16 DECEMBER 1983 · VOL. 222 · NO. 4629

$2.50

SCIENCE

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

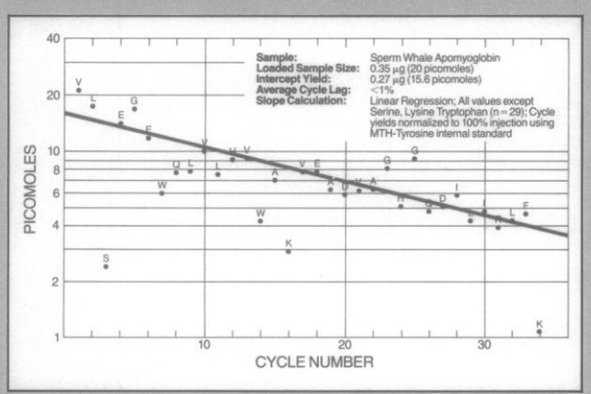
BIOSYSTEMS UPDATE

Gas-Phase Protein Sequencing

A Progress Report

Less than two years ago, Applied Biosystems introduced new gas-phase protein sequencing technology which, though in its infancy, set new standards of analytical performance and sensitivity. We are now pleased to announce the first in a series of improvements in chemistry, programming and hardware which begin to further realize the still untapped potential of the Model 470A Gas-Phase Protein Sequencer.

Changes in the coupling, cleavage and solvent extraction times, and use of an optional miniature sample cartridge, substantially increase repetitive yields and decrease lag on picomole level samples. Sequencer artifacts which can interfere with high sensitivity PTH-AA chromatography are also reduced by a factor of three to five.

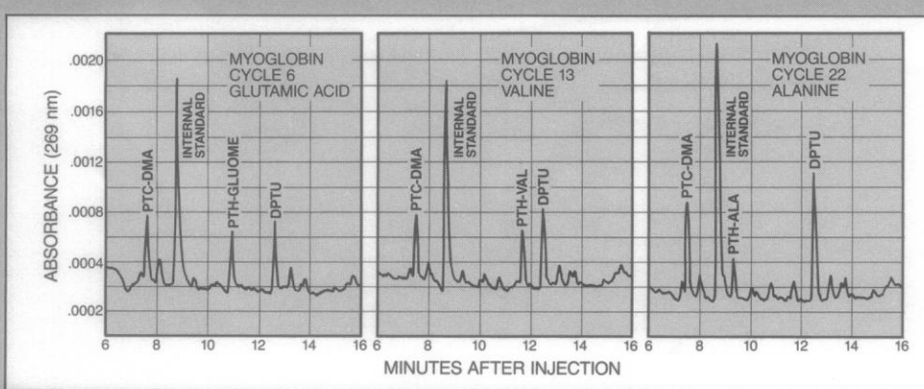


34 residues of 20 picomoles of sperm whale apomyoglobin. Repetitive yield is 96% calculated from the least squares linear regression plot of individual amino acids quantitatively recovered at each sequenced cycle. Lag averages less than 1%/cycle.

The improvements are particularly dramatic with peptides. A user evaluating our new chemistry has reported sequencing the octapeptide angiotensin II to completion with only 25 picomoles of sample.

A new miniature PTH conversion flask increases typical PTH-AA recovery to greater than 95%. The improvement is most significant on serine, threonine and tryptophan since drying times are reduced threefold.

Best of all, these improvements, and others still under development, are designed to be compatible with every instrument we've built so our current users will continue to be at the leading edge of protein sequencing technology. The 470A Gas-Phase Protein Sequencer is capable of setting even higher performance standards and Applied Biosystems, in collaboration with many of our users, is continuing to investigate further improvements to this remarkable instrument. If you'd like more information, please circle number 325.



Actual HPLC chromatograms, without background subtraction or data enhancement, of residues 6, 13 and 22 from sequencing analysis of 20 picomoles of sperm whale apomyoglobin. The data illustrate the low background and high sensitivity of the Model 470A Gas-Phase Protein Sequencer.*

**Chromatography: IBM Cyano Column. Internal Standard: MTH tyrosine. PTH yields normalized to 100% injection: Cycle 6 (glutamic acid)—11.7 pmol, cycle 13 (valine)—9.1 pmol, cycle 22 (alanine) 6.2 pmol. PTC-DMA, phenylthiocarbamyldimethylamine; DPTU, diphenylthiourea.*

Applied Biosystems

APPLIED BIOSYSTEMS, INC., 850 Lincoln Centre Drive, Foster City, CA 94404 • (800) 874-9868 • In California (800) 831-3582
IN EUROPE: APPLIED BIOSYSTEMS GMBH, Bergstrasse 104, D6102 Pfungstadt, West Germany • 06157-6036
Circle No. 325 on Readers' Service Card

Sometimes a good idea begins with a product or service you didn't know about. That's where our technical representatives can help.

There's always a possibility that something you're doing could be accomplished faster, or better, or more efficiently if you had the needed information.

Often enough your NEN representative has that information—whether it be a new method, a better product, or one of NEN's extra services.

Just ask. The answer will come from solid training and experience. More detailed technical answers are quickly available, too. Our representative will see that the question is handled by the most appropriate of several sources at NEN, such as our Technical Services Group, who specialize in customer assistance.

But first talk with the person who represents it all. A good idea may be only a conversation away.

NEN New England Nuclear®

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

Circle No. 344 on Readers' Service Card

ISSN 0036-8075

16 December 1983

Volume 222, No. 4629

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 Scientific Monthly**® Domestic individual membership and subscription (51 issues): $53. Domestic institutional subscription (51 issues): $90. Foreign postage extra: Canada $24, other (surface mail) $27, air-surface via Amsterdam $65. First class, airmail, school-year, and student rates on request. Single copies $2.50 ($3 by mail); back issues $3 ($3.50 by mail); Biotechnology issue, $5 ($5.50 by mail); classroom rates on request. **Change of address:** allow 6 weeks, giving old and new addresses and seven-digit account number. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted by AAAS to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that the base fee of $1 per copy plus $0.10 per page is paid directly to CCC, 21 Congress Street, Salem, Massachusetts 01970. The identification code for *Science* is 0036-8075/83 $1 + .10. **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

Climate anomalies during the Northern Hemisphere winter season (December 1982–February 1983) believed to be associated with the abnormally warm sea-surface temperatures in the equatorial Pacific Ocean. The white cloud symbol represents the region of enhanced rainfall and the streamlines with arrows represent circulation anomalies at the jet stream (about 10-kilometer) level. See page 1195. [Data from P. A. Arkin, Climate Analysis Center, National Oceanic and Atmospheric Administration, Washington, D.C.; analysis by J. M. Wallace, University of Washington, Seattle]

You Only Need One Flow Cytometer.

...because what I need

for my research is a state-of-the-art flow cytometer that gives me freedom of choice.

I need an instrument that doesn't limit my ability to explore new directions in research. That's why I have the

CYTOFLUOROGRAF* II Flow Cytometer;

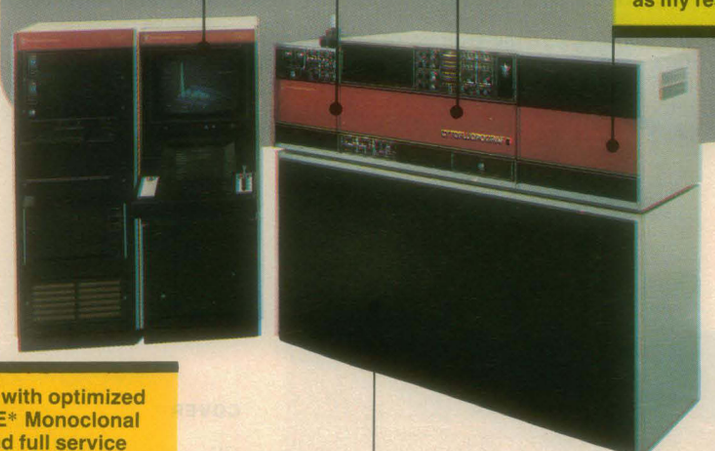
it gives me:

Superior resolution along with accurate and stable cell sorting exclusively with the new ORTHO *T/Q Flow Cell*.

New ORTHO* *Ultrasense Optics* for Maximum Sensitivity with lower laser power.

Real-time data analysis with mass storage and instant protocol set-up using the new 2140 or 2151 Data Handlers.

Modular components designed for flexibility. They let me upgrade my instrument as my research needs change.



Compatibility with optimized ORTHO-MUNE* Monoclonal Antibodies and full service technical support to develop my applications.

Exceptional versatility for applications in immunology, cell kinetics, microbiology and cell biology.

With the ORTHO SPECTRUM III and CYTOFLUOROGRAF II, we've designed "no compromise" flow cytometers that are optimized to meet the demands of *your* laboratory. Now, you needn't compromise with an instrument that does less than you want nor accept unnecessary (and expensive)

That's Why Ortho Makes Two.

...because what I need

for my clinical research is an easy-to-use flow cytometer that gives me accurate answers...and fast. I need an instrument that's a closed system for handling infectious samples, and one that many laboratory technologists can operate. That's why I have the

ORTHO SPECTRUM III* Laser Flow Cytometry System;

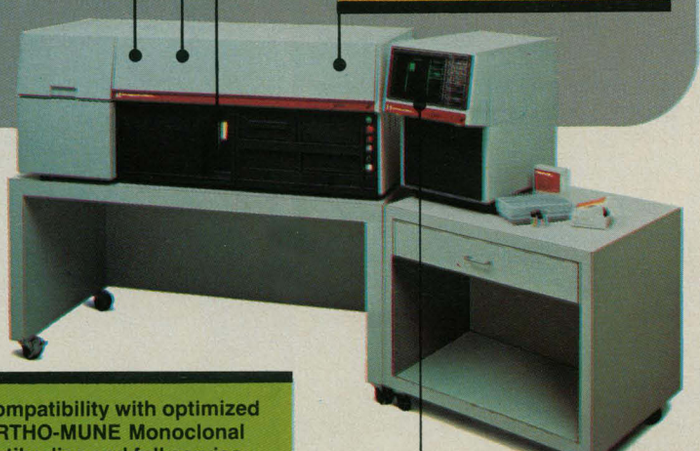
it gives me:

Maximum sensitivity with ORTHO *Ultrasense Optics* for analyzing low-level fluorescence and small particles such as platelets.

Analysis of 500 samples/day with minimal operator intervention using ORTHO *Quicksip Fluidics.*

Lower operating costs with an optical design that eliminates the need for high-power lasers.

Reproducible and accurate, absolute cell counts delivered time after time because a constant volume is analyzed.



Compatibility with optimized ORTHO-MUNE Monoclonal Antibodies and full service technical support to develop my applications.

Fast set-up and rapid data analysis with "user friendly," floppy disk software.

options designed for somebody else's research. For further information about Ortho flow cytometers and how they can help your research or clinical investigation, call 800-225-9855 or circle the appropriate reader service number.

Ortho Diagnostic Systems Inc.
Raritan, New Jersey 08869

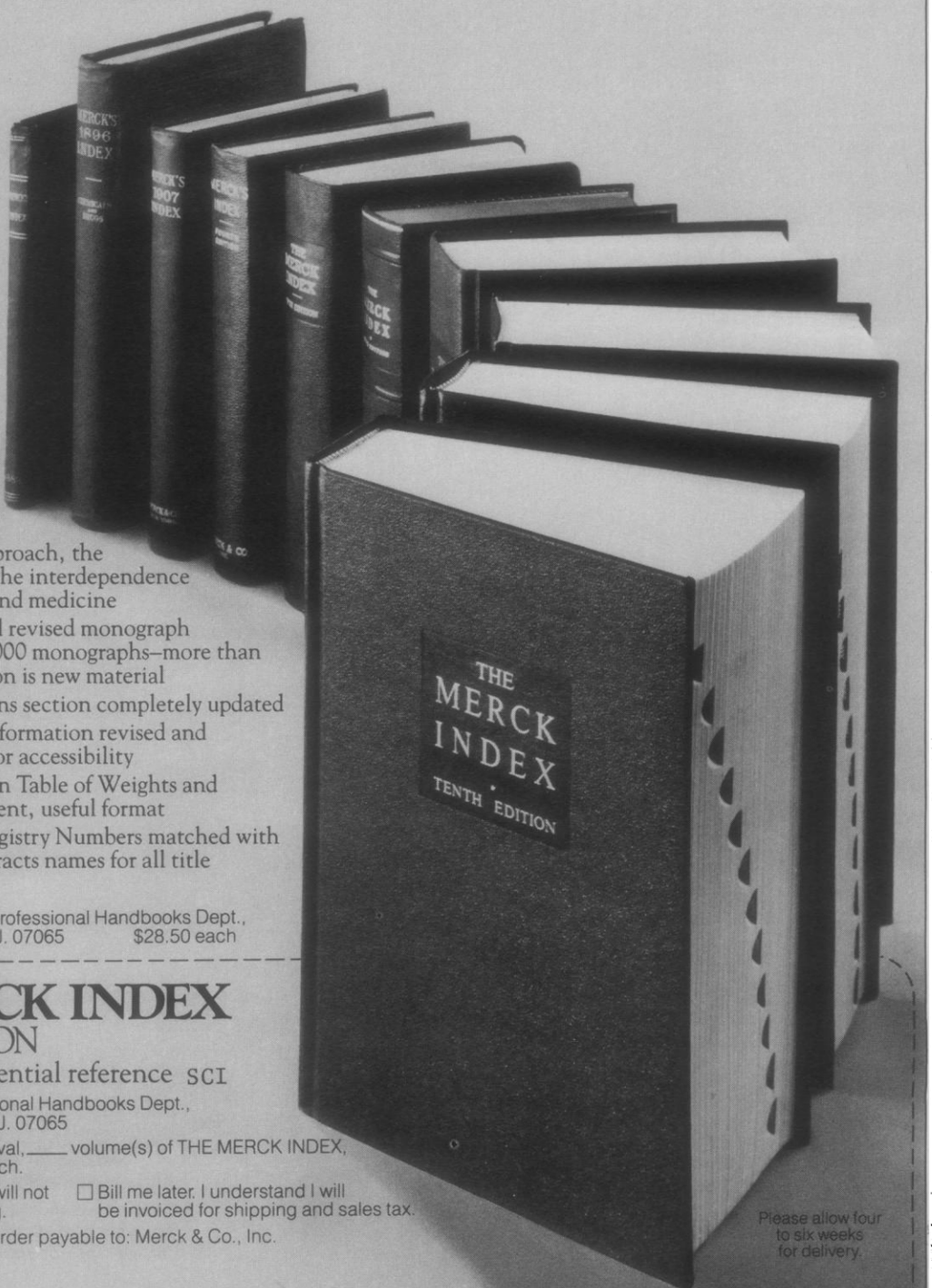
Circle No. 289 on Readers' Service Card

Ortho Diagnostic Systems: at the leading edge in flow cytometry

A classic...always contemporary

THE MERCK INDEX

NEW TENTH EDITION



- Broadened in scope, multidisciplinary in approach, the Tenth Edition reflects the interdependence of chemistry, biology, and medicine
- A greatly expanded and revised monograph section–more than 10,000 monographs–more than 50 percent of this section is new material
- Organic Name Reactions section completely updated
- Clinical and toxicity information revised and expanded–referenced for accessibility
- A Universal Conversion Table of Weights and Measures–in a convenient, useful format
- Chemical Abstracts Registry Numbers matched with correct Chemical Abstracts names for all title compounds

Order from: Merck & Co., Professional Handbooks Dept., P.O. Box 2000, Rahway, N.J. 07065 $28.50 each

---

THE MERCK INDEX
TENTH EDITION
Each edition an essential reference SCI

Merck & Co., Inc., Professional Handbooks Dept.,
P.O. Box 2000, Rahway, N.J. 07065

Please send me, on approval, ____ volume(s) of THE MERCK INDEX, Tenth Edition, at $28.50 each.

☐ Payment is enclosed. I will not be charged for shipping. ☐ Bill me later. I understand I will be invoiced for shipping and sales tax.

Make check or money order payable to: Merck & Co., Inc.

Please allow four to six weeks for delivery.

NAME

ADDRESS

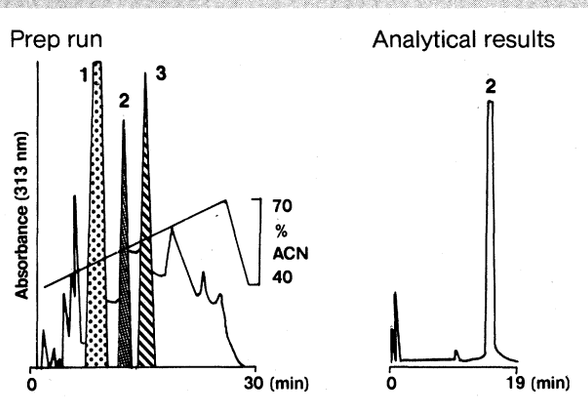
CITY STATE ZIP

Purify even the most difficult compounds in less time and with less effort than any other technique.

Waters PrepLC™ 500A System. Applying innovative technologies to the chemistry of separation for maximum load, resolution and purity.

Waters PrepLC 500A System is the fastest, most efficient preparative separation technique available for the separation of biological compounds, chemical intermediates, pharmaceuticals and virtually any compound separable by analytical HPLC. Innovative technologies such as Waters patented Radial Compression design, fluid velocity control and exclusive shave/recycle technique allow faster separations with less compound activity loss than any other separation process.

Isolate peptides and proteins with 99% purity

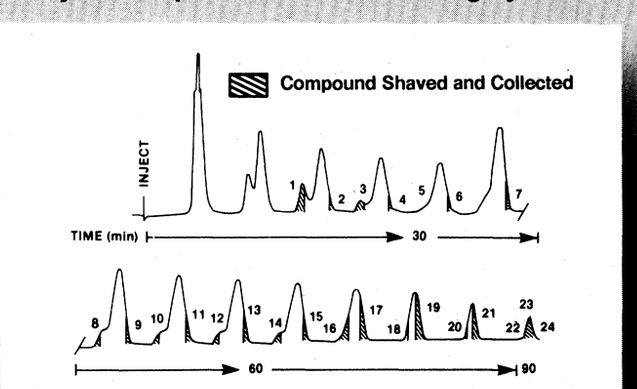


Problem: To isolate biologically active peptides and intermediate molecular weight proteins to 99% purity.

Solution: Isolate a crude synthetic peptide and protein extract to 99% purity without loss of biological activity by: performing a thirty-minute reverse phase gradient, collecting an enriched fraction of product, and rechromatographing a heavier load of the partially purified product under different gradient conditions.

Sample:	500 mg Peptide Hydrolysate
Cartridge:	PrepPAK® C_{18}, 57 mm x 30 cm (300Å pore, 30 μm particle)
Solvent:	A) 0.1% TFA in H_2O B) ACN: 0.1% TFA in H_2O, 40:60 0-100% B in 30 min, linear
Flow Rate:	150 ml/min
Detection:	UV, 313 nm

Purify natural product isomers with high yield



Problem: To purify three hard-to-resolve isomers with higher yield than traditional techniques.

Solution: By employing the exclusive shave/recycle feature of the PrepLC 500A System, the effective column length was increased to 26 feet (the sample was recycled 13 successive times without repetitive manual injection and collection) and a 77% yield of pure isomers was realized. This compares favorably to a 26.6% yield achieved with column chromatography.[1]

Sample:	.75 g Labdatriene Isomers
Cartridge:	PrepPAK® 500 Silica, 57 mm x 60 cm
Mobile Phase:	n-Hexane
Flow Rate:	250 ml/min
Detector:	RI

[1]*Journal of Liquid Chromatography* **4(3)** 525-532, (1981); *Journal of Organic Chemistry*, **46**, 3062, 1981

Let us show you how the Waters PrepLC 500A will purify even your most difficult mixtures with higher yield. Call or write Waters today.

Waters

MILLIPORE **Waters Associates**
34 Maple Street Milford MA 01757/(617) 478-2000

Circle No. 343 on Readers' Service Card

NEW U.L. LISTED EPPENDORF® 5414 MICRO CENTRIFUGE WITH MOMENTARY SWITCH AND TIMING LIGHT.

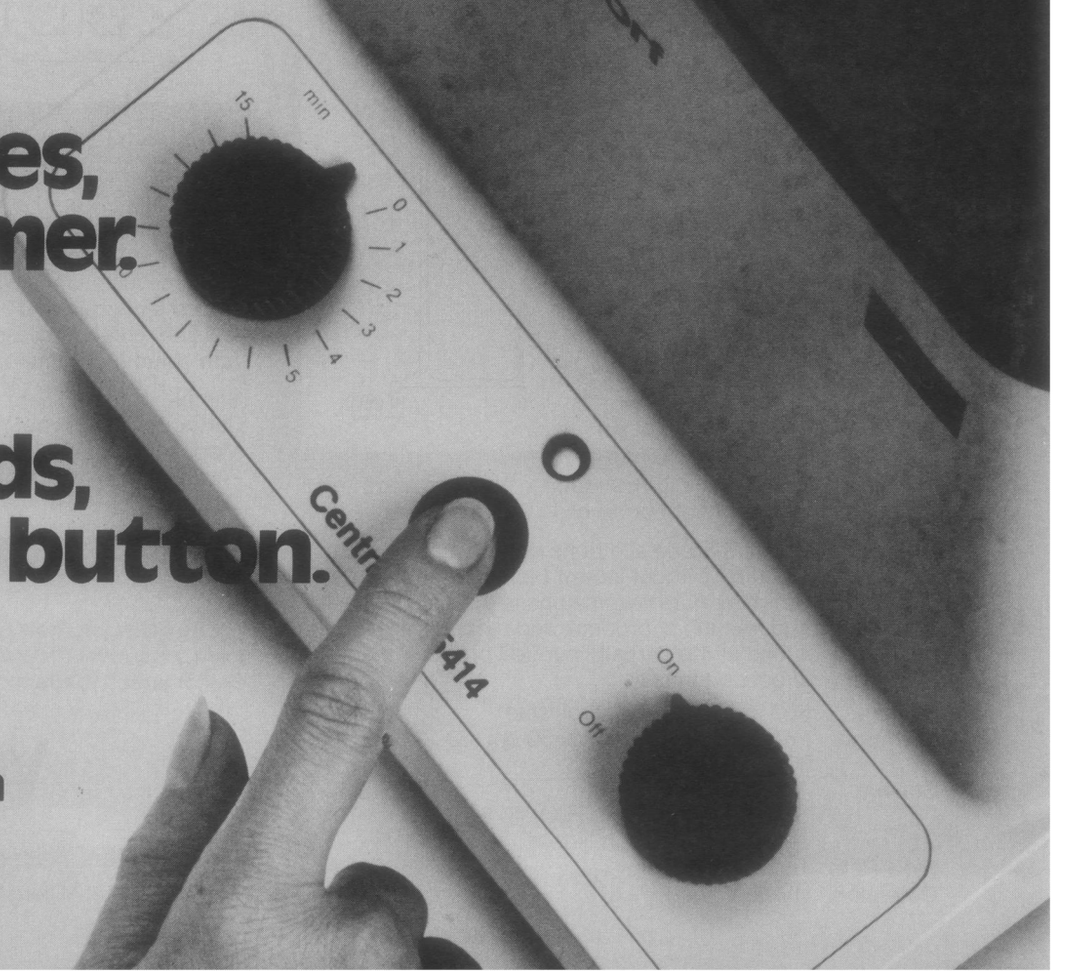
This is the centrifuge that lets you spin a sample without spinning the timer dial. For spins of 60 seconds or less, simply hold down the Momentary Switch as long as necessary; a lighted diode flashes at 1-second intervals to let you time the spin. Longer centrifuging is controlled by the built-in 15- or 30-minute timer with automatic shut-off.

More convenient and more efficient than previous models, the 5414 reaches maximum speed in just 5 seconds, regardless of load. RCF has been increased to 15,600xG at 15,000 rpm for faster separations. The angled rotor head accepts twelve standard 1.5 ml Eppendorf Test Tubes, or 500 µl, 400 µl and 250 µl tubes using adapters. (For larger loads, Model 5413 spins up to forty tubes horizontally in four vertical carriers holding up to ten 1.5 ml, 400 µl or 250 µl tubes each. Maximum RCF is 8,800xG at 11,500 rpm.) On both models, a safety lid lock prevents operation with the top open.

For literature, write: Eppendorf Division, Brinkmann Instruments, Inc., Subsidiary of Sybron Corporation, Cantiague Road, Westbury, NY 11590; or call 516/334-7500. In Canada: Brinkmann Instruments (Canada), Ltd.

To spin for minutes, set the timer.

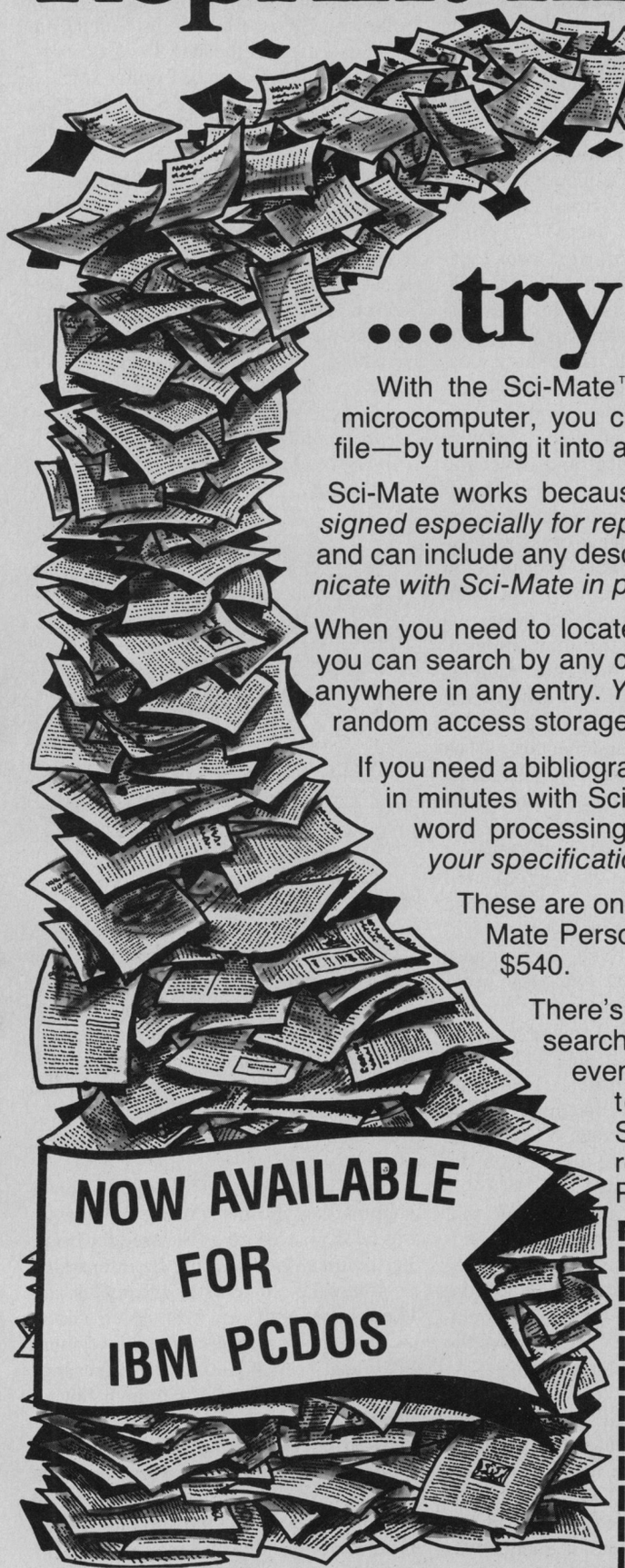
To spin for seconds, touch the button.



SYBRON | Brinkmann

For literature circle reader service number 273
For demonstration circle reader service number 274

Reprint file entropy?



...try Sci-Mate!

With the Sci-Mate™ Personal Text Manager software and your microcomputer, you can enhance your reprint file or any other text file—by turning it into an easily accessible, personal data base.

Sci-Mate works because *it's the first text management system designed especially for reprints.* Each citation you enter can be any length and can include any descriptive notes you want to add. And *you communicate with Sci-Mate in plain English!* No keywords are required.

When you need to locate an article, you're not limited by "keywords"—you can search by any characters, word, name, or phrase that might be anywhere in any entry. *Your searches are fast* because Sci-Mate's random access storage provides rapid retrieval.

If you need a bibliography on a specialized subject, you can print it out in minutes with Sci-Mate, or you can integrate it into your existing word processing system. Sci-Mate even *generates reports to your specifications.*

These are only a few of the many features that make the Sci-Mate Personal Text Manager invaluable. And it costs just $540.

There's also additional software that takes you through searches on DIALOG, MEDLINE, ISI, SDC, and BRS even if you don't know the languages of those systems. With the Sci-Mate Universal Online Searcher, you can immediately incorporate the results of your online searches into your Sci-Mate Personal Text Manager.

Sci-Mate is available for IBM PC and Apple II, II+ or IIe, on 5¼" diskettes; for TRS 80 Models II or 12 on 8" diskettes; and for other CP/M 80 systems on 8" diskettes.

For more information, fill in and mail this coupon to the address below.

Name _____ Title _____

Organization _____

Address _____

City _____ State/Province _____

ZIP/Postal Code _____ Country _____

Area Code _____ Telephone _____

ISI® Institute for Scientific Information® 29-3251
3501 Market St., Philadelphia, PA 19104 U.S.A. ©1983 ISI
Telephone: (215) 386-0100, Cable: SCINFO, Telex: 84-5305

LETTERS

Retrovirus Terminology

A human retrovirus, human T-cell leukemia virus (HTLV), was first isolated by Gallo and his colleagues in 1980 from a cell line established from a patient with cutaneous T-cell lymphoma (mycosis fungoides) (*1*). Subsequently, ATLV (adult T-cell leukemia virus) (*2*, *3*) was isolated from the cell line MT-2, established by Miyoshi *et al.* (*4*), from Japanese patients with adult T-cell leukemia-lymphoma (ATL). This disease was discovered by Takatsuki and his colleagues (*5*) as a unique T-cell malignancy clustered in the southwest part of Japan. These two independent viral isolates were shown to be closely associated with ATL by epidemiological and molecular biological studies.

HTLV and ATLV were shown to be similar by immunological cross-reactivities (*6*) and nucleic acid hybridization (*7*). However, the data were not sufficient to prove the identity of these two viral isolates because the immunological cross-reactivities of the core proteins p19 and p24 reflected only part of the *gag* gene of the viral genomes and because the viral complementary DNA preparations were not representative. Recently, we determined (*8*) the total nucleotide sequence of the ATLV genome cloned in λATK-1. On the basis of this structural information, we compared the provirus genomes of HTLV and ATLV integrated in the cell lines HUT-102 and MT-2, respectively, by Southern blotting analysis using five viral gene-specific probes. With every specific probe the expected viral fragments were identical for the HTLV and ATLV proviruses (*9*). These results clearly indicate that the locations of the gene-specific sequences and the cleavage sites of some restriction enzymes are identical in the proviral genomes integrated in HUT-102 and MT-2. Thus, we can conclude that HTLV and ATLV are the same, even if they differ in their base replacements, small insertions, or deletions. This conclusion indicates that the viral populations in the southwest of Japan and in the Caribbean have a common origin.

In view of these results we propose to use the term HTLV rather than ATLV, respecting the first isolate of this retrovirus. We will use the terminology "ATK strain of HTLV ($HTLV_{ATK}$)" for the ATLV previously cloned and reported as λATK-1, and whose total sequence was determined (*8*). At the conference on human T-cell leukemia viruses held at Cold Spring Harbor in September 1983, a letter proposing that the term HTLV be used for the retrovirus was signed by the following: W. A. Blattner, National Cancer Institute, Bethesda; D. Catovsky, Hammersmith Hospital, London; M. Essex, Harvard University School of Public Health; R. C. Gallo, National Cancer Institute, Bethesda; M. Greaves, Imperial Cancer Research Fund, London; Y. E. Ito, Kyoto University; I. Miyoshi, Kochi Medical School; K. Takatsuki, Kumamoto University Medical School; R. A. Weiss, Institute of Cancer Research, London; and M. Yoshida, Cancer Institute, Tokyo.

TOSHIKI WATANABE
MOTOHARU SEIKI
MISTUAKI YOSHIDA
Department of Viral Oncology, Cancer Institute, Kami-Ikebukuro, Toshima-ku, Tokyo 170, Japan

References

1. B. J. Poiesz *et al.*, *Proc. Natl. Acad. Sci. U.S.A.* **77**, 7415 (1980).
2. M. Yoshida, I. Miyoshi, Y. Hinuma, *ibid.* **79**, 2031 (1982).
3. Y. Hinuma *et al.*, *ibid.* **78**, 6476 (1981).
4. I. Miyoshi *et al.*, *Nature (London)* **294**, 770 (1981).
5. T. Uchiyama *et al.*, *Blood* **50**, 481 (1977).
6. V. S. Kalyanaraman *et al.*, *Proc. Natl. Acad. Sci. U.S.A.* **79**, 1653 (1982); J. Nagy *et al.*, *Int. J. Cancer* **32**, 321 (1983).
7. M. Popovic *et al.*, *Nature (London)* **300**, 63 (1982).
8. M. Seiki, S. Hattori, Y. Hirayama, M. Yoshida, *Proc. Natl. Acad. Sci. U.S.A.* **80**, 3618 (1983).
9. T. Watanabe *et al.*, *Virology*, in press.

The AAAS and Human Rights

We write to support the position of the AAAS Committee on Scientific Freedom and Responsibility (Letters, 7 Oct., p. 6) and to endorse Lee Frank's statement that "any systematic violation of human rights and repression of free expression is deserving of every public forum the free world offers" (Letters, 12 Aug., p. 604).

Some are concerned that expression of support for another human being who has been mistreated or tortured for his or her political views would be interpreted as political statements or political action (Letters, 15 July, p. 216). Even if that were so in some cases, we believe there are clear ethical and humane reasons which are paramount. Although not always honored, the basic principles recognized internationally are stated in the Universal Declaration of Human Rights of the U.N. General Assembly of 10 December 1948 and the Declaration on the Protection of All Persons from Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment,

THE NEW NALGENE® FILTER HOLDER SYSTEM. VERSATILE, SIMPLE, LONG-LASTING.

The new reusable Nalgene Filter Holders are available with either a receiver, for filtering up to 250 mL, or with a funnel, for use with manifolds. They combine all the performance and convenience features you want in a single membrane filtration system.

EXCLUSIVE: TWO MEMBRANE SUPPORT PLATES
Each Nalgene Holder is supplied with a sterilization plate for fast flow-through, **and** an analysis plate, to maintain the perfectly flat membrane needed for analytical work.

INTERCHANGEABLE UPPER CHAMBER
Upper chamber can be used with either receiver or funnel. For economical conversion of Holder and Receiver to a filter funnel, ask for the Nalgene Funnel Conversion Assembly.

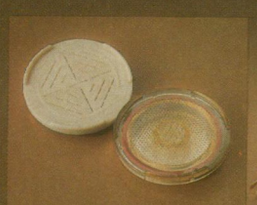
TOUGH POLYSULFONE CONSTRUCTION
Nalgene Filter Holders are made of transparent polysulfone, the rugged plastic that withstands far more cycles in the autoclave than units made of polycarbonate.

EASY TO USE
Holders are designed to be simple to use for **either** vacuum or pressure filtration.

LOCKING RING COUPLING SYSTEM
Forms a tight seal between upper and lower chamber without twisting or damaging the membrane.

AVAILABLE FROM LAB SUPPLY DEALERS EVERYWHERE
Ask for the Nalgene Filter Holder with Receiver (Cat. No. 300-4000) or Filter Holder with Funnel (Cat. No. 310-4000).

For more information, write or call us: Nalgene Labware Department, Nalge Company, Box 365, Rochester, New York 14602. Telephone (716) 586-8800; Telex 97-8242.



Sterilization and analytical support plates

Optional Funnel Conversion Assembly (Cat. No. 305-4000)

Locking ring coupling system

Nalge

SYBRON

Circle No. 279 on Readers' Service Card

A new generation of microscopes with advanced optical engineering and ergonometric design: Olympus BH-2 System Series.

This could well be a most significant contribution to the science of microscopy and photomicrography.

The Olympus BH-2.

Fulfillment of operational, illumination and brightness control goals.

Unsurpassed totally new LB optics provide vastly superior image quality.

New operational superiority improves viewing comfort and offers a natural eyepoint position.

Low position focusing and stage movement knobs provide natural hand positioning.

Improved Koehler illumination is developed for ultra-low magnifications (1x to 4x); and standard magnifications (2x to 100x).

Add precision L.E.D. brightness controls and a host of accessories (phase contrast, Nomarski interference contrast, Hoffman modulation contrast, reflected and transmitted light fluorescence, polarized light and more) and you have today's state-of-the-art development inviting your examination.

Contact the Olympus Authorized Dealer listed in your Yellow Pages, or Precision Instrument Division, 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. 335 on Readers' Service Card

adopted by the U.N. General Assembly on 9 December 1975. These principles are a solid basis for providing support for all human beings who are mistreated.

Amnesty International is the paradigm of an organization which assiduously avoids any political stance other than a support for basic human rights in all circumstances. Let us not hold back; let us take a stand on these principles.

KEITH BARE
JEFF CLARK
ROBERT FINE
CAROL HOOVER
JOHN A. JACQUEZ
MONIKA KONIG
MARILYN LANDER
PAT MCKINLEY
VERONICA O'NEILL
GENEVIEVE SCHIFFMANN*
National Institutes of Health, Bethesda, Maryland 20205

*Members, Medical Scientists Committee at the National Institutes of Health, affiliated with Amnesty International.

Computer Testing

In his timely editorial on computerized psychological testing (22 July, p. 323), Joseph Matarazzo criticizes automated test interpretations. However, readers might be left with the impression that he is criticizing any use of computers in giving psychological tests.

Matarazzo writes that a computer-presented test has "a spurious appearance of objectivity and infallibility," as a halo effect from the computer. In fact, the appearance of infallibility is closely related to the appearance of precision of numerical test scores, a problem that predates the computer. Matarazzo expresses concern that results of computerized psychological tests can be harmful in the hands of an unqualified person, such as a college admissions officer, but surely this would not apply to computerized cognitive tests of knowledge, such as the Graduate Record Examination or the Scholastic Aptitude Test.

A paper-and-pencil test does not lose its power when it migrates to a computer. A vocabulary test measures word knowledge just as well on a computer as in a booklet. Further, computer presentation has many benefits. For example, in tests of knowledge and cognitive skills, the computer can adapt the level of difficulty of the question to the apparent level of knowledge of the student. The computer also permits new types of tests; memory and response speed are but two of the skills more easily assessed by computer than by test booklets.

Matarazzo does not object to presenting personality tests on a computer console rather than in a booklet, or to using the computer to process the responses and provide the customary profile of test scores for inventories such as the Minnesota Multiphasic Personality Inventory (MMPI). Scores from the paper-and-pencil version of the MMPI have demonstrated validity for many purposes, and the *scores* from the computer version may be presumed to have similar validity.

Narrative interpretations of test scores are another matter. The basis for these interpretations is shrouded in proprietary secrecy and, as Matarazzo states, no evidence has been published in peer-reviewed journals of the validity of any such interpretations. Establishing their validity will not be easy because appropriate methods are not well developed.

Although there is no cause for alarm about computerized testing, much more remains to be learned about automated test interpretations, and here I join Matarazzo in urging caution. Eventually, these interpretations might turn out to be better than those given by the average clinician, but in any case they will be based only on the test responses and must be considered only partially digested information for use by qualified professionals.

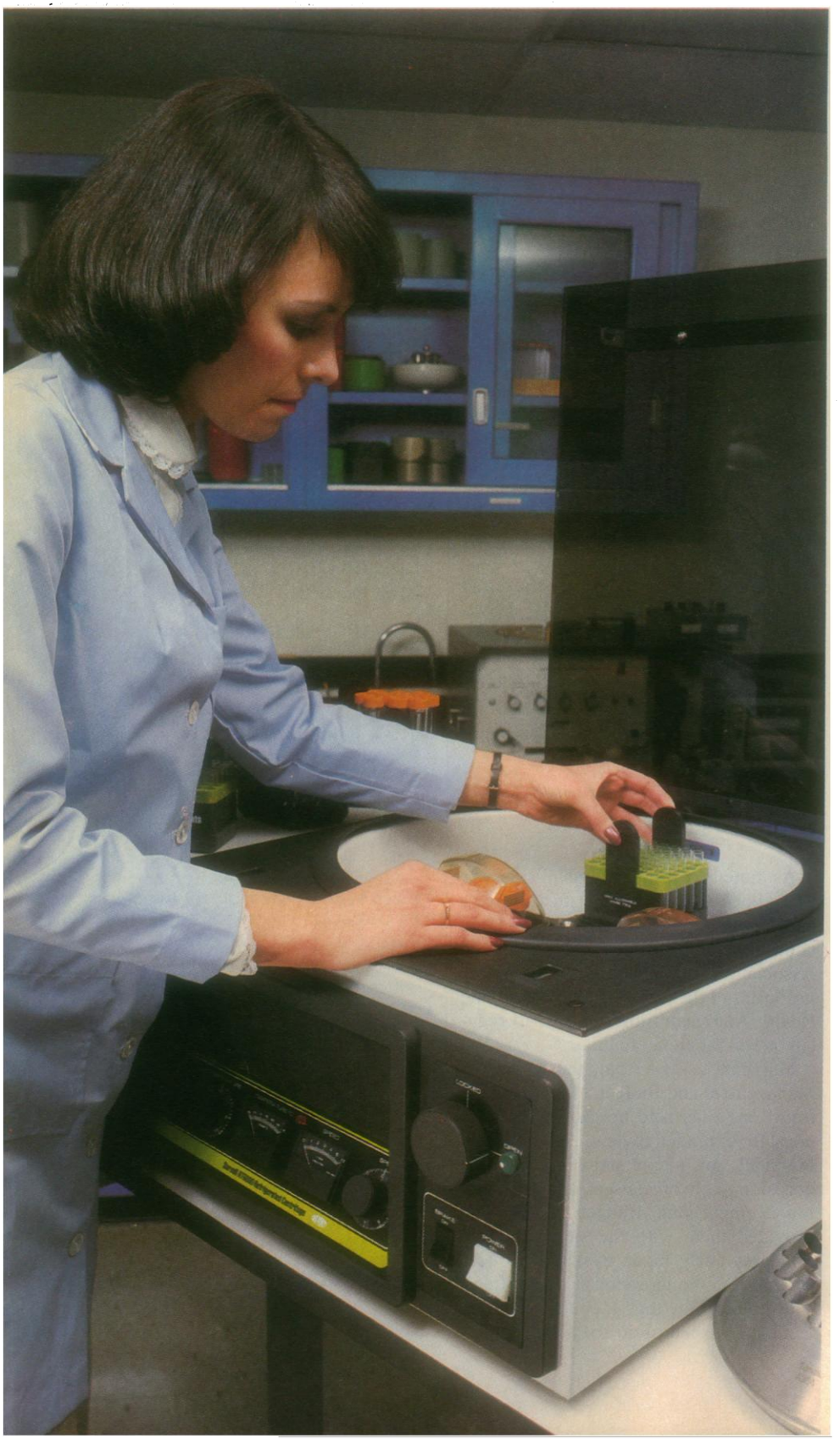
BERT F. GREEN
Department of Psychology, Johns Hopkins University, Baltimore, Maryland 21218

Grain Elevator Safety

As noted in Eliot Marshall's article "Deadlock over explosive dust" (News and Comment, 4 Nov., p. 485), I am counsel for the National Grain and Feed Association in connection with pending proposals of the Occupational Safety and Health Administration (OSHA) to regulate grain-handling facilities.

Marshall asserts that the Office of Management and Budget, "[w]ith advice from" me, has held up the OSHA proposal for extended review. As I informed Marshall, my client and I met on one occasion with officials at the Office of Management and Budget (OMB) and provided them with the same information previously made available to both OSHA and congressional committees. The implication that I could (even assuming I wished to do so) dictate policy

THE SORVALL® RT-6000. True "floor-model" performance in a refrigerated tabletop centrifuge.



Everything you'd expect to find in a floor-model refrigerated centrifuge, you'll find in the Du Pont Sorvall® RT-6000 refrigerated tabletop centrifuge.

Real Refrigeration system—the RT-6000 has floor-model style wrap-around coils for accurate temperature control, from −5°C to +25°C.

High productivity—an unequalled combination of speed, capacity and g-force means that you need up to 30% less spin time than you require with other tabletop centrifuges.

Compact size—functional, modern, low-profile design conserves valuable lab bench space.

Powerful motor—for longer life, faster acceleration/deceleration, and quieter operation than competitive centrifuges.

Automatic rate control—protects delicate density gradients in such precise techniques as whole-cell separations; the only tabletop with this feature.

Complete system of accessories—adapters for swinging-bucket and fixed-angle rotors; carriers for micro-titration plates; sealing covers for buckets.

Unique see-through lid—you see the rotor in operation and can easily, safely, and conveniently verify speed with a phototachometer.

Nonrefrigerated model also available. The nonrefrigerated T-6000 gives you all the performance features of the RT-6000 and can be readily converted to include refrigeration when your centrifugation needs change.

No other refrigerated/nonrefrigerated tabletop centrifuge family offers you as much versatility and performance as the Sorvall® RT-6000 and T-6000.

For more information, call 1-800-345-8600 ext. 500, or write: Du Pont Company, Instrument Systems, Room X40181, Wilmington, DE 19898.

Sorvall® Centrifuges

DU PONT

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

Circle No. 135 on Readers' Service Card

to OMB is incorrect. OMB has received input from many sources and reached its own conclusions for its own reasons. I have no idea what OMB has said to OSHA or vice versa.

We were pleased to see Marshall's reference to the $3-million research program funded by the industry. As OSHA's Barry White says, "the grain-handling industry has probably undertaken more research than any other he has dealt with in safety rule-making." This research reflects the serious commitment of the industry to find meaningful solutions to the problems of dust explosions and fires. There have thus far been 28 studies initiated by the association, utilizing the research expertise of university, government, and private research organizations. A number of additional studies are in the final planning stages. Every study is made available to the public. Nothing has been kept secret. (We offered these research studies to Marshall, but he declined to review them.) Far from causing delays, this massive effort has led to numerous improvements in elevator design. There will be more. We hope that the number of explosions continues to be small, reflecting, at least in part, improvements in elevator design and work habits prompted by these industry studies.

I disagree with Marshall's statements that the study by the National Academy of Sciences is "a classic of its genre" and that the "panel suggested that no more that one sixty-fourth of an inch of surface dust be tolerated inside the elevator building." The 1/64 inch was suggested as a "guideline" applicable to layered dust by a "subpanel." The report notes that it "should be considered as a beginning step in formulating standards by a cooperative action between industry and government." The subpanel report also concluded that "additional research is needed to eliminate the controversy over such questions as the role of metal sparks in dust cloud ignition." The industry is undertaking such research.

Marshall also quotes panel member Albert Townsend, president of a grain elevator insurer, as having chaired a subpanel "that wrote a report spelling out exactly how to build a workable dust removal system." Even when one ignores the fact that Townsend is promoting a device which he designed, that report notes (*1*):

> This report and the conclusions herein are based on testing and techniques that are based on assumptions, therefore the accuracy is uncertain. . . . Further, the conclusions drawn may not be applicable to other equipment or operating conditions.

It would be the height of folly for a government regulatory agency to take such an admittedly preliminary report and base a regulation costing at least $750 million upon it. Among interested persons, only the industry is seeking to ensure the accuracy of the preliminary conclusions. Rather than being criticized, the industry should be congratulated.

Marshall's comments concerning the industry's economic analysis of the proposed rule also require explication. While it is true that the industry has not yet concluded a formal economic analysis, the study prepared by Arthur D. Little Co. for OSHA concluded that the costs of the rule outweighed the benefits, and that, because of an inability to raise prices, "[p]rofits could be substantially reduced for small country elevators." Under a more stringent 1/64-inch dust standard, the study concluded that "small country elevators, including those at small feed mills, become financially unviable." When OSHA's own consultant reaches this conclusion, everyone's concern about the economic impact of the regulation should be heightened.

MARC L. FLEISCHAKER
Arent, Fox, Kintner, Plotkin & Kahn, 1050 Connecticut Avenue, NW, Washington, D.C. 20036-5339

References

1. *Pneumatic Dust Control in Grain Elevators: Guidelines for Design Operation and Maintenance* (National Academy Press, Washington, D.C., 1982), p. 103.

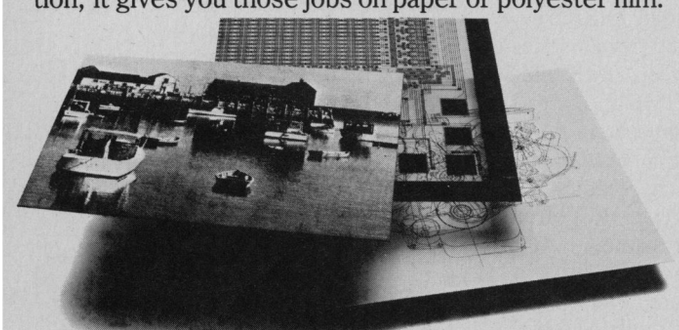
The grain industry does not dictate OMB policy, but at least one congressman—Representative George Miller (D–Calif.), chairman of the House subcommittee on labor standards—has concluded that it guides policy in a benevolent fashion. Miller, who is investigating the grain dust decision, wrote on 7 November to OSHA's director, Thorne Auchter: "The extended OMB review appears to have resulted from a series of private meetings between OMB and industry officials . . . OMB's expressed concerns over the proposed grain elevator safety standard are markedly similar to those of its industry visitors." Because opposing views were not aired in these sessions, Miller wrote, the OMB review has been "one-sided."

As far as I am aware, Fleischaker is the only one to imply that there is anything secret in the industry's research. His client, the National Grain and Feed Association, sent me abstracts describing all the projects it is funding, and I read these before meeting Fleischaker.

—ELIOT MARSHALL

No other printer or plotter does so much for so many.

Only V-80 does so much, so fast, for so many. V-80 is a multi-user printer that delivers drafts at 1000 lines per minute. V-80 is a plot server that draws graphics, maps, even halftone pictures, for a local network. V-80 is a workstation hard copy unit that makes copies direct from your favorite display terminal. It does all these jobs quickly and quietly. And at your option, it gives you those jobs on paper or polyester film.



Print reports, complete with graphics. Draw complex plots that would take hours on a pen plotter, in just seven seconds. Even produce transparent overlays, overheads, and photocopy masters direct from computer or display terminal.

Share your V-80. Nobody waits long at seven seconds per page. And you can place V-80 nearby, because it works without nerve-racking clatter.

V-80 delivers output worth sharing. It prints with three times the character definition of comparably priced impact printers. And with 40,000 points per square inch resolution, it's the choice of leading CAD and graphics workstation suppliers for high speed graphics.

Versatec serial and parallel interfaces, intelligent controllers, and multiplexers link V-80 with a wide range of multi-terminal systems. Available with Ethernet interfacing, V-80 is the ideal plot server for local networks.

Discover how V-80 can help you get more out of your multi-user system or local network. Circle our readers' service number for a free full-color brochure.

VERSATEC
A XEROX COMPANY

2710 Walsh Avenue, Santa Clara, California 95051, (408) 988-2800
27/35 London Road, Newbury, Berkshire, England (0635) 31221

XEROX® and Ethernet® are trademarks of XEROX CORPORATION V-80 is a trademark of Versatec

Circle No. 302 on Readers' Service Card

The best of the old becomes the best of the new.

If you are using research biochemicals in your laboratory, chances are you've heard the phrase, "excellence in biochemistry". For over 30 years P-L Biochemicals has earned the right to use these words with a long history of product "firsts" and consistent quality. From this well-established tradition and firm foundation will come some very exciting changes in the very near future.

We're changing our name...

The news is that Pharmacia Fine Chemicals, a world leader in the field of biomolecular purification technology has joined forces with P-L Biochemicals. The combination of separation technology and research biochemicals come together to produce a level of experience, perspective and resources that is unmatched within this industry. Now, biochemicals, molecular biology products, separation media and instrumentation are available through one highly skilled organization. The new P-L organization is called **Pharmacia P-L Biochemicals, Inc.**
Yes we've changed our name...

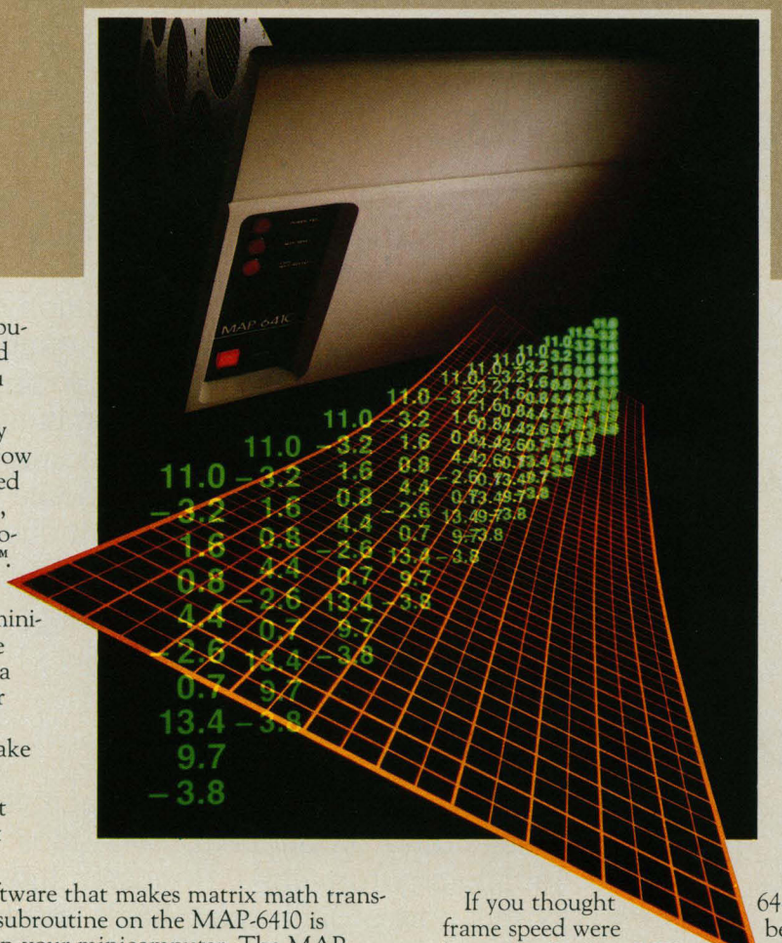
But not our commitment.

The commitment of both companies to produce outstanding products from the most recent technology remains foremost in the objectives of this new organization. Look to the future for exciting new developments from **Pharmacia P-L Biochemicals, Inc.**

2202 North Bartlett Avenue, Milwaukee, WI 53202

To receive the latest issue of Analects, the Pharmacia P-L Biochemicals newsletter, circle reader service #281

64-Bit Computation at Mainframe Speed NOW only $50,000*



Double precision computation for scientific and engineering tasks—you need it! But not at the $300,000 price of bulky attached processors! Now CSPI answers your need with our newest 64-bit, floating point array processor—the MAP-6410™.

Couple the MAP-6410 with your 32-bit minicomputer and enhance number crunching by a factor of 50 to 200. For example, a 100 × 100 matrix inversion will take only 1.6 seconds.

We've set the price at $50,000 to make 64-bit precision **practical**!

We designed new software that makes matrix math transparent! Now calling a subroutine on the MAP-6410 is the same as calling it on your minicomputer. The MAP-6410 has 1/2 Megabyte of data memory and is FORTRAN programmable.

We've made the MAP-6410 compatible with the latest superminis from Gould SEL, Perkin Elmer, Data General, Prime, and DEC™ to make 64-bit computation a first-time reality for the widest spectrum of host computers.

Since 1968 CSPI has been a technological leader in the field of scientific computation. We have the largest line of array processors, and ours was the first 64-bit array processor on the market.

At CSPI we are dedicated to making our customers successful so we back our array processor line with strong applications assistance, with training, with convenient parts depots, and with field service to support our world wide installations.

If you thought 64-bit computation and mainframe speed were beyond your budget, you haven't talked to CSPI. See for yourself how we've made matrix math transparent. We explain it all in the applications note on our new math library. Call us and ask for it. And ask about our field-proven library of SNAP II FORTRAN-callable math routines. Call toll-free 1 800 325-3110.

*USA price.

CSPI

THE ARRAY PROCESSORS

40 Linnell Circle, Billerica, Massachusetts 01821 • 617/272-6020 • TWX: 710-347-0176

Circle No. 315 on Readers' Service Card

16 December 1983, Volume 222, Number 4629 **SCIENCE**

Upgrading Policy Analysis: The NSF Role

Each year public and private organizations commission or perform thousands of policy-focused analyses in which issues of science and technology are centrally important. This blizzard of risk assessments, decision analyses, and the like plays an increasingly important role in the processes of managing, governing, and regulating our technological society. While they may require a few days or several years to perform, such analyses are inherently short-term. They must use available strategies, analytical tools, and science to inform and enlighten the policy-making process.

Many of these analyses have been disappointing. Too often the boundaries and assumptions are not adequately defined and justified; scientific and other uncertainties are inadequately characterized; issues of value are not clearly delineated and may be confused with issues of fact; analytical techniques are inadequate; and virtues such as simplicity, robustness, flexibility, and transparency are lost in a haze of technical verbiage.

Improving the quality of policy analysis that involves science and technology is the responsibility of many groups, both public and private. The National Science Foundation, charged with the support of basic research in science and engineering, has a unique opportunity to contribute. It could support research, development, and selected demonstrations related to basic strategies, tools, and assumptions in science- and technology-related policy analysis; encourage the development of mechanisms for the critical review and evaluation of analyses and analysis methods, both in the interest of quality control and in the expectation that we can learn from past experience; support selected "model" policy studies with substantive science or engineering content which could serve as benchmarks against which day-to-day analyses could be measured; support policy studies on important problems that fall between the cracks of mission-agency agendas; support graduate education in this field; and finally, encourage a modest portion of basic research to be more responsive to policy-focused needs.

Until recently, NSF has supported some of these activities but has not undertaken a broad program to support fundamental long-term improvement of the field. Since the late 1970's NSF's policy resources have been concentrated in its Division of Policy Research and Analysis (PRA). Particularly in its early years, PRA devoted some of its resources to long-term fundamental work. However, the provision of policy analysis support to various federal agencies has always been part of its mission. In recent years it has spent more and more of its resources on studies that are responsive to the immediate and, often, political needs of these agencies.

In recent months, PRA has moved aggressively to restructure its activities. It has assumed a higher profile in servicing the needs of OSTP, OMB, EPA, and other federal agencies, doing some work in-house and obtaining some outside assistance from groups such as consulting firms through "basic ordering agreements" rather than the traditional grant mechanism. It also plans a variety of longer term grant programs. It is not yet clear how substantive these will be, how much science and engineering they will involve, or how closely they will be tied to federal agency agendas.

For several reasons a different and more drastic reorientation of PRA should be contemplated. NSF is not, and has never been, a good place for a federal policy analysis job shop. Despite possible political appeal, the long-term risks of such work to the foundation, particularly to its reputation as a dispassionate and objective research organization, are considerable. NSF could have a far greater impact, and in a manner more consistent with its traditional role, if steps were taken to substantially reduce its direct involvement in policy support for federal agencies and its efforts were concentrated on building a long-term substantive program designed to improve the quality and fundamental capabilities of science- and technology-focused policy analysis. The choice deserves careful reconsideration.

—M. GRANGER MORGAN, *Head, Department of Engineering and Public Policy, Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213*

How do you cool things off?

New Lauda digital circulators to −120°C with convenient LED display and unique safety control.

Labs that know say the smartest way to cool things off is with one of 13 new constant temperature circulators from Lauda, systems based on a long line of innovations backed by 25 years of experience.

To maximize efficiency, most models include proportional cooling, which can cut power consumption by as much as 75%. A digital temperature setting and digital readout help you cool things off with greater accuracy and precision. And dependable safety features like variable over-temperature controls and zero crossover switching/RFI suppression keep you and your circulators cool under any kind of pressure.

From 150° to −120°C, there's a Lauda refrigerated circulator to satisfy your needs:

□ **RM Series** circulators operate at 120° to −15°C, and occupy less than 8″ of bench space.

□ **RC Series** circulators feature an expanded range of 150° to −30°C, and either pressure or pressure/suction pumps. High heat-removal capacity of 2100 BTU/hr at 20°C.

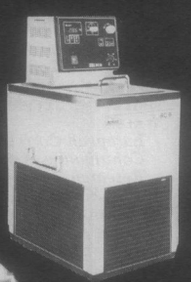
□ **Models RKS-20D** and **RKP-20D** offer a wider temperature range, 150° to −40°C, and are equipped with more powerful pumps. They feature heat-removal capacity of 2550 BTU/hr at 20°C. In addition, RKP-20D also features a built-in programmer, which streamlines temperature control with a number of predetermined functions.

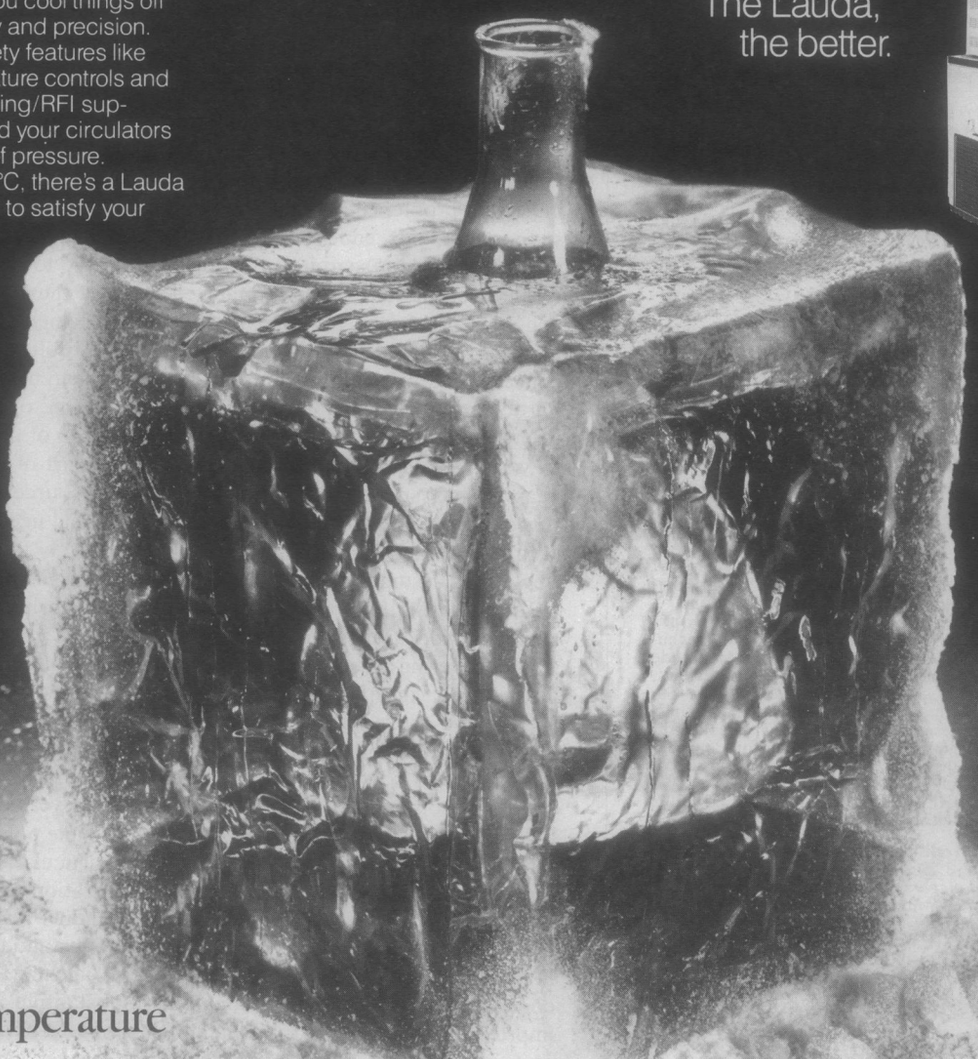
□ **Model SK-65** operates at 40° to −65°C, **Model K-120** at 20° to −120°C. Both feature larger baths and are equipped with pressure pumps for the external circulation of liquids to instruments or other appliances.

To learn more about the benefits of being Lauda, contact your Brinkmann representative. Or call or write Brinkmann Instruments Co., Division of Sybron Corporation, Cantiague Road, Westbury, NY 11590, Tel: 800-645-3050; in New York, 516-334-7500. In Canada: 50 Galaxy Blvd., Rexdale, Ont. M9W 4Y5, Tel: 416-675-7911.

The sooner you do, the sooner *you'll* say...

The Lauda, the better.





Lauda constant temperature circulators

Brinkmann

For information circle reader service number 271
For a demonstration circle reader service number 272

SYBRON

BRK-5079