# SCIENCE

17 May 1974

Vol. 184, No. 4138

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

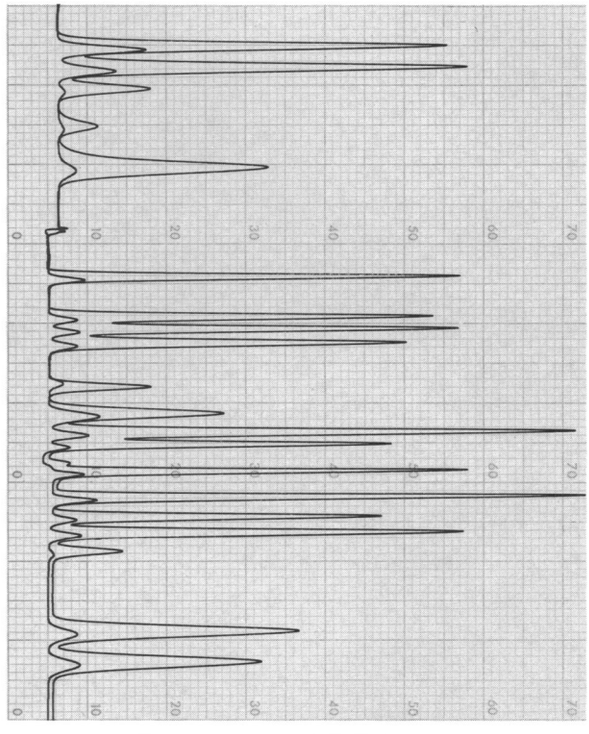

# The 121M Amino Acid Analyzer runs samples as small as 0.1 nmole

This new Beckman Amino Acid Analyzer offers the important advantages of microcolumn operation—rapid, high sensitivity analyses, less sample volume, and 1/10 the reagent consumption of conventional systems.

With its microbore (2.8 mm) columns, the Model 121M can analyze samples as small as 0.1 nanomole per component. That's 20 times the sensitivity of our Model 121 Analyzer which uses conventional bore (9.0 mm) columns. Model 121M sample volume can be as little as 20 $\mu$l, an important plus when only a limited amount of sample is available. And, a typical hydrolyzate run takes only 90 minutes at conventional column pressures.

The fully automatic Model 121M will analyze up to 72 samples without operator attention. You can get computed results, too—in concentration, percent concentration, molar ratio, and 440/570 nm ratio—by adding the new Beckman System AA Computing Integrator.

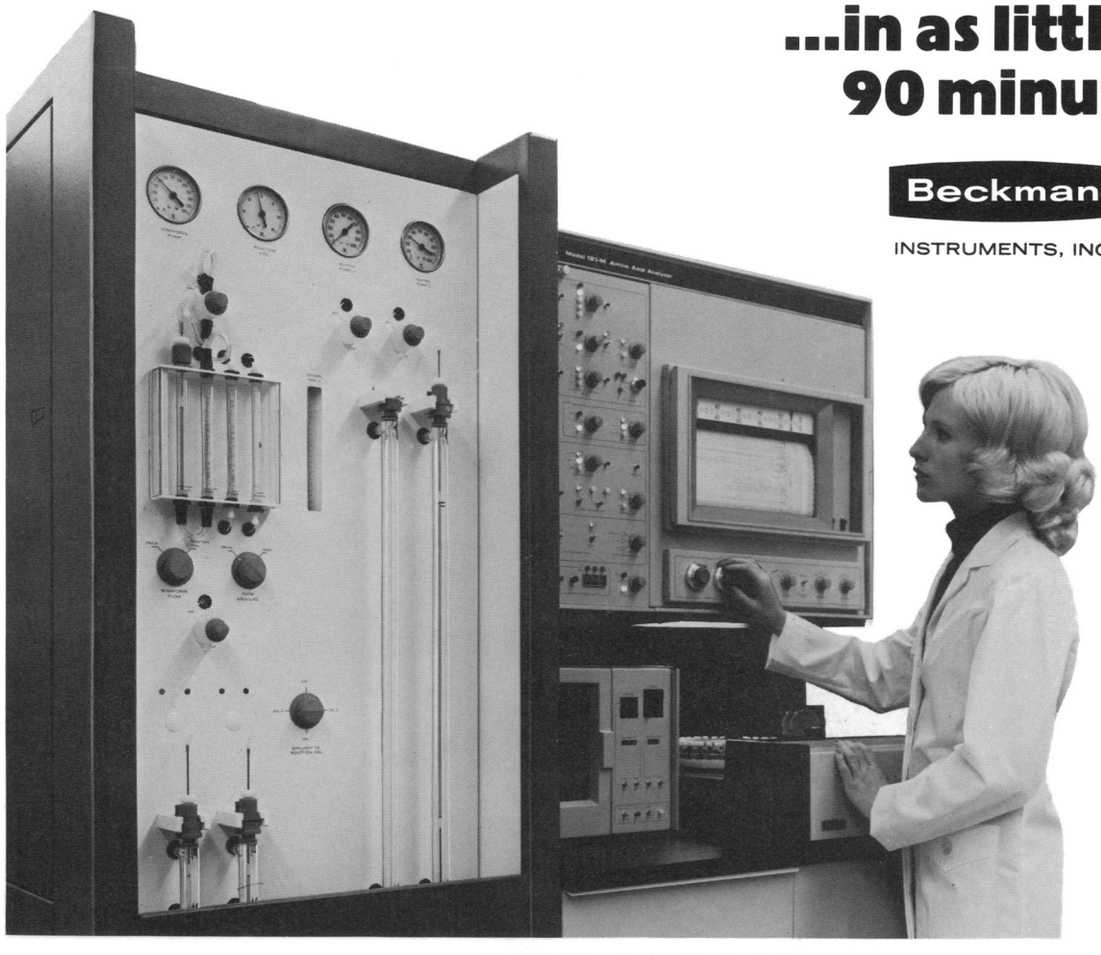
Let us send you full information on the 121M. Write Spinco Division, Beckman Instruments, Inc., 1117 California Avenue, Palo Alto, Calif. 94304.



## ...in as little as 90 minutes

Beckman®

INSTRUMENTS, INC.



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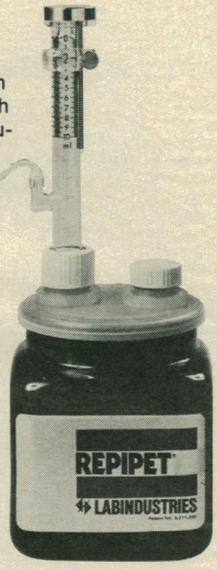
# Now there's a REPIPET® Dispenser and Dilutor for every lab need.

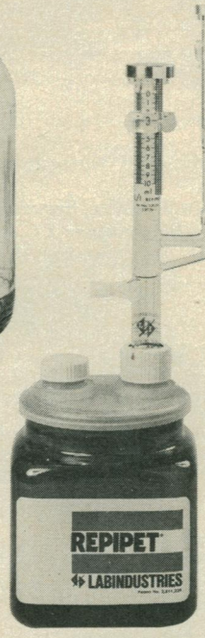
The six REPIPET® Dispensers shown here are but a few of the many models Labindustries can supply you for precise repetitive measurements. Every lab reagent — even corrosives — can be used with REPIPET Dispensers except HF. Choose from 1, 5, 10, 20 and 50 ml sizes, all with 50% lifetime guarantees. Take a moment to circle the reader number for our free new catalog "L/I REPIPETS and Dilutors."

**1.** Universal REPIPET Dispenser fits any container from ½ ml up to 5 gallons. Simply cut the TEFLON® tubing to fit. 10 ml model $75.

**2. NEW** Low Silhouette with new 2-opening wide-mouth container. Leave the instrument in place, use the second opening to refill with reagent. This 10 ml unit $66.50 including container.



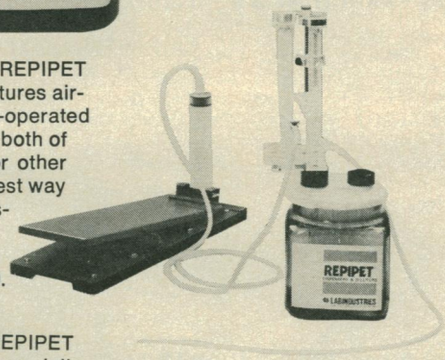

**4. NEW** REPIPET Dilutor. This simple, precise and low cost Dilutor now features sturdier construction and low profile container. Many models 1 to 50 ml. 10 ml model with 1 ml aspirator $118.50.





**3. NEW** REPIPET Jr. Dispenser only $29.50. An unbreakable plastic 0.5% precision dispenser for non-corrosive reagents. We include chemical resistance chart.

**5. NEW** AUTO-REPIPET Dispenser features air-activated foot-operated pedal — frees both of your hands for other work. The safest way possible to dispense corrosives. Model shown is $160.




**6. NEW** MINI-REPIPET Dispensers. Especially suited for dispensing directly from diagnostic reagent containers ½ ml and larger with 0.1% precision. Avoid the hazards of mouth pipetting! All standard sizes $63.50.

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17 May 1974

Volume 184, No. 4138

# SCIENCE





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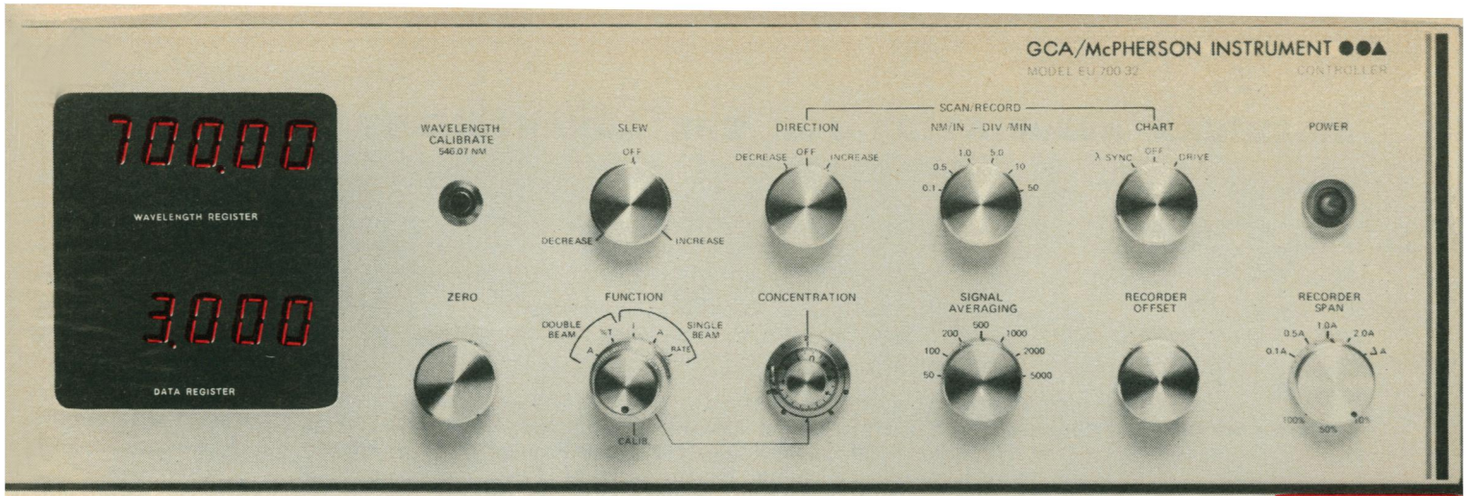
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE





**COVER**

Wet, dim lit, moss-hung cloud forest on summit of Long Island (near New Guinea), two centuries after devastation by a volcanic explosion. Although the summit forest has already regained mature structure under these perpetually moist conditions, montane birds have recolonized much more slowly than lowland birds. See page 803 [Jared Diamond, University of California Medical Center, Los Angeles]

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## *The new GCA/McPherson Spectrophotometer.*

# *Easiest one to use*

The new GCA/McPherson Series 700 Spectrophotometer features a unique instrument panel which groups all operating controls—helps you get research-quality results the very first time.

***EASIEST TO OPERATE***
You select chart format (nm/div), and integration time. Solid state logic automatically selects scan rate. Result: no chance of losing data by scanning faster than system response time and one less knob to use.

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# Computerized β/γ Counting COMPARE

**Find out why there are more Intertechnique computerized counting systems in the field than those of all other manufacturers combined.**

Multi-Mat is the world leader in computerized beta and gamma counting. You have as many as four counters — simultaneously — on-line to a central processor. You can use any combination of Intertechnique liquid scintillation or gamma counters.

**Multi-Mat gives you:**

- **More programs**
- **More flexible programming**
- **More flexible configurations**

**More Programs** . . . Multi-Mat users get a library of more than 40 fully commented programs . . . and new ones are being added almost weekly. Programs for liquid scintillation or gamma counting: for RIA (we'll provide a tailor-made program for any commercially available RIA kit); for plotting histograms; for counting 1, 2 or 3 isotopes; for quench correction; specific activity; blood clearance; statistics, and more. For use on- or off-line. We're proud of what we have; we'll be more than happy to show you.

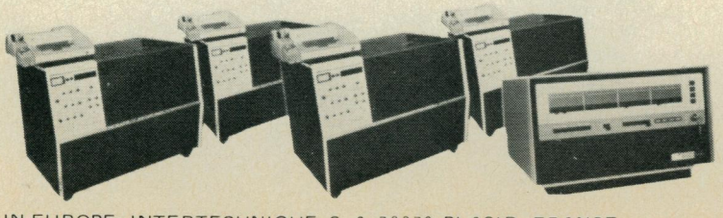
**Flexible Programming** . . . Multi-Mat users get LEM, the only high-level computer language developed expressly for bio-medical use. LEM is simple, straightforward, easily learned. It allows any user to write programs to meet your own specific requirements. No more waiting for someone else to get around to doing what you want done. No more being forced to accept compromises! With LEM, you can make yourself independent of a programmer because LEM is the language that can make everyone a programmer.

**Flexible System Configurations** . . . Multi-Mat systems can have from 1 to 4 counters . . . 200 sample or 300 sample . . . liquid scintillation or gamma . . . in any combination! Each counter may have a different operating program while all of them are on-line at the same time to a single Multi-20 central processor. That kind of flexibility is exclusive to Intertechnique . . . and there's even more. Each of several users of a single counter can have his own program which is automatically called into use only when his samples are in place and counting. And all of this programming is stored in core and called out as programs should be — electronically — and in microseconds. You won't find an equivalent elsewhere, because there is none.

That's why there are more Intertechnique computerized counting systems in the field than those of all other manufacturers combined.

Write or call today for more facts:

- Multi-Mat brochure
- LEM Makes You the Boss booklet
- Simplified Computer Programming for Liquid Scintillation Programming.



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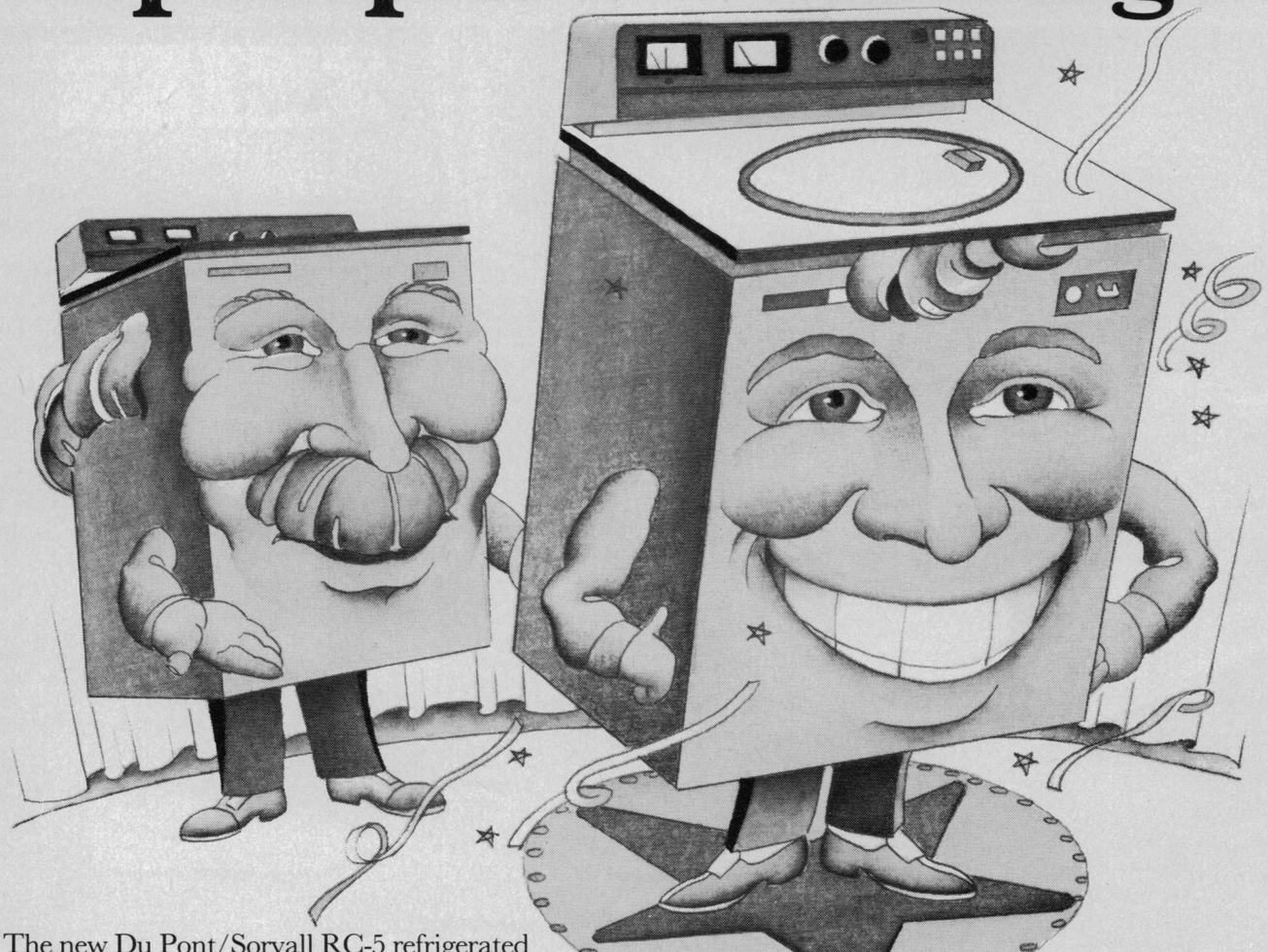
# Our good ol' RC-2B is pleased to introduce our new and better RC-5 Superspeed Centrifuge.



The new Du Pont/Sorvall RC-5 refrigerated superspeed centrifuge gives you the proven performance and reliability of the RC-2B... Plus:

- a new safety door interlock prevents opening the door when the rotor is spinning
- new all electronic circuitry gives more reliable speed and temperature control
- same price range as the RC-2B
- uses all the RC-2B rotors

## See it at Bio/Bio.

(Biochemistry/Biophysics 1974 meeting, June 3-7 in Minneapolis.) Or write for a copy of our RC-5 brochure. Du Pont Instruments, Sorvall Operations, Room 23697F, Newtown, CT 06470, or call 203-426-5811.

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**In the 7Å, 30x-60,000x, 60kv range, when Rudolf Partsch talks about the world's easiest-to-operate electron microscope, he talks about the Zeiss EM9S-2.**

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For complete details on the versatile Zeiss EM9S-2 and EM-10 electron microscopes write or phone Rudolf Partsch at Carl Zeiss, Inc., 444 5th Ave., New York, N. Y. 10018. (212) 736-6070.
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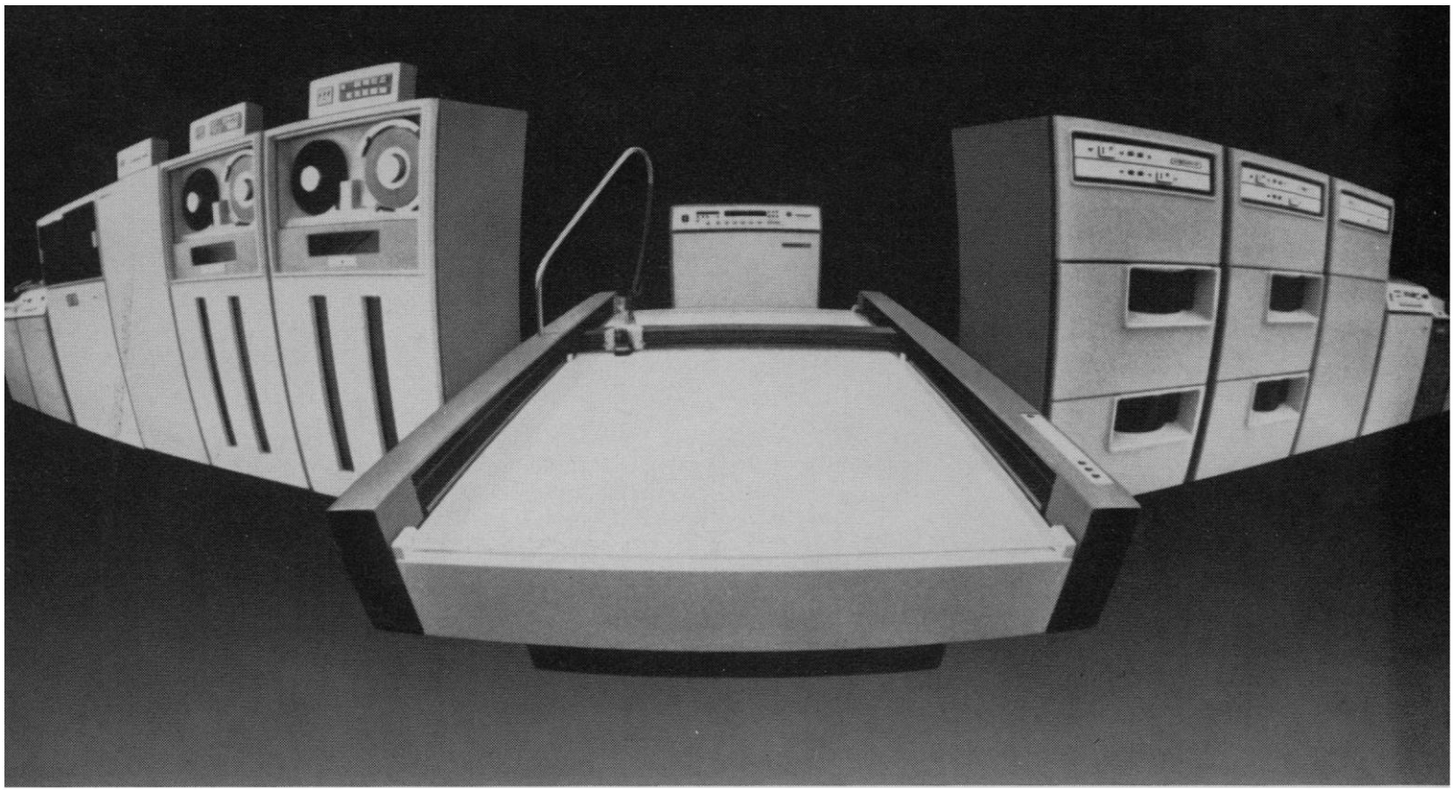

# Peripheral vision.

From the beginning, we have preferred concentration to diversification. We don't supply everything that attaches to your computer. But the things we do supply are the best.

What do we supply?

*Drum plotters.* We're the world's leading supplier of both hardware and software.

*Flatbed plotters.* Several years ago, we saw a need and an opportunity to expand the plotter's uses. The flatbed plotter allows a variety of materials to be substituted for paper; and it has expanded the market for computer graphics, as well.

*Microfilm plotters.* Here, we got bigger by getting smaller. With microfilm. Our 1675 COM plotter/printer and our 2100 COM printer deliver the best price/performance in the industry.

*Disk memory equipment.* This was our second area of concentration. In a remarkably short time, we have become the leading independent supplier.

*Tape systems.* We've recently begun to concentrate on tape. The result is that our new 1040 Tape Drive combines the features of others with our own experience. We intend to be a leader in this field.

The point is we have not grown by accident. Thirteen years after our beginning, we have become a leader in computer peripherals.

For information on peripheral products, call your local CalComp office, or contact California Computer Products Inc., SM-M5-74, 2411 West La Palma Avenue, Anaheim, California 92801. (714) 821-2011.

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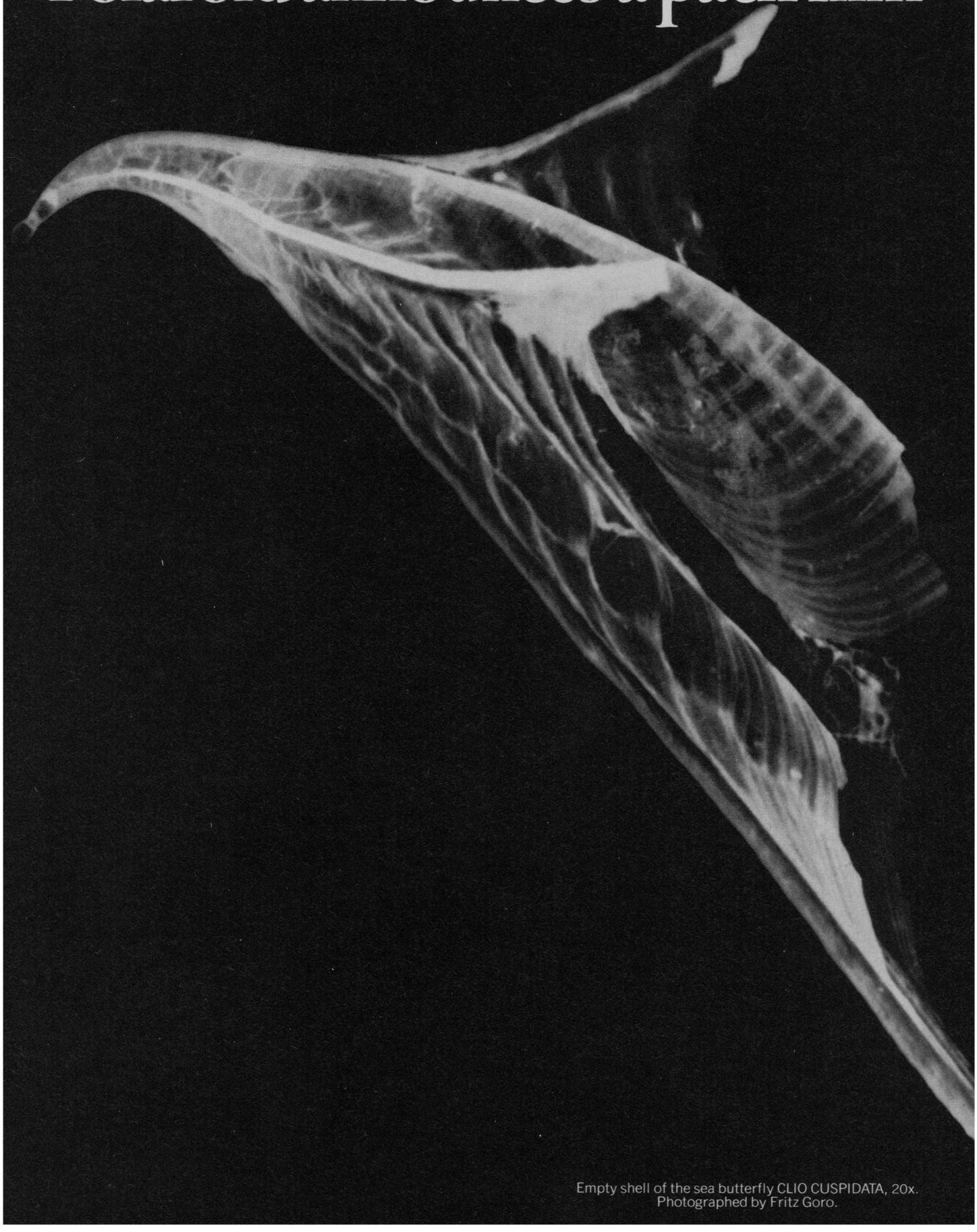
# Polaroid announces a pack film



Empty shell of the sea butterfly CLIO CUSPIDATA, 20x.
Photographed by Fritz Goro.

# for instant prints and negatives.

## A new film for cameras and instruments now using Polaroid 3¼"x4¼" film.

Introducing Type 105.

A brand new Polaroid Land film for industrial, scientific and laboratory photographers that delivers exceptionally high-quality prints and negatives. And delivers them economically and conveniently.

Just 30 seconds after you shoot with Type 105 you get a black and white print of exceptional tonal range, sharpness and luminosity.

And a quality negative to match. With a resolution of over 150 lines/mm so enlargements retain original sharp detail.



What's more, this new positive/negative film comes in our convenient 3¼" x 4¼" eight-shot pack format. So it fits any instrument, camera, and Polaroid Land camera that already uses our Type 107 or Type 108 pack film.

(For 4 x 5 cameras and instruments we're introducing a new adapter for all our 3¼" x 4¼" pack film called the Model 405 Land Pack Film Holder.)

Ask at your photo store for our new Type 105 Land film.

A superb black and white film for instant prints and reprints.

## Polaroid's instant positive/negative pack film.

Polaroid®

# How to use Gaertner optical/ instrument benches for

*lab set-ups, alignment, and vibration isolation.*

—in the lab or shop

—in
- physics,
- metrology,
- biomedical engineering,
- spectroscopy,
- vision,
- psychology,
- anatomy . . .

you name it.

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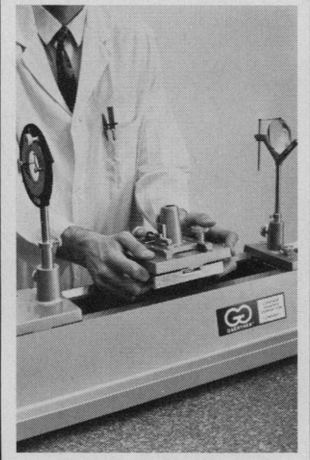
## Checking lenses . . . straight line set-ups . . . aligning electronic parts . . . or ?

### Lathe bed optical/ instrument benches.



If your work involves checking the parameters of lenses and lens systems, or the manipulation and alignment of experimental systems using lasers, optical, and electronic parts and similar devices, consider a Gaertner optical bench. It will provide the stability and precision you need—with a choice of options to meet your specific requirements.

**Rugged.** These benches are made of a special, massive casting with ribbed design for stability—treated and precision ground to assure permanent straightness of the guide ways.

Two basic lengths, 160cm and 120cm are offered. We can furnish any combination of these lengths, joined to provide extra long benches as needed.

**Optical testing.** For accurate testing of lenses, mirrors, and optical systems our Model L36ON precision optical bench assembly is ideally suited for measuring focal length, resolving power, distortion, astigmatism, curvature of field, coma, spherical aberration and lateral and axial chromatic aberrations.

**Alignment.** If your laboratory experiments involve precise, dependable and stable alignment of components, as for instance, laser or photometric systems, electron guns, breadboarding or prototype setups, you'll find a lathe bed bench indispensable. Or you can use the bench as a base for a scale comparator, a flame photometer, spectrophotometer, or similar instrumentation. **Ask for Bulletin 156-73.**■

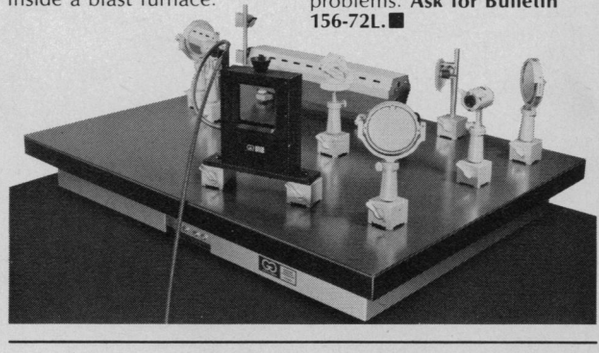
## Rectangular flat bed optical/instrument benches.

You can select these Gaertner benches in three basic sizes, all with or without vibration isolation air-suspension systems: 2 meters x 57cm; 3′x4′ or 4′x6′. They provide a large stable magnetic surface, yet are reasonably portable. With a variety of magnetic carriages and other accessories, these benches give you great flexibility for positioning, breadboarding and prototype set-ups—for holographic work, instrument experiment and design arrangements using folded optical paths, and more . . .

**Vibration isolation.** With the vibration isolation system you can support sensitive instruments such as spectroscopic systems, interferometers, a micro balance, etc. Also useful in photography and photogrammetry. The benches are used for many industrial applications as well as research. Example: in a steel mill to isolate delicate equipment for monitoring the chemical composition of the melt inside a blast furnace.

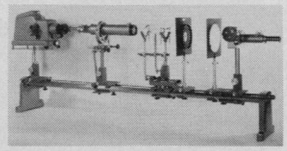
**Unlimited holographic applications.** Gaertner rectangular optical/ instrument benches can be furnished with holographic components for use in information storage and retrieval, material studies, and other work in a broad range of fields where holography is being applied. Examples: (1) the study of internal stress in medicinal tablets to eliminate a problem with crumbling; (2) microholographic study of tissues from rats; (3) refractometer experimentation, (4) the investigation of the second harmonic generation of a laser, and many many more . . .

**Accessories . . . plus an inexpensive liquid plate-holder.** Gaertner offers a complete selection of optical bench accessories and component assemblies, including magnetic holders. The low-cost liquid plate-holder for real-time holography permits processing a plate without removing from the holder, eliminating repositioning problems. **Ask for Bulletin 156-72L.**■



## Double rod benches: inexpensive and versatile.

For less critical applications, you'll find a double rod optical instrument bench excellent. It is a relatively inexpensive yet sturdy and straight base for a variety of carriages and component assemblies. Available in 1, 2, and 3 meter lengths, with or without a linear scale.



These benches may be used for lens testing, determination of conjugate focii of lenses, or with microscopes for the measurement of dimensional changes of materials such as floor tile, paper, etc., in various environments. Medical researchers have used a double rod bench in developing special transducers for use in open heart surgery. With the bench supported over an aquarium, they were able to precisely position samples and transducers within the tank.

**Accessories.** There's a complete selection of Gaertner optical/instrument bench accessories for all kinds of set-ups requiring alignment, positioning, linear and rotational movement of test pieces or components. Included are calibrated fine x-y and x-y-z motion stages, lift-off carriages, microscopes, light sources, holders, slits, collimators, and others.

For information on Gaertner lathe bed and double rod optical/ instrument benches, **ask for Bulletin 156-73.**■

## Information.

Please request literature on any Gaertner instruments of interest to you. Or ask our recommendation for an instrument designed to meet your particular requirement.

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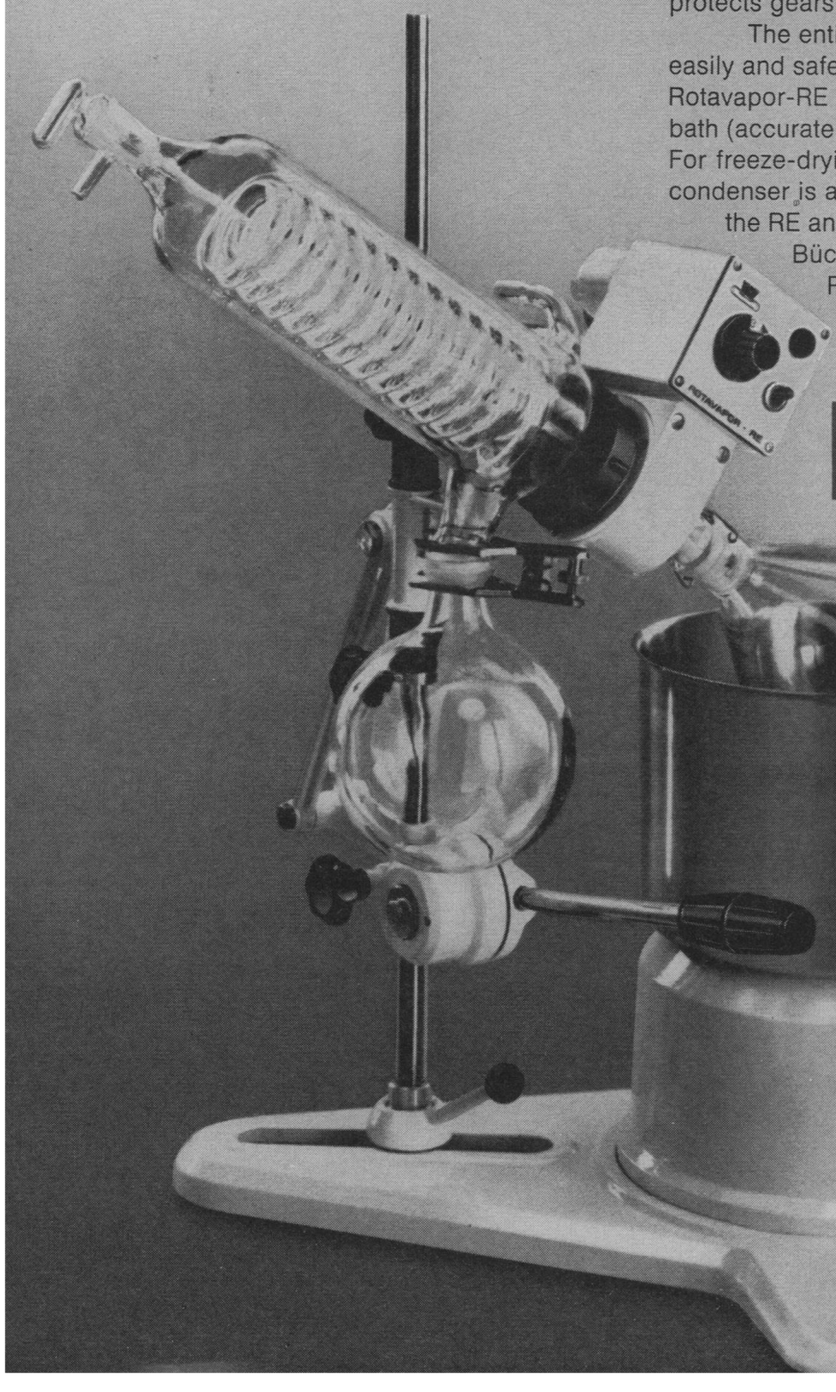
# It's got a lot of nice little features... (electronic motor, quick-action jack, deflector shield, stainless-steel water bath).

Whether you're simply evaporating or drying powders or working with very viscous materials, the Büchi/Brinkmann Rotavapor-RE is probably the ideal rotating evaporator for your needs. Consider these important features: an electronically-controlled motor that provides almost constant torque over its entire range of speeds from 10 to 220 rpm. (Careful use of the speed control helps reduce foaming and bumping of liquids.) A deflector ring in the drive unit protects gears from distillate in case of a faulty vacuum seal.

The entire evaporator unit can be raised or lowered easily and safely by means of the quick-action jack. The Rotavapor-RE comes equipped with stainless-steel water bath (accurate to ±1.0°C) and specially coated base casting. For freeze-drying operations, an optional cold trap condenser is available. For an illustrated brochure describing the RE and other Büchi/Brinkmann models, just write: Büchi Division, Brinkmann Instruments, Cantiague Road, Westbury, N.Y. 11590. In Canada, write: Brinkmann Instruments (Canada) Ltd., 50 Galaxy Blvd., Rexdale (Toronto) Ont.



**Büchi/Brinkmann Rotavapor-RE**

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# Digital introduces the PDP-11E10.

## For $21,000* you get one of the most versatile computer powerhouses ever built.

It's a complete hardware system. What's more you get our advanced 16-bit PDP-11E10 CPU, and 16K words of 980 nanosecond internal memory free when you buy our 1.2-million word cartridge disk, dual-drive tape cassette, Digital's own 30 cps console terminal and small peripherals controller.

Starting from there, you can go in any direction you want. Hook it up to instrumentation, build it into your OEM system, expand it with more memory and peripherals. Develop interfaces and application software, or better yet, check into what's available from us, including interfaces, real-time disk operating system for $750, and plenty more. Delivery in sixty days.

Contact your local Digital Office, or write: Digital Equipment Corporation, Maynard, Mass. 01754. European headquarters: 81 route de l'Aire, 1211 Geneva 26. Digital Equipment of Canada Ltd., P.O. Box 11500, Ottawa, Ontario K2H 8K8.

digital

*With non-profit institutional discount.

Circle No. 11 on Readers' Service Card

# Eastman Organic Chemicals News

about products for liquid scintillation counting

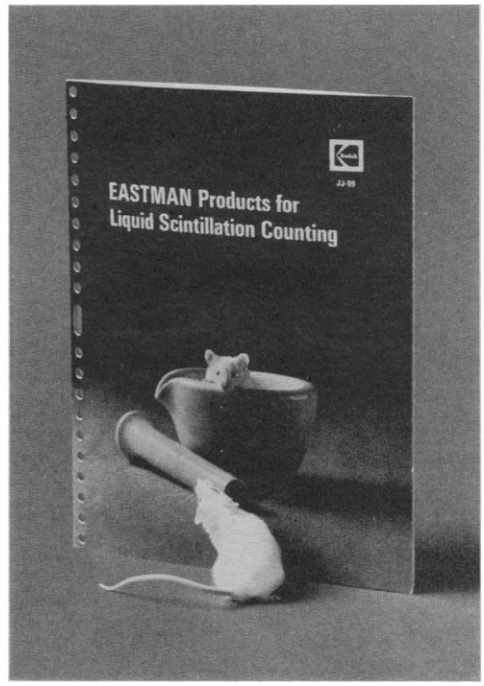
**Six convenience products join the 27 "Scintillation Grade" EASTMAN Organic Chemicals. Depending on your needs, and the degree of flexibility you desire, choose from:**

EASTMAN Ready-To-Use I
EASTMAN Concentrate I
EASTMAN Dry Blend I
} Formulated for counting samples with low quench.

EASTMAN Ready-To-Use II
EASTMAN Concentrate II
EASTMAN Dry Blend II
} Formulated for counting highly quenched samples.

One source for all your LSC reagent needs with a full product line. These six convenience products provide consistent high quality, carefully controlled through use-testing at three stages during their production. And they are readily available from these nearby laboratory supply houses:

Coulter CMS, Inc.
Fisher Scientific
North-Strong
Preiser Scientific
Sargent-Welch Scientific
Scichemco
VWR Scientific (East)




Return the coupon to request your copy of the new Kodak Publication No. JJ-59, "EASTMAN Products for Liquid Scintillation Counting," pictured above. It contains specifications, use-data in typical counting applications, and an extensive bibliography on liquid scintillation counting. The bibliography, prepared by the University of California, San Francisco, contains 80 timely references in 16 subject categories.

Kodak

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Eastman Organic Chemicals
Dept. 412L
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Affiliation _____

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# Television Microdensitometer measures integrated optical density of 5,000 cells per minute

The Quantimet® Television Microdensitometer is a powerful new research tool that at last makes microdensitometry practical for everyday use in the life sciences. Comparative densitometric information can now be obtained on large cell populations at speeds up to 1,000 times faster than with conventional whole field densitometer systems.

Pattern recognition capability enables the Quantimet to measure geometric parameters such as cell area, perimeter, width and height . . . and to utilize them in selecting cells for density measurements.

The system can be programmed to provide 64 level area/density plots in the neutral density range of 0 to 3.00. Its high speed measurement capability permits comparative microdensitometry on a cell by cell basis.

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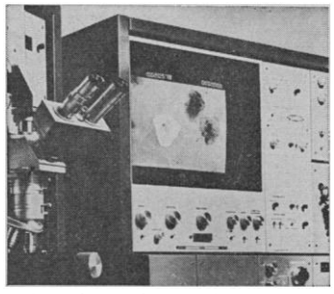
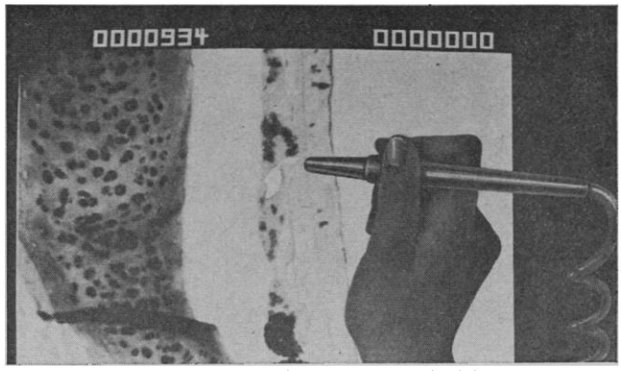
The new television scanner, using 720 non-interlaced scan lines, has been specifically designed for microdensitometry. Scan parameters have been chosen to optimize speed, resolution, noise and grey level discrimination. Off axis operation has been improved by using the best available optics. Glare problems, associated with conventional units, have been eliminated with a unique and effective automatic glare corrector.



Quantimet Microdensitometer.

### Light Pen Selection Of Individual Cells

The investigator can choose individual cells or other features for measurement by pointing the light pen at the cell. The density, or other selected parameter, is digitally displayed above the monitor screen in 1/10 second.



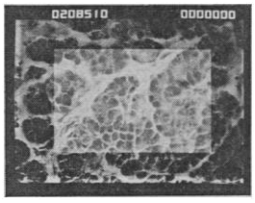

Light pen selects individual features.

### Speed Of Operation

Using the light pen, an operator can measure 700 to 800 cells per hour. An automated system can perform a 30 level density distribution of 100,000 cells in an hour, or a total integrated density of 300,000 cells per hour.

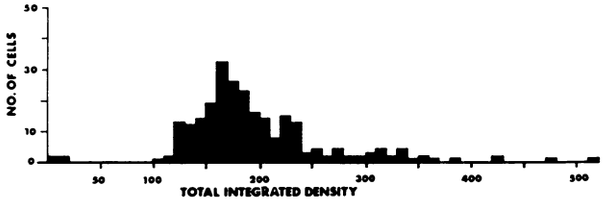
### Applications

Typical applications include the quantitative determination of DNA in cervical smear specimens to detect the presence of abnormal nuclei, and enzyme determinations by quantitative histochemistry on a cellular and a tissue basis.




Entire field operation—the total integrated density of the whole measuring area is determined to quantify the non-specific esterase present in the histochemically stained section of mouse pancreas.


All selected features operation — alveolar macrophages in a section of rat lung are selected from the background by grey level, then measured to determine the total integrated density contribution of that acid phosphatase restricted to the alveolar macrophages.




Histogram of a cervical smear indicates malignant condition.

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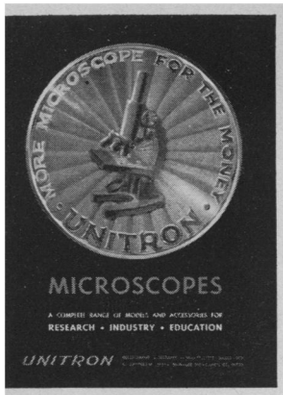


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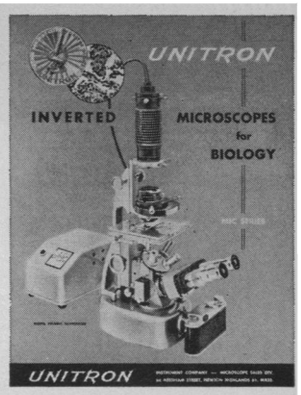





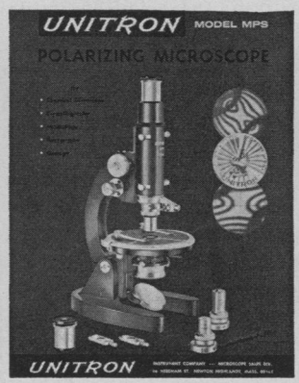



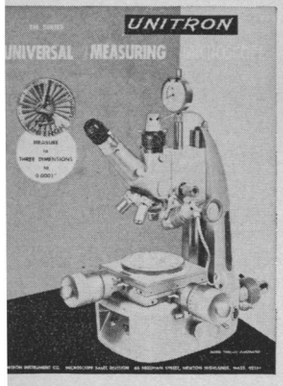


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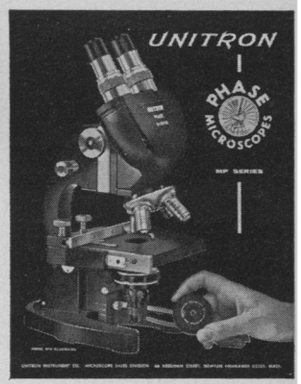







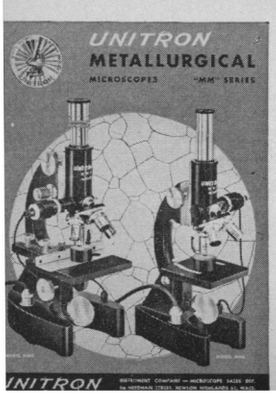


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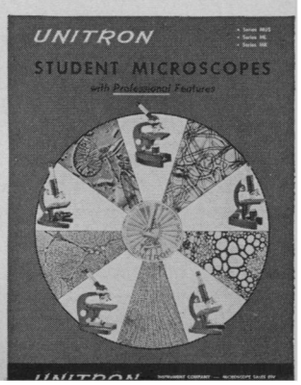

intense as that from the naturally occurring mineral pitchblende, so it will be easy to handle. The plutonium and other actinides can then be easily separated out and used as a reactor fuel.

The critics say that it is unfair for us to burden future generations with our waste. But isn't it much more unfair for us to use up in 100 years or so the fossil fuels that have accumulated over hundreds of millions of years? Moreover, in exchange for watching a few buildings for 500 years, future generations will receive from us the technology for powering their civilization. That would seem to be a very fair exchange.

BERNARD L. COHEN
*Department of Physics,*
*University of Pittsburgh,*
*Pittsburgh, Pennsylvania 15260*

## Inter-American Relations

In his article "The future of the Americas" (7 Sept. 1973, p. 916) Sol M. Linowitz looks at the problems of the Americas. He expects a better life for all Americans through international cooperation and investment on the part of the developed nations. For the last 15 years I have been considering the problems of a small region of "underdeveloped" rural Latin America. I come to conclusions which are in complete opposition to those of Linowitz. Development aid given by the United States has done little to bring a better life to the Latin American urban worker or unemployed person or to the peasant. It has simply made possible the survival of considerably more people at the same mean level of existence. Moreover, antagonisms toward the United States have been constantly increasing.

During the mid-1950's, crop failures and livestock deaths in the Titicaca Altiplano [highland] in Peru brought the people of this region close to famine. The United States sent food, and catastrophe was averted. No one that I know has acknowledged that U.S. aid saved many lives. Meanwhile, the continuing high birth rate and disbursement of food donated by the United States ensure that the next drought cycle will require even more prodigious efforts on the part of the United States to avoid catastrophe in the Titicaca Altiplano.

The United States should follow a laissez-faire policy with regard to development in Latin America. The U.S. tax dollar should not be frittered away on development schemes, many of which appear to border on fraud. Technical and scientific advice should be available to those countries who ask for it and who are prepared to make reasonable payment for it. Cooperative research efforts involving scientists from various countries should be facilitated. Latin America should stand on its own feet. Latin Americans should work out their own future.

CARL WIDMER
*Lake Titicaca Ecological Studies,*
*Casilla 23, Puno, Peru*

Widmer's experience in his "small region of 'underdeveloped' rural Latin America" has led him to some very broad generalizations. I can only say that his own recipe for a "laissez-faire policy" on the part of the United States has been tried during the past several years and found to be dismally wanting, as Secretary of State Kissinger's new approach clearly indicates.

SOL M. LINOWITZ
*One Farragut Square South,*
*Washington, D.C. 20006*

## Schistosomiasis Research Projects

The Edna McConnell Clark Foundation announces a program of support for research projects on schistosomiasis. Research projects will be supported in three major areas: (i) investigating immunity and immunopathology in animals and man; (ii) increasing the effectiveness of control measures that prevent development of clinical disease; and (iii) determining the medical, economic, and social impact of schistosomiasis.

Proposals from indigenous scientists working in lesser developed countries are encouraged, but the program is open to all applicants. The deadline for receiving materials is 15 July 1974 for a September 1974 decision. Grants will not generally be made for scholarships, fellowships, endowments, or for capital expenses. Interested parties who desire further program information, the proposal format, and proposal requirements should address requests to me.

DONALD B. HOFFMAN, JR.
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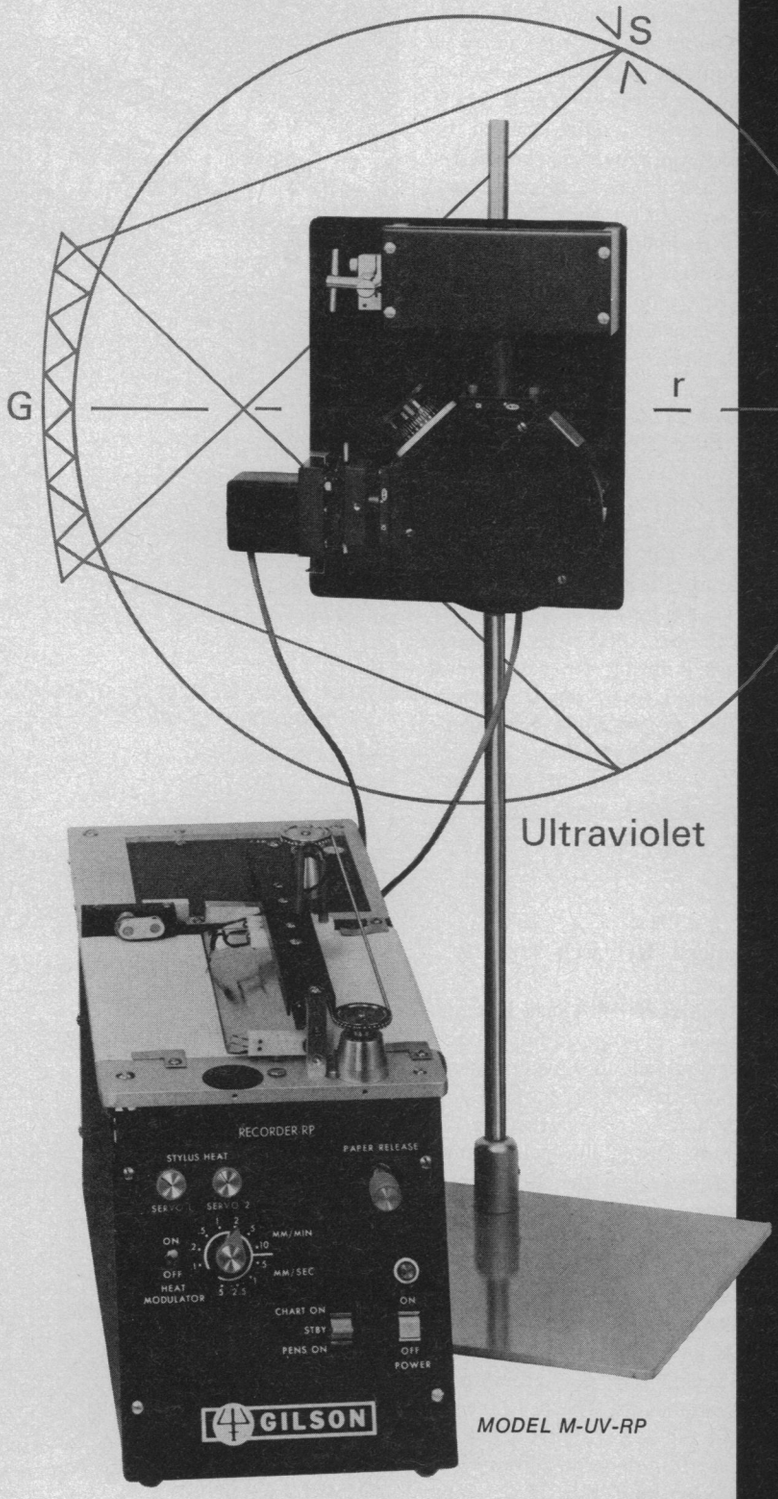


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17 May 1974, Volume 184, Number 4138 **SCIENCE**



# Genetic Counseling

The avalanche of new genetic discoveries and revolutionary techniques (such as amniocentesis, fetoscopy, and fetal biopsy) has introduced into our social consciousness an awareness of moral, ethical, and philosophical concepts at the grass-roots level that were formerly left to the ivory-tower scholars. Suddenly we are faced with choices previously left to fate: Should a genetically defective child be aborted? Should parents be allowed to select the sex of their offspring? Do parents have an inalienable right to knowingly produce defective children?

These and related questions are receiving increasing attention in professional journals and in articles for the layman. The bioethicists promulgate heated arguments, convincing me that there are no right or wrong answers to the questions posed. Most of the recent articles on genetic counseling have pointed out the complex issues involved, the difficulties in communication, and the ethical dilemmas posed. Many authors have taken a stand on the "best" way to counsel. Each reflects a different point of view.

My point of view is that we need to preserve these different points of view. As a geneticist, I cherish human variability. Our collective strength lies in our pluralistic attitudes. Freedom of speech preserves our right to shout our convictions and to try to persuade others. But the power to make rational decisions preserves our ability to resist coercion from others. There is no opportunity for rational choice, however, when a counselor does not disclose this variety of viewpoints which enables the counselee to arrive at an independent, autonomous decision.

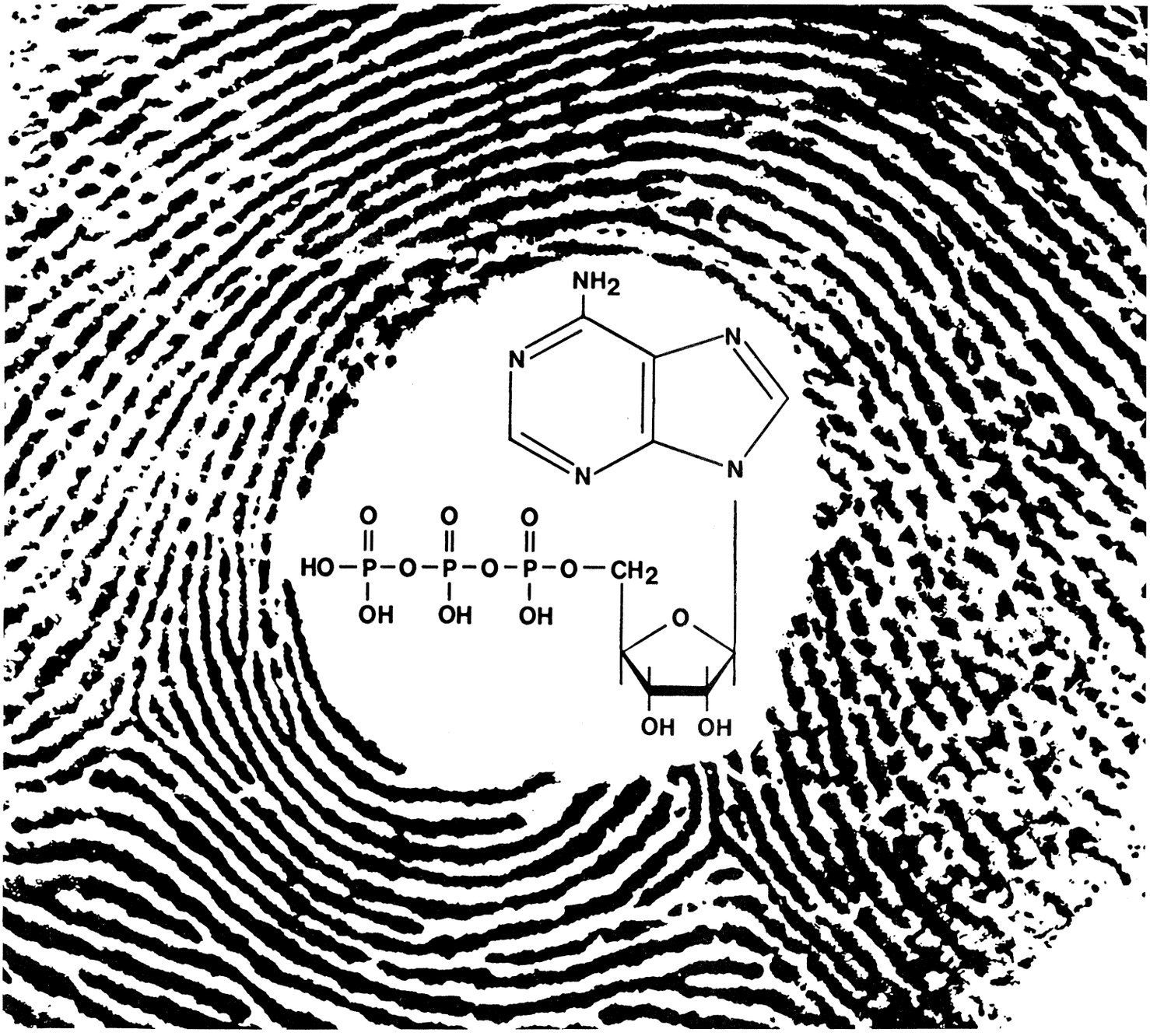
I am not afraid that genetic screening will lead to genocide, nor that abortion will lead to infanticide, as many have warned. If we need checks on our behavior the law will provide them.

The relationship of the genetic counselor to the counselee is a very personal one. It involves a discussion of procreation decisions. Should the counselor describe only the genetic risks, inform the counselee of the range of decisions available, or advise the counselee on the action to be taken? Different counselors do different things. The counselor has freedom to persuade, according to his personal convictions, but he does not have freedom to coerce, based upon his inherent power in the counseling milieu. He must accept the counselee as the ultimate decision-maker. Different parents have a variety of motives for their ultimate decisions. Thus, the outcome of their deliberations will vary. And we will preserve our genetic heterogeneity!

Professionals in general, and physicians in particular, tend to adopt a paternalistic attitude in dealing with patients or experimental subjects or relatives. But only those who desire "parenting" will blindly follow another's advice. The rest will be influenced to a greater or lesser degree by the prescriptions of the counselor who is directive rather than permissive. Those who would argue that the counselee needs protection from directive counseling are themselves being paternalistic.

As our life-styles have become more individualized, so have our ethical codes. The Supreme Court has recognized this trend in the Roe *v.* Wade decision on elective abortion. The proposed amendment to the Constitution to reverse this decision would narrow our options to make individual choices. I see no immediate need to arrive at a consensus or to make policy decisions. Let us keep our options open and preserve our diversity of opinion. By so doing, we preserve our diversity of people.

—MARGERY W. SHAW, *Director, Medical Genetics Center, Health Sciences Center at Houston, University of Texas, Houston 77025*

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## Susceptibility of the Fetus and Child to Chemical Pollutants

As chemicals increasingly permeate our environment, there is a need to consider the special vulnerability of the fetus and child. As a first step, a meeting was held on this subject at Browns Lake, Wisconsin, 11 to 13 June 1973, under the sponsorship of the Committee on Environmental Hazards of the American Academy of Pediatrics, the National Institute of Environmental Health Sciences (NIEHS), and the National Institute of Child Health and Human Development (NICHD). Fresh thinking was sought by bringing together scientists who know about environmental effects but not about child health, and pediatricians, who know about child health, but have not given much thought to environmental effects.

Children may be harmed in special ways by pollutants, as illustrated by two epidemics in Japan: the well-known occurrence of congenital cerebral palsy among infants whose mothers, during pregnancy, ingested fish contaminated with methylmercury from industrial waste, and the less well known occurrence of undersized newborn infants with brown discoloration of the skin caused by maternal ingestion of polychlorinated biphenyls which leaked into cooking oil as it was manufactured.

The history of medicine reveals that environmental causes of malformations and other diseases in man have usually been first recognized by alert practitioners. With this in mind, the participants repeatedly urged implementation of an Alert Practitioner Program, in which physicians would report suspicions of new environmental effects for evaluation by a panel of experts. A feasibility study concerning childhood diseases is being made by the American Academy of Pediatrics under contract with NIEHS.

When population studies are contemplated, Sullivan (Guy's Hospital, London) noted that if the usual frequency of an anomaly is 1 in 1,000 newborn infants, the offspring of 23,000 mothers who had taken a suspect drug must be studied to detect a doubling in the incidence of the defect. Other participants stressed the desirability of monitoring populations for the earliest possible detection of malformations due to chemicals newly introduced into the environment.

In screening for transplacental hazards, Fraumeni (National Cancer Institute, Bethesda), stated that the entire range of fetal response should be covered, including miscarriage in the early stages, malformations during organ development, and neoplasia when exposure occurs later in pregnancy. Battaglia (University of Colorado) stated that chemical pollutants might also affect the rates for premature births. The onset of labor is in part triggered by the pituitary-adrenal axis of the fetus and by enzyme systems affecting the synthesis of prostaglandins in the uterine mucosa. Chemicals might affect prematurity rates by blocking enzymes that channel certain fatty acids to prostaglandins. An increase in the prematurity rates of California sea lions has since been attributed to organochlorine pesticides and polychlorinated biphenyl residues.

The effects of interacting environmental chemicals was illustrated by the increased frequency and severity of cretinism on Idjwi Island in the Congo. The increase, as described by Gardner (State University of New York Upstate Medical Center), was due to a deficiency of iodine in the diet, the adverse effects of which were worsened by eating cassava. Linamarin, a glucoside in this food, produces cyanide, which, when metabolized to thiocyanate, depresses iodine uptake by the thyroid.

The brain may be particularly susceptible to environmental exposures, but minimal dysfunction is difficult to demonstrate. Weiss (University of Rochester) stated that techniques must be developed to evaluate the relative contribution of various components of the brain, as well as the relationship among all of the structural, functional, and chemical constituents of the central nervous system.

Important concepts about general principles of teratogenesis have come from animal experimentation, but such studies have not been satisfactory in predicting the effects of drugs in man. As an example of new understanding which can be derived from molecular biology, Dorfman (University of Chicago) described the importance of timing in cell differentiation. When 5-bromodeoxyuridine (BrdU) is substituted for thymidine in DNA early in the development of cells in culture, the cells will not differentiate. If BrdU is introduced after differentiation, the cells will not perform certain functions: muscle cells will not make myosin, and cartilage cells will not make chondroitin sulfate. By such studies a basis may be

established for the different actions of teratogens at different stages of development.

In turning from the fetus to the child, Brown (University of Georgia) said that recent research into bilirubin metabolism gives added importance to the effects of light soon after birth. In the newborn infant, bilirubin absorbs light, which may then react to form singlet oxygen and be degraded into water-soluble dipyrroles. Infants should be observed for the effects of actions consciously sought from a drug and unconsciously produced from sunlight or fluorescent bulbs.

More is known about air pollution. Holland (St. Thomas' Hospital, London) presented evidence that the origins of respiratory diseases with onset late in life can be traced to childhood: persons who migrate from one country to another, even before 10 years of age, carry with them the higher disease rate of the old country. The next generation, born in the new country, does not have its parents' higher rate of respiratory diseases.

Other potential hazards in the environment of the infant or child include skin preparations (such as hexachlorophene), dyes or other materials on the surfaces of toys, pesticides and herbicides, and, as always, lead poisoning from ingesting paint from the walls of deteriorated old houses.

The teen-ager, because of unusual social and environmental subcultures, may experience special environmental difficulties. Cohen (Montefiore Hospital, New York) noted that food faddism and drug abuse, so common among adolescents, pose a variety of problems which may be intensified by the active growth of members of this age group. Adolescents are also more prone than older persons to enter occupations which subject them to chemical hazards.

In reviewing the genetic aspects of chemical pollution, Sutton (University of Texas, Austin) noted that environmentally induced mutations in somatic cells may threaten the survival of the individual, whereas mutations in germ cells may threaten the survival of a population. Mass screening for human mutagenesis will not be feasible until technology is further developed. It is theoretically possible, Sutton said, to examine 100 million somatic cells to detect very low mutation rates—on the order of $1 \times 10^{-7}$. This is an enormous advantage over the currently employed approaches to the study of germinal mutations.

The discussion made clear the fact that the Environmental Protection Agency is responsible for regulatory actions pertaining to chemical pollutants for the population in general, but no federal health organization is responsible for research concerning the special susceptibility of the fetus and child. The participants concluded that there is an urgent need for a national agency to assume responsibility for research in this area.

ROBERT W. MILLER
*Epidemiology Branch, National Cancer Institute, Bethesda, Maryland 20014*



## Forthcoming Events

### June

*3–4.* **Intestinal Microecology**, 3rd intern. symp., Columbia, Mo. (Conference Section, Continuing Medical Education, M-175 Medical Center, Columbia 65201)

*3–6.* **Tissue Culture** Assoc., 25th annual, Miami, Fla. (M. Siegel, Univ. of Miami, P.O. Box 520875, Biscayne Annex, Miami 33152)

*6–7.* **Geodesy/Solid-Earth and Ocean Physics,** 7th conf., American Geophysical Union, Defense Mapping Agency, Natl. Aeronautics and Space Administration, Natl. Oceanic and Atmospheric Administration, Ohio State Univ. Dept. of Geodetic Science, and U.S. Geological Survey, Columbus, Ohio. (AGU, 1707 L St., NW, Washington, D.C. 20036)

*6–7.* Symposium on **Nutrition and Public Policy,** New York State Nutrition Inst., Ithaca, N.Y. (M. T. Knipe, NYSNI, Savage Hall, Cornell Univ., Ithaca 14850)

*6–7.* **Role of Immunological Factors, Infectious, Allergic and Autoimmune Processes,** 8th Miles intern symp., Miles Labs., Inc., Baltimore, Md. (E. G. Bassett, Miles Labs., Inc., Elkhart, Ind. 46514)

*6–9.* Association for the **Psychophysiological Study of Sleep,** 14th annual, Jackson Hole, Wyo. (D. Foulkes, Univ. of Wyoming, Box 3291, University Station 82071)

*7–10.* Society of **Biological Psychiatry,** Boston, Mass. (I. F. Small, Larue D. Carter Memorial Hospital., 1315 W. 10 St., Indianapolis 46202)

*8–12.* **Nuclear Energy** Conf., European Federation of Chemical Engineers, Paris, France. (Societé de Chimie Industrielle, 80, Ave. du 18-juin-1940, 9500 Rueil-Malmaison, France)

*9–11.* American Assoc. of **Petroleum Geologists,** Rocky Mountain Section, Casper, Wyo. (W. H. Curry III, P.O. Box 3001, Casper 82601)

*9–12.* Society for **Developmental Biology,** 33rd annual, Athens, Ga. (W. S. Badman, SDB, P.O. Box 502, Kalamazoo, Mich. 49005)

*9–12.* **Nuclear Reactors,** 14th intern. conf., Canadian Nuclear Assoc., Montreal, Canada. (J. A. Weller, CNA, Suite 65 Queen St., W, Toronto, M5H 2M5, Can.)

*9–12.* **Public Health Hazards of Viruses in Water,** American Public Health Assoc., Mexico City, D.F. (N. R. Bernstein, APHA, 1015 18th St., NW, Washington, D.C. 20036)

*9–14.* **Geothermal Energy** Conf., Engineering Foundation, Pacific Grove, Calif. (EF, 345 E. 47 St., New York 10017)

*10–11.* **Microanalysis with the Scanning Electron Microscope** Conf., EMventions Microanalysis Lab., Rockville, Md. (J. M. Wehrung, EML, 2351 Shady Grove Rd., Rockville 20850)

*10–12.* Conference on **Laboratory Instruction in Chemistry,** Intern. Union of Pure and Applied Chemistry, Troy, N.Y. (R. L. Strong, Dept. of Chemistry, Rensselaer Polytechnic Inst., Troy 12181)

*10–12.* American **Neurological** Assoc., 99th annual, jointly with Assoc. of British Neurologists, Boston, Mass. (S. A. Trufant, Cincinnati General Hospital, Cincinnati, Ohio 45229)

*10–12.* Conference on **Thermodynamics and National Energy Problems,** Numerical Data Advisory Board and the Natl. Acad. of Sciences, Warrenton, Va. (C. Holley, Los Alamos Scientific Lab., Los Alamos, N.M. 87544)

*10–13.* **Quantum Electronics,** 8th intern. conf., American Inst. of Physics and the Inst. of Electrical and Electronics Engineers, San Francisco, Calif. (D. Edgar, Courtesy Associates, Suite 700, 1629 K St., NW, Washington, D.C. 20006)

*10–14.* **Mathematical Research Conf. on Special Functions,** Natl. Science Founda-

tion, Blacksburg, Va. (J. A. Cochran, Dept. of Mathematics, Virginia Polytechnic Inst. and Virginia Univ., Blacksburg 24061)

*11–13.* **Astronomical Soc. of the Pacific**, Bishop, Calif. (L. E. Salanave, ASP, 75 Southgate Ave., Daly City, Calif. 94015)

*11–13.* **Trace Substances in Environmental Health**, 8th annual conf., Columbia, Mo. (D. Hemphill, 426 Clark Hall, Univ. of Missouri, Columbia 65201)

*11–14.* **Electrodynamics of Substorms and Magnetic Storms**, American Geophysical Union, Bayse, Va. (AGU, 1707 L St., NW, Washington, D.C. 20036)

*11–14.* **Endangered and Threatened Species of North America**, Wild Canid Survival and Research Center, Washington, D.C. (WCSRC, Wolf Sanctuary, P.O. Box 16204, St. Louis, Mo. 63105)

*11–14.* American Soc. of **Mechanical Engineers**, New Orleans, La. (R. B. Finch, ASME, 345 E. 47 St., New York 10017)

*11–14.* Society of **Nuclear Medicine**, San Diego, Calif. (M. Glos, SNM, 305 E. 45 St., New York 10017)

*12–14.* **Endocrine** Soc., Atlanta, Ga. (M. M. Branch, Suite 319, 1411 Classen Blvd., Oklahoma City, Okla. 73106)

*12–14.* International **Microwave** Symp., Inst. of Electrical and Electronics Engineers, Atlanta, Ga. (E. B. Joy, School of Electrical Engineering, Georgia Inst. of Technology, Atlanta 30332)

*12–14.* Canadian **Psychological** Assoc., 35th annual, Windsor, Ont. (M. Bunt, Univ. of Windsor, Windsor II, Ont.)

*12–14.* Society of **Research Administrators**, Northeastern section, New York, N.Y. (L. Lasker, New York Medical College, Fifth Ave. at 106 St., New York 10029)

*12–15.* **Analysis of Lipids and Lipoproteins**, American Oil Chemists' Soc., Washington, D.C. (E. G. Perkins, Dept. of Food Science, Burnsides Research Lab., Univ. of Illinois, Urbana)

*13–15.* Midwestern Conf. of **Parasitologists**, annual, Ann Arbor, Mich. (J. H. Greve, Dept. of Veterinary Pathology, Iowa State Univ., 50010)

*13–16.* Society of **Biological Psychiatry**, Boston, Mass. (I. F. Small, 1315 W. 10 St., Indianapolis, Ind. 46202)

*16–19.* International **Communications** Conf., Inst. of Electrical and Electronics Engineers, Minneapolis, Minn. (A. Cohen, Inst. of Technology, Univ. of Minnesota, Minneapolis 55455)

*16–20.* Canadian **Anesthetists** Soc., St. John's, Newfoundland. (CAS, 178 St. George St., Toronto, Ont., M5R 2M7)

*16–20.* **Medicinal Chemistry**, 14th symp., American Chemical Soc., Durham, N.H. (R. E. Lyle, Dept. of Chemistry, Parson Hall, Univ. of New Hampshire, Durham 03824)

*16–20.* **Photochemistry Conf. Honoring Prof. Francis E. Blacet**, Nashville, Tenn. (T. W. Martin, Box 1506/B, Vanderbilt Univ., Nashville 37235)

*16–21.* American Inst. of **Biological Sciences**, Tempe, Ariz. (A. Kulback, AIBS, 1401 Wilson Blvd., Arlington, Va. 22209)

*16–21.* **Botanical** Soc. of America, Tempe, Ariz. (B. F. Palser, Dept. of Botany, Rutgers Univ., New Brunswick, N.J. 08903)

*16–21.* American **Fern** Soc., Tempe, Ariz. (T. R. Webster, Biological Sciences

Group, Univ. of Connecticut, Storrs 06268)

*16–21.* Society for **Invertebrate Pathology**, 7th annual, Tempe, Ariz. (A. C. Smith, Hawaii BioMarine, No. A102, 4300 Waialae Ave., Honolulu, Hawaii 96816)

*16–21.* International Conf. on **Microscopy**, McCrone Research Inst., Chicago, Ill. (W. C. McCrone, 2820 S. Michigan Ave., Chicago 60616)

*16–21.* **Mycological** Soc. of America, Tempe, Ariz. (C. T. Rogerson, New York Botanical Garden, Bronx, N.Y. 10458)

*16–21.* American Soc. of **Plant Taxonomists**, Tempe, Ariz. (D. E. Stone, Dept. of Botany, Duke Univ., Durham, N.C. 27706)

*16–21.* American **Rheumatism** Assoc., Toronto, Ont., Canada (L. Bonfiglio, ARA, 1212 Ave. of the Americas, New York 10036)

*16–22.* World Confederation for **Physical Therapy**, 7th intern. congr., Montreal, P.Q., Canada. (WCPT, Brigray House 20/22, Mortimer St., London W.1, England)

*17–19.* **Recent Advances in the Analytical Chemistry of Pollutants**, 4th symp., American Chemical Soc. and U.S. Environmental Protection Agency, Basle, Switzerland. (D. M. Hercules, Dept. of Chemistry, Univ. of Georgia, Athens 30602)

*17–19.* **Velikovsky and the Recent History of the Solar System**, Student Academic Freedom Forum, Hamilton, Ont., Canada. (S. L. Talbott, *Pensee Magazine*, Post Office Box 414, Portland, Ore. 97207)

*17–20.* American Soc. for **Engineering Education**, Troy, N.Y. (L. B. Williams, ASEE, Suite 400, 1 Dupont Circle, NW, Washington, D.C. 20036)

*17–20.* American Soc. of **Plant Physiologists**, Ithaca, N.Y. (W. H. Klein, Smithsonian Radiation Biology Lab., 12441 Parklawn Dr., Rockville, Md. 20852)

*17–20.* Canadian **Public Health** Assoc., 65th annual, St. John's, Newfoundland. (C. D. Noble, CPHA, 1255 Yonge St., Toronto, Ont., M4T 1W6)

*17–21.* American Assoc. for the **Advancement of Science** (Pacific Div.), Irvine, Calif. (R. T. Orr, California Acad. of Sciences, Golden Gate Park, San Francisco 94118)

*17–22.* American Soc. of **Ichthyologists and Herpetologists**, Ottawa, Ont., Canada. (R. Highton, Dept. of Zoology, Univ. of Maryland, College Park 20742)

*17–22.* **Phycological** Soc. of America, Tempe, Ariz. (M. J. Wynne, Dept. of Botany, Univ. of Texas, Austin 78712)

*19–20.* **Problem Solving Through Information Management**, Univ. of Pittsburgh, Pittsburgh, Pa. (Director of Continuing Education, 418 Cathedral of Learning, Univ. of Pittsburgh, Pittsburgh 15260)

*19–21.* **Biological Motivated Automata Theory** Conf., McLean, Va. (M. A. Arbib, Dept. of Computer and Information Science, Univ. of Massachusetts, Amherst 01002)

*19–22.* Idaho **Medical** Assoc., Sun Valley. (A. L. Bird, 407 W. Bannock St., Boise, Idaho 83702)

*20.* Symposium on the **Systems Approach: Key to Successful Computer Applications**, Assoc. for Computing Machin-