.
West Germany,
06196-86067, Telex: 418310 insy d

7/82

Name _____ Title _____

Company _____

Street _____

City _____ State _____ Zip _____

Country _____ Phone _____

We have _____ (No. of units) _____ (Make) _____ (Model)

_____ (No. of units) _____ (Make) _____ (Model)

* A Product of Hewlett-Packard

Circle No. 112 on Readers' Service Card

Luminescence is within our range

A complete range of high grade reagents, including six kits, is now available from LKB-Wallac for use in chemiluminescence analysis. These reagents have been developed in our own laboratories specifically to enhance the sensitivity and reliability of the luminescent measurement technique.

The bioluminescent measurement of very low levels of substrates or enzymes that can be coupled to the consumption or production of ATP or NAD(P)H is significantly improved by the use of our specially compounded Monitoring Reagents which produce a stable level of light emission. This also allows kinetic measurements such as creatine kinase isoenzyme activity to be made.

If you are designing your own luminoimmunoassays, investigating peroxide or haem catalysed reactions, or studying phagocytosis, then our chemiluminescence reagents can solve your procedural problems.

Rigorous quality control procedures are routinely carried out to ensure that our reagents are the best available for use with any luminescence photometer, liquid scintillation counter or fluorometer.

For further information about our luminescence reagents, instrumentation or application literature, please contact your local LKB representative or Wallac directly.

LKB WALLAC

Wallac Oy, P.O. Box 10, 20101 Turku 10, Finland, Tel. 921-366 444, Tlx 62 333

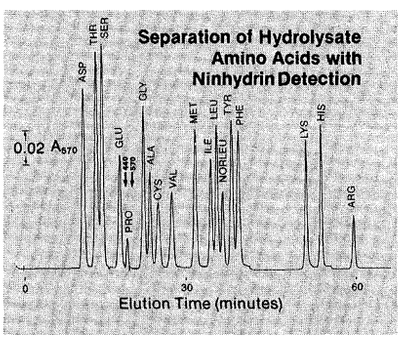
Circle No. 87 on Readers' Service Card

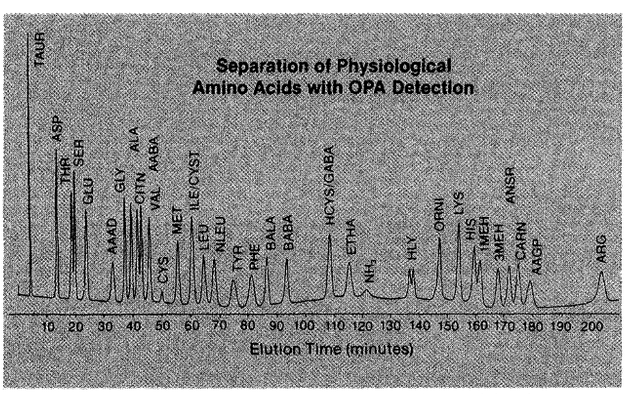
Fast protein chemistry is getting faster: Varian LC and UV

The latest additions to Varian's growing family of analytical instruments continue to improve on the time it takes to get problems answered. The new amino acid reaction systems and the new 2200/2300 Series UV-Vis Spectrophotometers are outstanding examples. Here's how Varian life scientists have added analytical clout to solve specific problems—with unbeatable speed and ease!

Varian automated HPLC—the new alternative for amino acid analysis. The Varian Model 5000 HPLC with post-column reaction system gives you capabilities comparable to those of a dedicated amino acid analyzer, with chemistries that can be tailored to your laboratory's needs. To find out how, circle Reader Service No. 351.

Using the *ninhydrin post-column reaction system* combined with the new UV-100 Programmable Wavelength Detector, you can reliably quantitate both primary and secondary amino acids in one run, with a single detector. Circle No. 352.



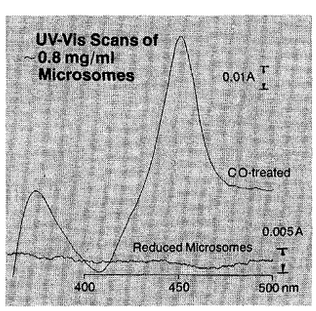


For high-sensitivity analyses of primary amino acids, the Varian *OPA post-column reaction system* with the Fluorichrom fluorescence detector gives you picomole detection limits. Circle No. 353.

Hydrolysate or physiological-fluid analysis—with the Varian HPLC system, you retain the flexibility of a general-purpose system while its inherent reliability assures you a minimum of downtime. You can add a *VISTA 401 Chromatography Data System* and obtain completely unattended automatic operation. Advanced data handling capabilities of the VISTA 401 offer you

excellent quantitation and let you store your raw data or calculated reports on disk for easy retrieval at the touch of a few keys. Circle Reader Service No. 354 for more information.

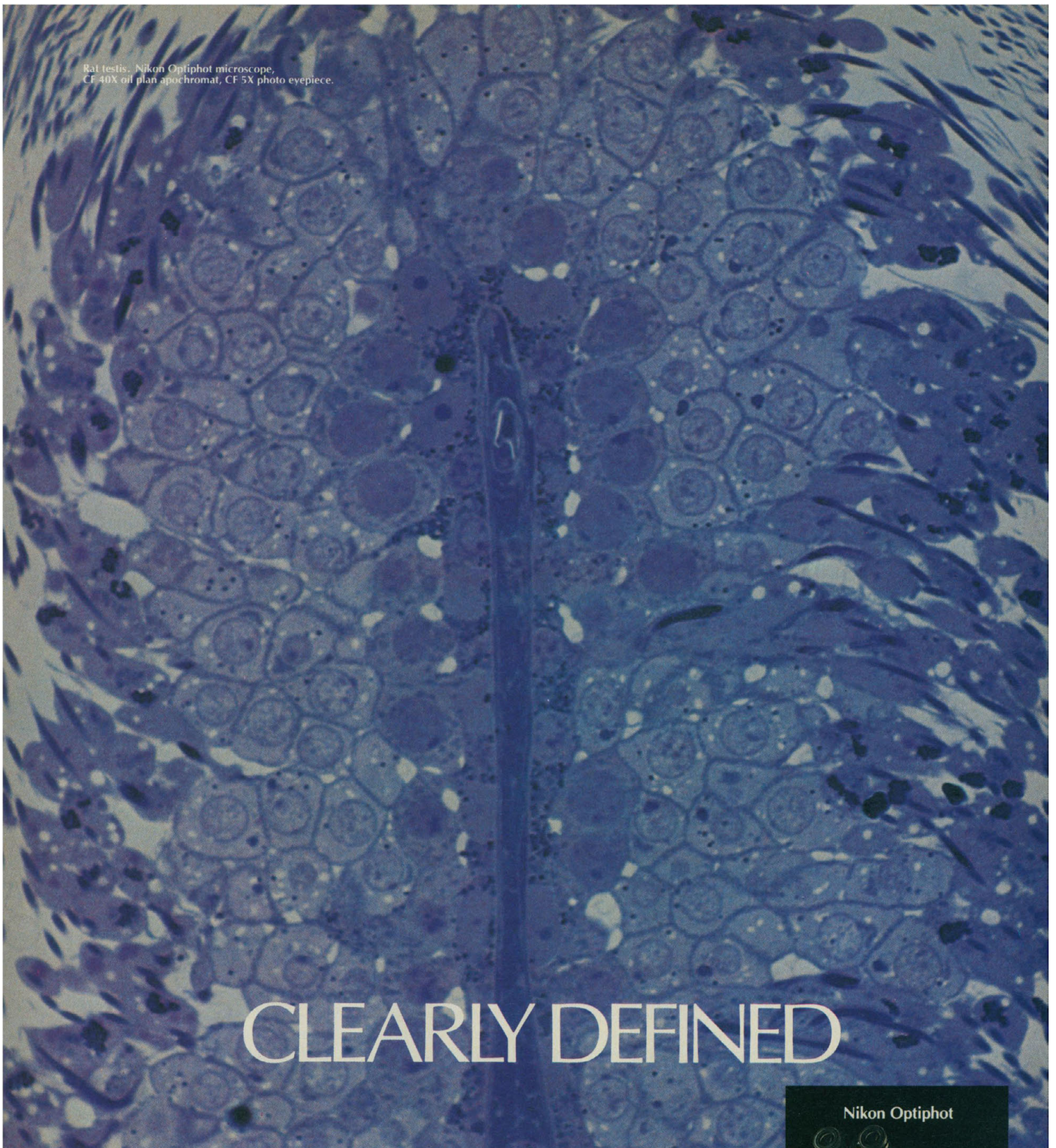
Difference spectroscopy of cytochrome P-450—the easy way. The new 2200/2300 UV-Vis-NIR Spectrophotometers reduce measurement of cytochrome P-450 and other microsomal enzymes to a simple procedure. Speed and utter simplicity of operation make getting accurate data on difficult turbid samples a breeze. Interactive CRT and touchkey panel help you set up any special analysis and store the parameters for later retrieval. After the analysis, ready-to-evaluate results appear on the screen. Spectrophotometry couldn't be simpler! Circle No. 355 for details.



Try our direct info service! Researchers in the Varian laboratories are continually developing solutions to problems like those in your own lab. Your quickest way to learn about them is to have a Varian representative drop in and show you. Circle No. 356.

varian

For assistance contact: • Florham Park, NJ (201) 822-3700 • Park Ridge, IL (312) 825-7772 • Houston, TX (713) 783-1800 • Los Altos, CA (415) 968-8141
In Europe: Steinhauserstrasse, CH-6300 Zug, Switzerland.



Rat testis. Nikon Optiphot microscope, CF 40X oil plan apochromat, CF 5X photo eyepiece.

CLEARLY DEFINED

In microscopy, as in language, clear understanding depends on clear definition.

That's why many scientists depend on the Nikon Optiphot microscope. The startling clarity, remarkable resolution and crisp contrast of its unique CF optics reveal a precise, undistorted picture of the specimen. For fast, sure documentation, the optional FX photomicrographic systems provide microprocessor-controlled exposure accuracy. Add whatever accessories you require and the Optiphot can easily keep pace with your curiosity.

See how your investigations could benefit from a more definitive view. Ask to look into an Optiphot. For full information and a reproduction of this photomicrograph, write: Nikon Inc., Instrument Division, 623 Stewart Avenue, Garden City, NY 11530 (516) 222-0200.

Nikon

Extending Man's Vision

Circle No. 97 on Readers' Service Card

9 July 1982, Volume 217, Number 4555 **SCIENCE**

Goals of Science Education

Much of the discussion of the crisis in science, mathematics, and engineering education has been in terms of the exposure of individuals to these subjects in the precollege and early college years. Much less attention has been given to the nature and quality of that educational experience—properties which can best be assessed in terms of goals.

All education is the consequence of the response of individuals to enabling experiences—experiences provided to the individual and experiences generated by the individual. What are the goals we seek to enable the student to accomplish? The traditional goals for many science programs have been to enable the individual to get on with the process of becoming a scientist, or to decide against a scientific profession. What are the goals for those who do not become scientists, and what do we seek to enable these students to accomplish?

I suggest that we seek to provide experiences to enable the student to accomplish the following goals:

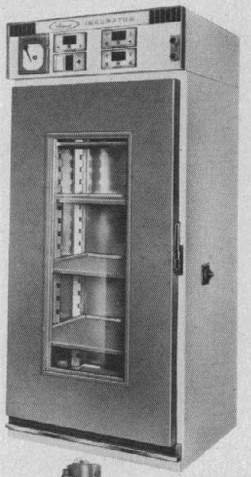
- To discover and explore scientific phenomena.
- To have some experience with the scientific approach to the rationalization of the results of investigations.
- To develop some understanding of the integrity of the process of scientific investigation and through that the integrity of scientific knowledge.
- To develop some understanding of the process of technological innovation and of the productivity of technology.
- To explore the impact of scientific knowledge on the manner in which we perceive ourselves and on our relations with others and everything that surrounds us.
- To explore the impact of technology and the products of technology on the quality of life and the quality of the environment.
- To develop the interest, competence, confidence, and will to continue to follow, throughout the next half century, scientific and technological developments in areas related to societal concerns.
- To develop the will and confidence to endeavor to participate critically in the formation of decisions in societal matters involving science and technology.
- To develop to some degree an understanding of probability and statistics and the place of both in science and in the analysis and resolution of societal problems.
- To develop familiarity with the role of computers in the extension of scientific knowledge and technological capabilities.
- To develop the confidence to acquire competence in specific areas of technology closely coupled to the fulfillment of his or her professional responsibilities.

All of these goals are equally appropriate for those who become scientists. There is, however, a difference. These are primary goals for civic and professional life and they must be pursued during a period of limited exposure. Those who become scientists have a much longer time span within the formal academic environment to achieve these goals at a higher level of attainment.

With the exception of scientists in academic institutions, it is highly probable that whatever an adult over forty knows and understands about science and technology was acquired outside the formal academic environment. What the individual knows and understands is, however, dependent upon the academic experience.

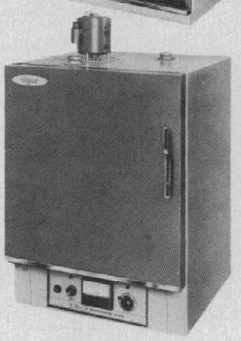
The great significance of having these or some other set of goals is that we can get on with the endeavor to develop appropriate mechanisms: courses, media events, and so on. These goals emphasize the significance of process and minimize the pressure to overload the academic experience with facts, and in so doing give us a refreshing degree of freedom in the selection of topics and methodologies of approach.—ANNA J. HARRISON, *Department of Chemistry, Mount Holyoke College, South Hadley, Massachusetts 01075*

pick a box... any box... and we'll fill it with the exact controlled environment you need



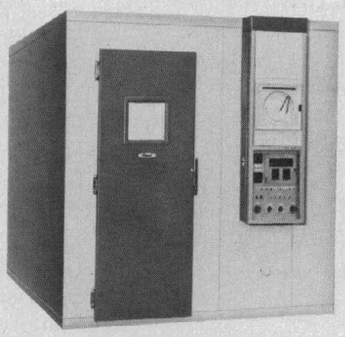
INCUBATORS

The largest selection in the industry. A model tailored to every budget, every application. Twenty-five CO_2 incubators alone. Tabletop models. Floor models. Undercounter models. Room size models. From "heat only" to full-bank digitally-controlled incubators with temperature, humidity, CO_2 and automatic decontamination.



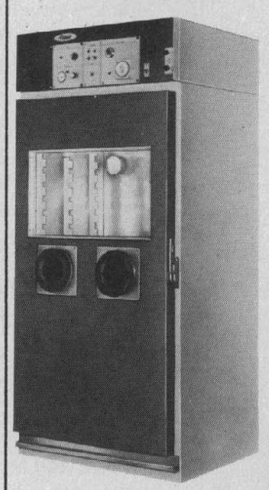
OVENS

Capacities from 1 to 96 cu ft. Mechanical or gravity-convected for science and industry. From standard temperature ranges to 538°C. Vacuum ovens. Safety ovens. Explosion proof ovens. Pass-thru ovens. All kinds. Custom ovens are our specialty.



WALK-IN ROOMS

Environmental test chambers . . . any size, any shape or any simulation. 234 standard sizes. Pick any combination of temperature, moisture or light for research, production or quality control. Widest choice of control systems.



HUMIDITY CHAMBERS

Full range of benchtop and floor models. From 5 to 33 cu ft. For package testing, drug stability, environmental testing, adhesive testing and corrosion-resistance. Automatic programming, including microprocessor control.

ASK ABOUT OUR PROGRAMMABLE MODELS!

Be picky. Don't "box yourself in" with a limited selection. Send for our FREE catalog today!

Hotpack®

HOTPACK CORPORATION

10940 DUTTON ROAD, PHILADELPHIA, PA 19154
215-824-1700 or 800-523-3608

Circle No. 90 on Readers' Service Card

H-163