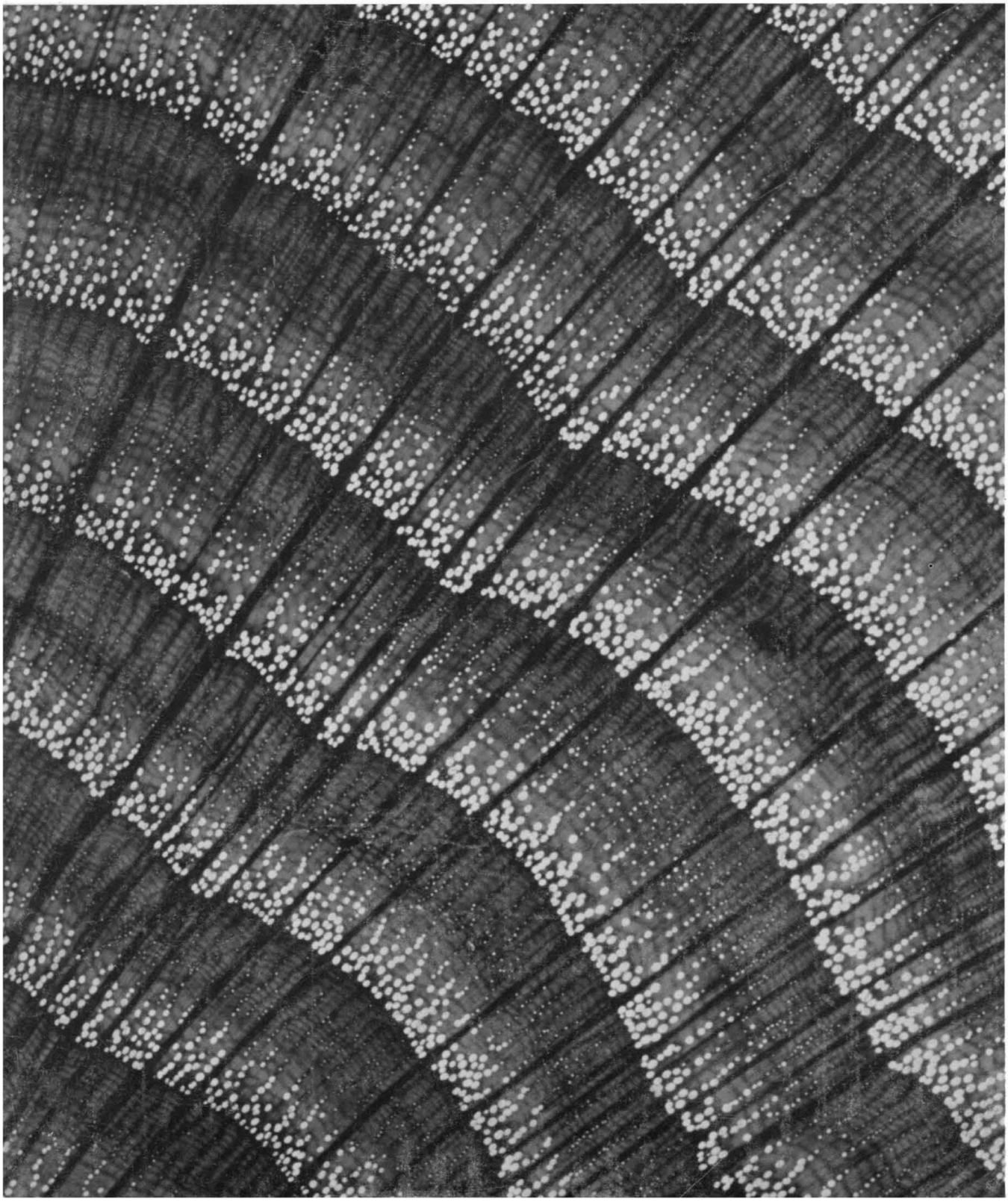
SCIENCE

9 June 1972

Vol. 176, No. 4039

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



THINK SMALL.

The LKB Microcalorimeter adds a new dimension to your research. It measures extremely small amounts of heat. This gives you the opportunity to determine fundamental thermochemical properties such as enthalpy and entropy on the basis of the heat generated or absorbed in a biological or biochemical reaction. You can also use the heat measurement for analytical purposes, or for the determination of overall levels of metabolism.

Some examples of applications of the LKB Microcalorimeter are: determination of bonding energies and stability constants for protein-protein interactions; studies of the overall metabolism of microorganisms and its relation to growth and respiration; studies of the metabolism of bacterial cultures and its correlation with specific protein synthesis; measurements of blood metabolism, for diagnosing thyroid dysfunction.

The commonly available heat in biological reactions has been disregarded as a parameter for analysis, due to the lack of reliable, simple-to-operate instruments. However, now that such instruments are available you really have the possibility of gaining an insight into a number of processes which have, so far, been difficult to measure in a direct fashion; for example, enzyme activity measurements on cell or tissue suspensions.

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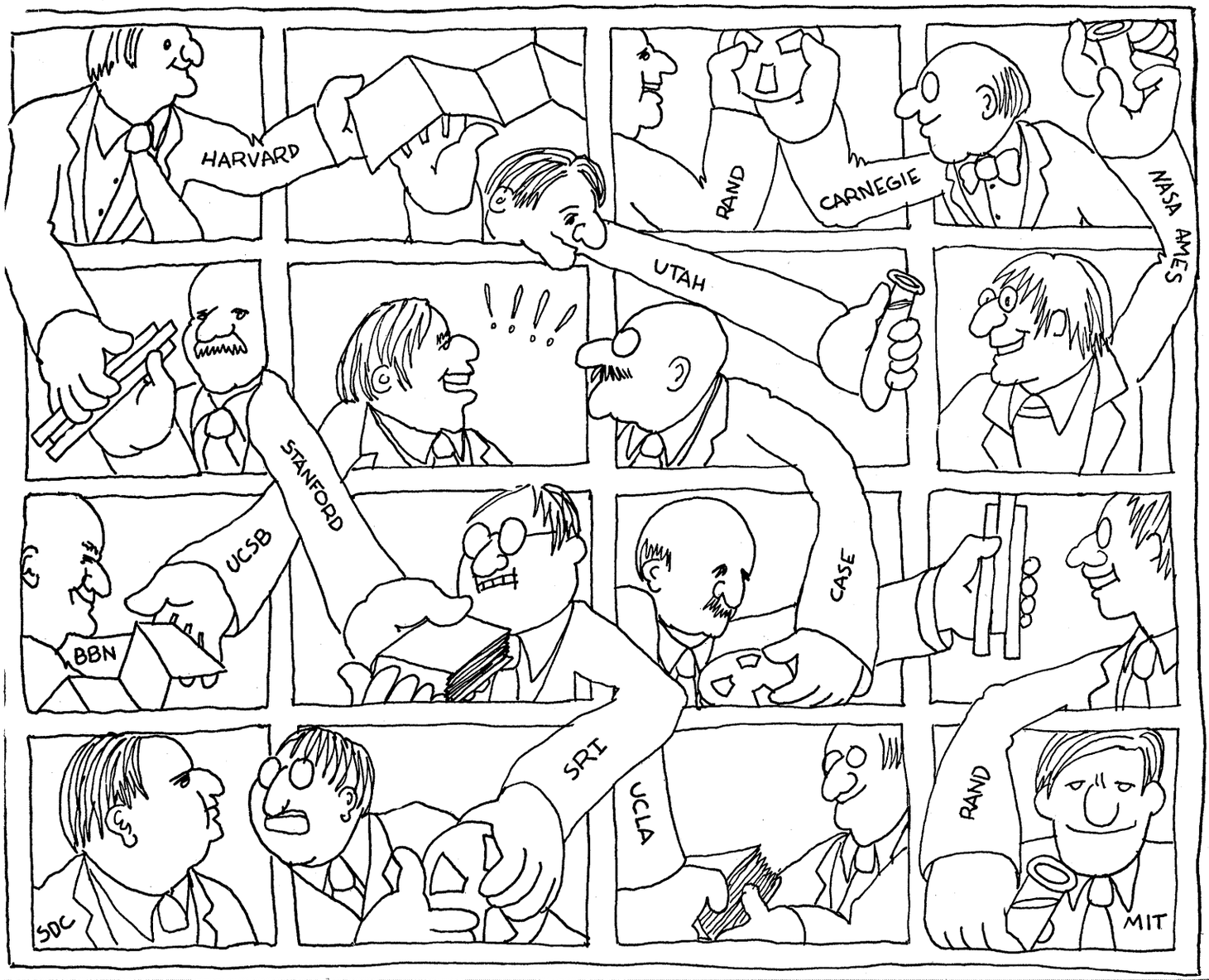

ARPA has a network of Supercomputers.

There are two dozen huge computer systems in the Advanced Research Projects Agency network.

Over half of them are DECsystem-10s. Our Supercomputer. MIT has two. So does Utah. Then there's Harvard, BBN, Carnegie, Case, SRI, Stanford and Rand.

Which should give you some idea of how popular our DECsystem-10 really is.

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DECsystem-10 Scientific Group. Digital Equipment Corporation, 146 Main St., Maynard, Mass. 01754. (617) 897-5111.

digital

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9 June 1972

Vol. 176, No. 4039

SCIENCE

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AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Cross section of pin oak wood (about × 5.5). A column of water supported only by atmospheric pressure can be only 10.3 meters high. Since trees grow higher than this, the ascent of sap in the xylem must be due to another mechanism. Tension has been assumed to be the mechanism, but a new theory is proposed. See page 1129. [From *Patterns of Life: The Unseen World of Plants;*]

We've improved our 4x5 films so much

Obviously, this extraordinary offer is a result of changes in our 4x5 films.

We've made complex changes. Chemical adjustments in our black and white films have improved their quality and sensitometry.

And we've made simple changes—such as venting the color film packet to let air escape when you pull the packet out of the holder. This change improved the film's color saturation and sharpness.

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So we've introduced extra-sturdy boxes and put a three-eighths-inch layer of polyurethane foam in each to protect the film. While we were at it, we color coded the new boxes. Now you can tell at a glance which of the five films you're working with.

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that now we can guarantee your results.

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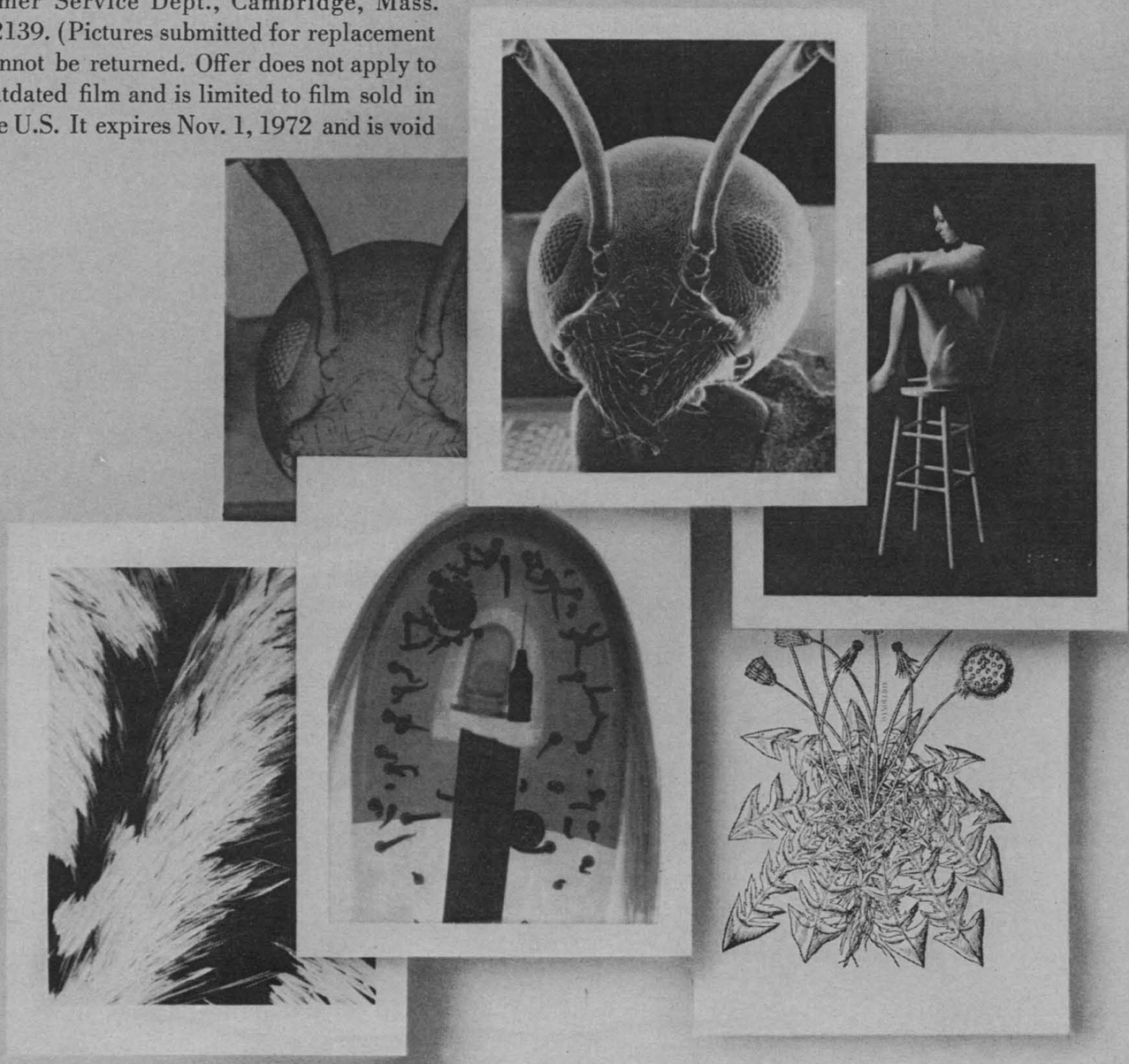
3. You can call us collect. The toll-free phone number is 617-547-5176, and it's in every box if you need it. This direct line to Polaroid for technical assistance is available to you as often as you wish, regardless of the kind of camera or equipment you own or the type of Polaroid instant films you are using.

You'll find the full details of this program in every box of Polaroid 4x5 film.

We've been working hard to perfect our films. And we want to do anything we can to help you perfect your skills.

Polaroid 4x5 Land Films



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Contest year.

Material must have been published within the United States, October 1, 1971 thru September 30, 1972.

Deadline for submitting entries is October 10, 1972. For entry blanks and detailed rules, contact Grayce A. Finger, (Dept. F), American Association for the Advancement of Science, 1515 Massachusetts Ave., N.W., Washington, D.C. 20005.

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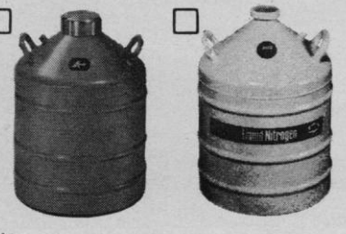

Evaporation rate (liters per day)	0.42	1.24
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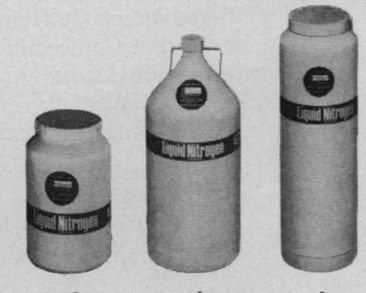

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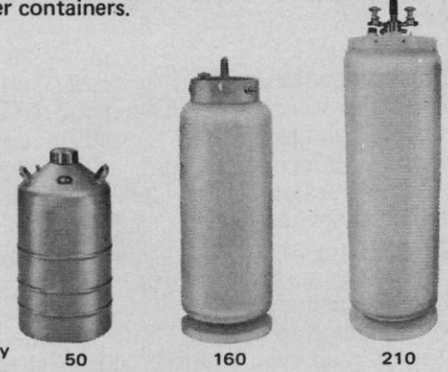

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Filled Weight (pounds)	130	503	625

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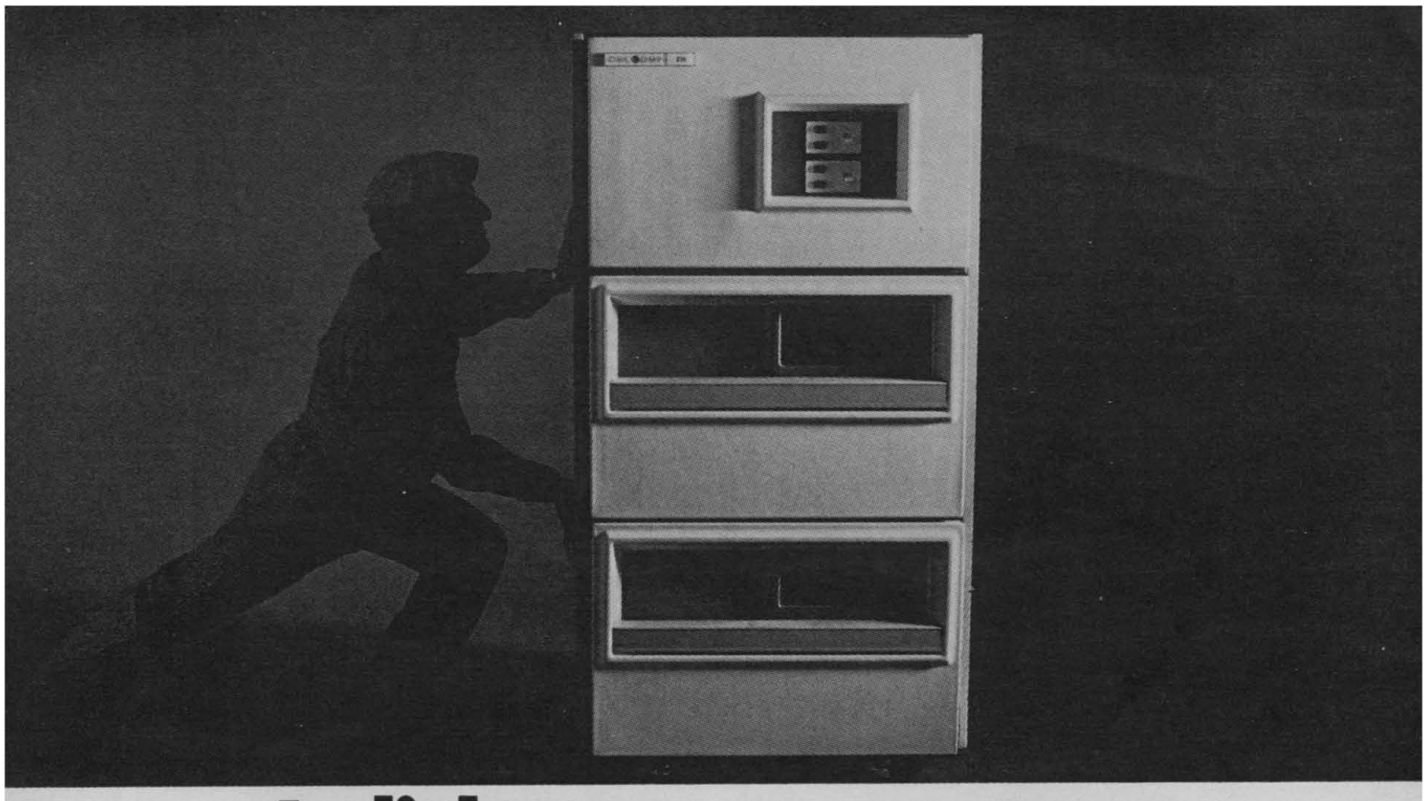

A disk storage system for people in between Courtesy Chevrolet and General Motors.

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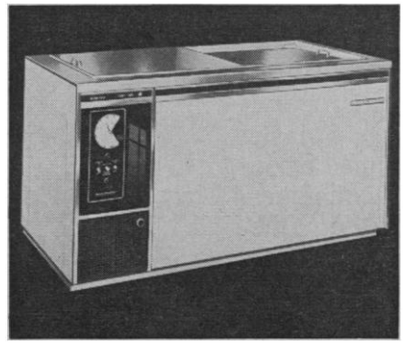
What's good about the chest model? It gets colder. And the top can give you some more work surface. And here too we've come up with a great way for you to identify the location of everything that's in it.

More. Both have automatic alarm systems and 2″ portholes to accommodate recorders. More importantly, both carry the name Kelvinator Commercial. The company that knows how to give you the best cold you ever had.



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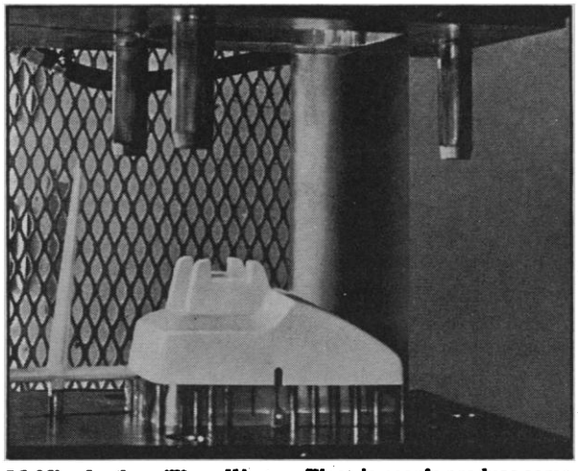
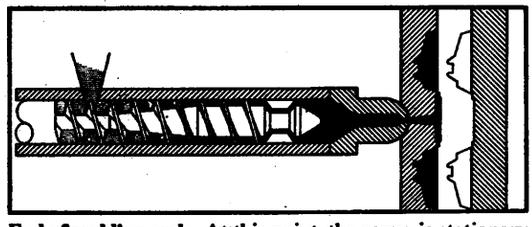
WESTERN ELECTRIC REPORTS



Molding by the millions. Western Electric people produce some 8 million phones a year. Molded plastic is used for housings and many other parts. So there is a constant investigation into the most effective way to use these materials.

$$A^*(z,t) = A_e^*(z) - [(A_f^* - A_i^*)/(1 - e^{-\beta N t_r})]e^{-\beta N t}$$

In developing the model at Western Electric's Engineering Research Center, it was found that melting behavior can be described by this formula which includes terms for shear heating and conduction heating effects. Other models were developed for temperature and pressure profiles.



End of molding cycle. At this point, the screw is stationary and heat is conducted into the plastic on the screw. After the plastic solidifies, the mold is opened as shown. The parts can then be ejected.

Solving the mysteries of molding with mathematics.

Even though plastics have been around for many years, there's still a lot to be learned about these versatile materials and their processing. So they are the subject for continuing studies by our engineers.

Some of their recent investigations have brought forth new and highly useful information about a relatively unexplored area: the melting behavior of plastics in the injection molding process.

One result of these studies is the mathematical formula, or model, above.

The model helps us predict melting behavior along the length of the injection screw molding machine used to mold telephone housings and other parts. Melting behavior is extremely important, because plastic pellets should be completely melted but not thermally decomposed before injection into the mold.

This information on melting is then used to investigate screw designs, operating conditions, machine sizes and plastic properties. All of which is aimed at obtaining optimum processing techniques.

Predictions obtained from the mathematical model have checked out closely with experimental observations. So the resulting screw designs are now undergoing evaluation by engineers at our plants in Indianapolis and Shreveport.

Conclusion: For new designs and materials, the model can help reduce the development cost for new molded parts and materials. For manufacturing current products, operating costs can be reduced.

Perhaps most significant is that we're getting information about molding temperatures not available experimentally. And many other types of information can be obtained without the use of costly, time-consuming experimental work.

The end result will be more efficient plastic molding and therefore a better product for the lowest possible cost.

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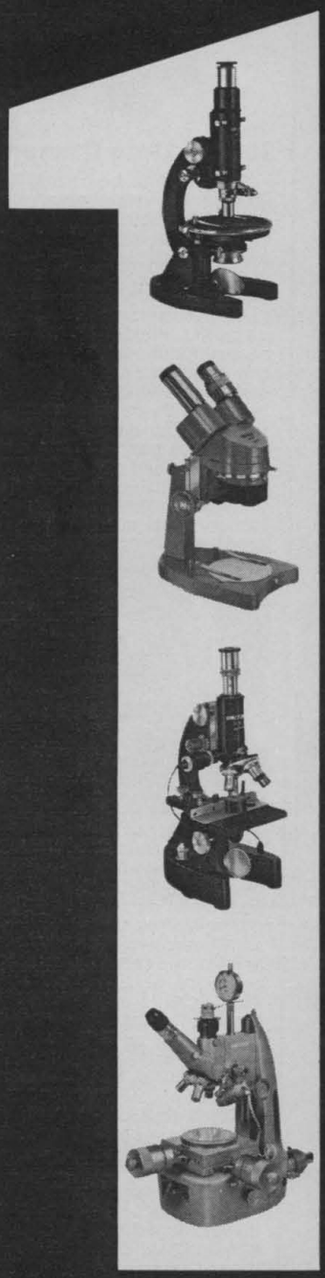

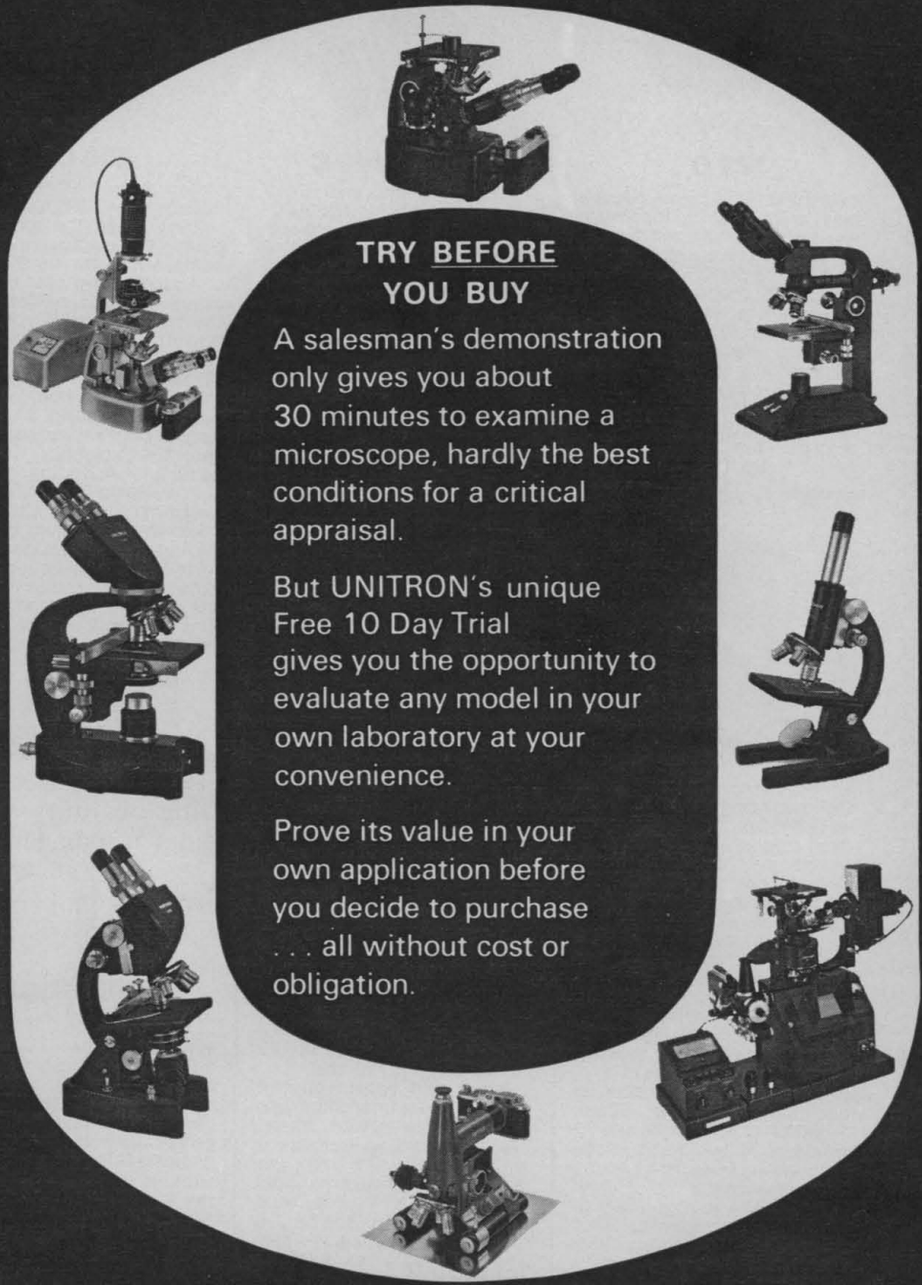

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To do many different jobs
NASA chose many different cameras. Hasselblad.

500 C

In 1962 NASA chose Hasselblad to be used by the Astronauts on manned spaceflights.

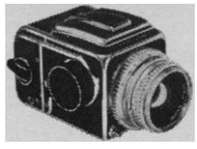
The first Hasselblad to go up was the 500C, aboard the Mercury Spacecraft Sigma 7. The camera has an 80mm Zeiss Planar f2.8 lens and 12-exposure magazine. All components are interchangeable.

The famous first walk in space by Astronaut Edward White, aboard Gemini 4, was recorded by Command Pilot James McDivitt, using a 500C.

NASA chose Hasselblad for the space program because of its legendary reliability, quality of results, ease of operation (Astronauts are not professional photographers) and scope as a photographic system. These same characteristics have made Hasselblad the choice of discriminating photographers on earth.

A Hasselblad camera is what you make of it. Snap on a super wide angle Zeiss Distagon 40mm lens, a 24-exposure magazine and an eye-level prism finder, and it becomes one thing. Switch to a Zeiss Tele-Tessar 500mm lens, a 70-exposure magazine, a pistol grip—and it becomes something else again.

That's why photographers of all kinds—commercial, advertising, news, scientific, industrial, amateur—all satisfy their diverse photographic needs within the Hasselblad System.



500 C/M

Super Wide C

For four years and eight manned spaceflights, the 500C was *the* Hasselblad space camera.

Then in 1966, a second Hasselblad was added. The wide angle Hasselblad SWC, with its 38mm Zeiss Biogon lens.

It made its first flight aboard Gemini 9, where Astronaut Eugene Cernan used it on his 2 hour space walk. During that walk the camera operated flawlessly in total vacuum.

An exciting glimpse of life inside the capsule was also made possible by the SWC, because of its sweeping 90-degree angle of view and great depth of field.

On earth the SWC is used by industrial, architectural, landscape and amateur photographers. The SWC allows them to work indoors and out, at extremely close quarters, with extraordinary sharpness from corner to corner and incredible depth of field (from 26 inches to infinity at f22).

News and sports photographers make interesting use of the unique features of the SWC by presetting it, snapping on 70-exposure film magazine, then using it to take grab shots when there isn't time to focus.

The versatility of the SWC is extended by the use of interchangeable film magazines and other components of the Hasselblad System.

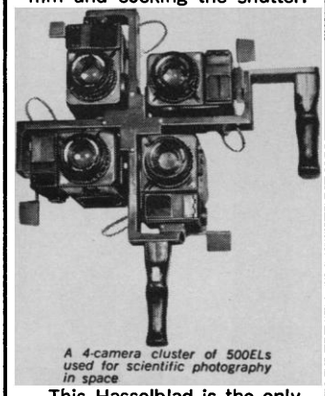
Super Wide C

500 EL

Two and a half years later, in December 1968, a third Hasselblad joined the space program—the electrically-driven 500EL. The event was the flight of Apollo 8. Two 500ELs went along—one with an 80mm lens, the other with a Zeiss Sonnar 250mm lens—plus 7 interchangeable 70mm magazines.

This was the first time that men journeyed from earth to orbit another world. The photographs from this voyage were essential in planning the forthcoming lunar landing.

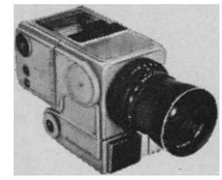
The Hasselblad 500EL allowed more photographs to be taken with less effort, because no film winding was necessary. After each exposure the 500EL automatically readies itself for the next shot by advancing the film and cocking the shutter.



A 4-camera cluster of 500ELs used for scientific photography in space

This Hasselblad is the only electrically-driven 2¼" camera on earth. Because of its automatic features, it can be sucessfully operated from a distance, freeing the photographer from the camera and allowing him to work more with his subject. That's part of the reason why the Hasselblad 500EL/M has won the esteem of advertising and publicity photographers, as well as sports, wildlife, industrial and scientific photographers.

500 EL/M



500 EL Data Camera

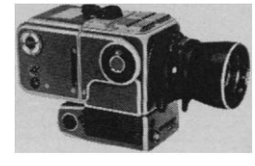
But the first camera to be used on the moon wasn't the Hasselblad 500C, or the SWC, or even the 500EL. It was a fourth Hasselblad—the 500EL Data Camera, with Reseau plate and Zeiss Biogon 60mm f5.6 lens. A photogrammetric camera, whose tiny cross-shaped index marks appear on the negative, making it possible to measure distances and heights with great accuracy.

When Astronaut Neil Armstrong took man's first walk on the moon, on July 20, 1969, the Hasselblad 500EL Data Camera was there with him, attached to his chestpack.

The 500EL Data Camera proved so valuable that an earth version—the MK70—was developed and is the newest addition to the System.

The MK70 fills a need for a small, easy-to-handle photogrammetric camera capable of producing exceptional results. The MK70 is the ideal photographic tool for use in applied engineering and construction work, as well as for mapping, architectural, industrial and medical photography.

For a free copy of the 48-page Hasselblad catalog, describing all the different cameras and accessories of the Hasselblad System, write Paillard Incorporated, 1900 Lower Road, Linden, N. J. 07036. Other products: Bolex movie equipment, Hermes typewriters and figuring machines.



MK70

It takes more than one camera to make a system.

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The PDS/3.
Data reduction (and more).
For true DPM (and more). In liquid scintillation counting (and more).

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Dual-labeled, single-labeled, or intermixed samples—just load the sample changer and the PDS/3 does the rest.

With it's own adaptable software, the PDS/3 yields results that used to require large-scale data processing facilities. And remember, it's not limited to liquid scintillation applications.

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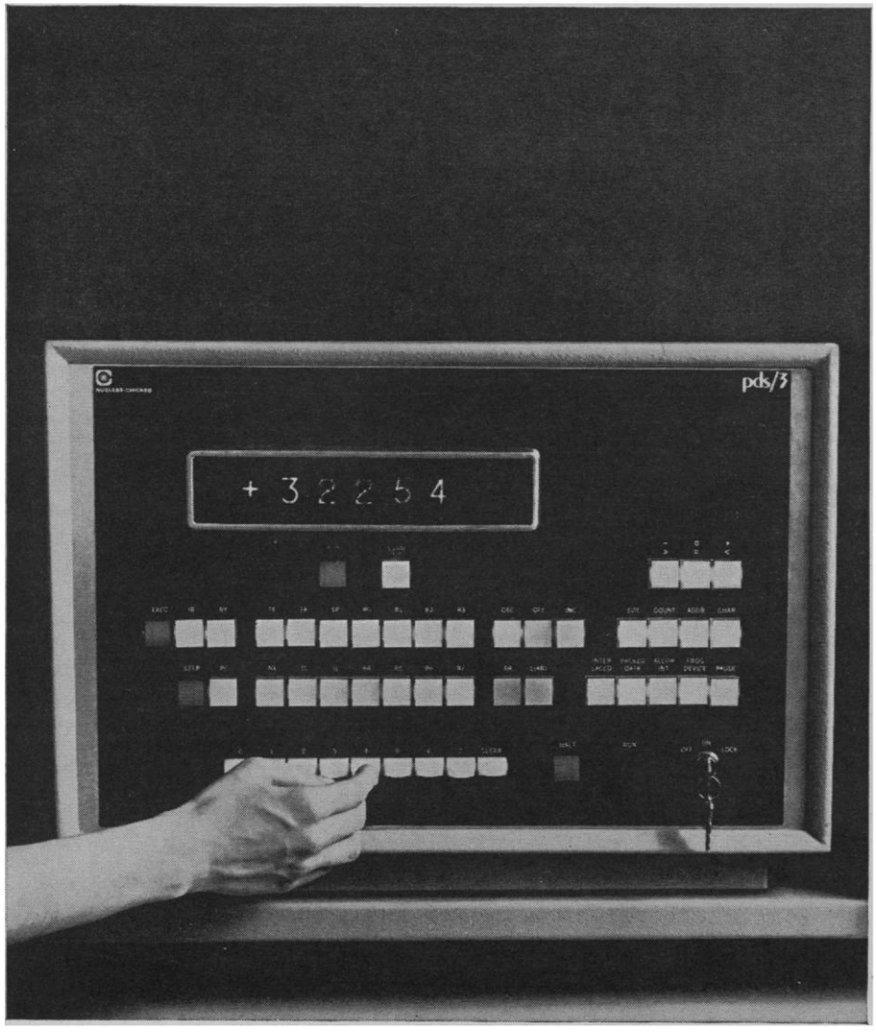

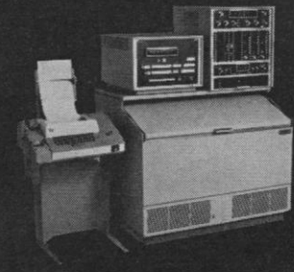

The Mark II
Liquid Scintillation System.

The New Isocap/300
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Both shown with the
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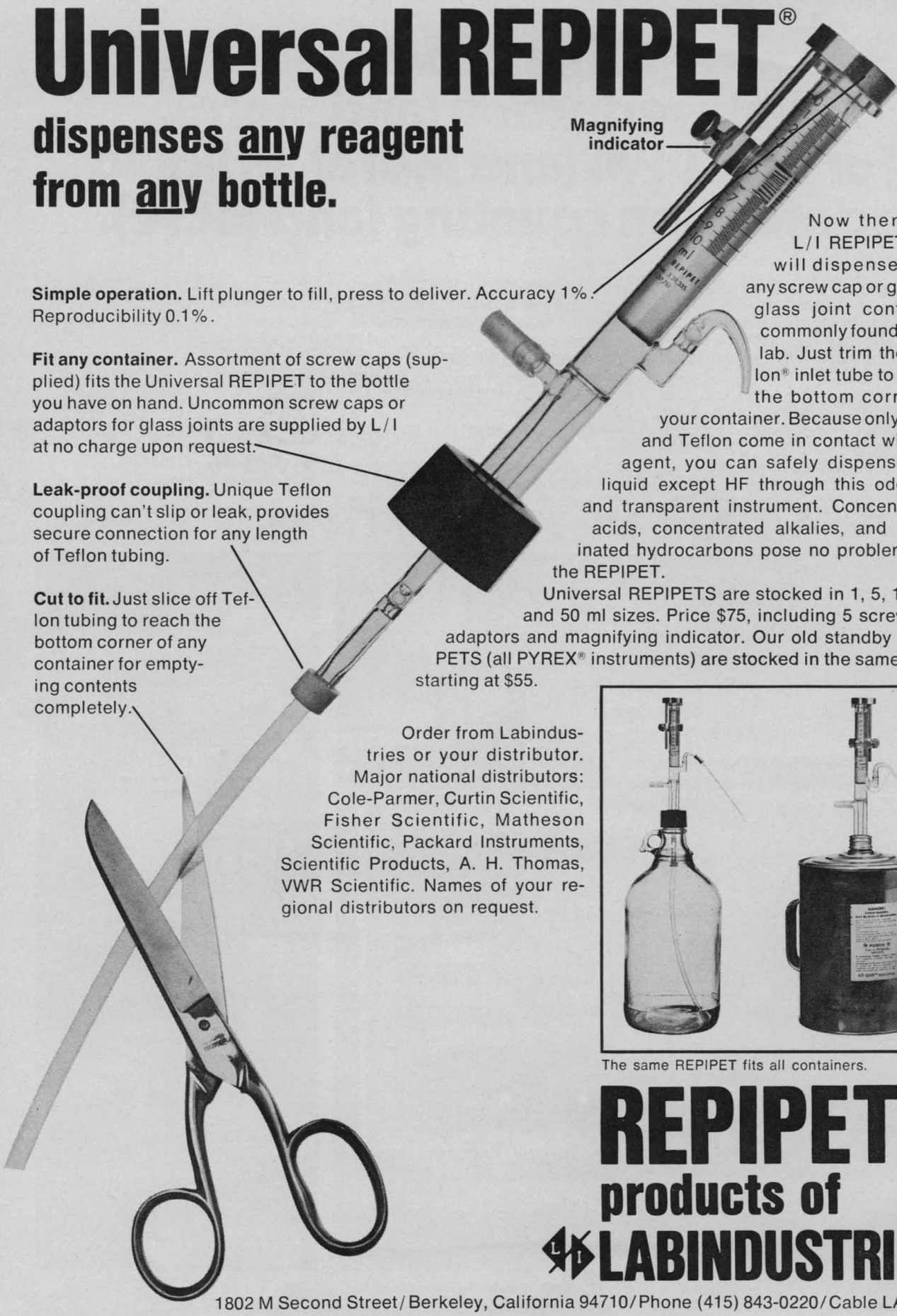
Universal REPIPET®

dispenses any reagent from any bottle.



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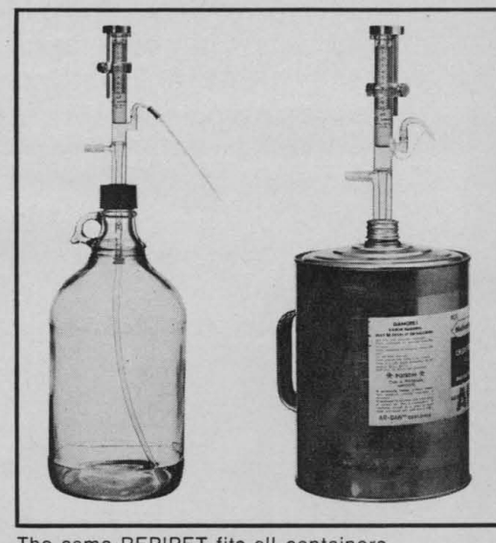

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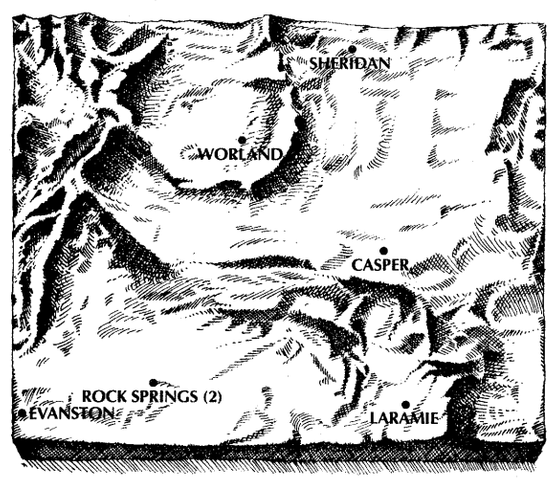

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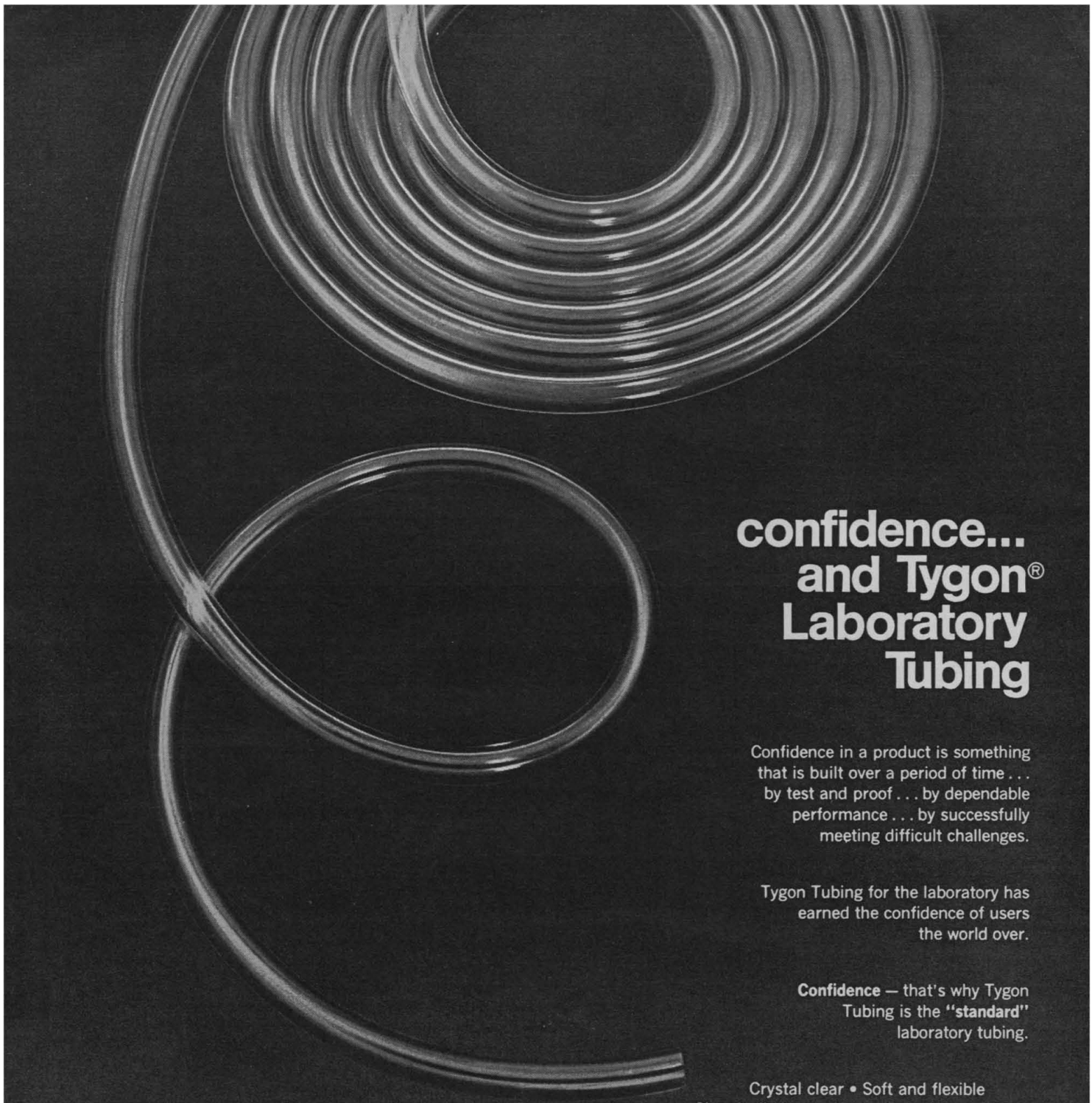

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who continue to violate the inexorable laws of nature would be to allow the endless settlement and development of every floodplain on every river in the country, with the result that each stream could then be encased in concrete from its headwaters to its delta mouth, at public expense.

According to the same logic, we should import gold and ore-bearing rocks from elsewhere so that Montana's metal mines could continue to sustain the communities that are dependent upon them. It would also follow that the United States should be obligated to reimburse the untold thousands of homesteaders who failed in their attempts to establish 160-acre farms on the arid Great Plains.

I hope the AAAS Committee on Arid Lands will fully assume its social responsibilities by clearly defining the natural constraints to which our species must accommodate if we are ever to have a sustained and productive coexistence with nature.

GEORGE DARROW
Montana State House of Representatives, District 9, Box 2001, Billings 59101

Mercury Compounds

G. F. Wright (Letters, 19 Nov. 1971, p. 771) gives additional support—although uncontrolled—to the already well-known fact that monoalkyl mercury compounds behave differently from dialkyl mercury compounds and from the aryl mercury compounds (mentioned as diuretics) in biological systems.

The recalcitrant monomethyl mercury entity (present in fish and used as seed dressing) has a biological half-life of about 70 days in man, whereas mammals rapidly excrete dimethyl mercury and aryl mercury compounds when exposed to them. The distribution in the body as well as the biological effects are also very different.

It is not advisable to take a 1-gram intravenous injection (or oral dose) of monomethyl mercury if one wishes to enjoy a meaningful life.

ERIK ARRHENIUS
GÖRAN LÖFROTH
CLAES RAMEL
Wallenberglaboratoriet, University of Stockholm, Lilla Frescati, S-104 05 Stockholm 50, Sweden

I fully agree with George Wright. He has been extremely lucky. Of all the mercury salts he mentions, not one is outside the class of dialkyl mercury salts. It has been said for some time, for example, that dimethyl mercury is biologically inert (*1*). Monomethyl mercury, however, has been implicated as a deadly environmental poison. The metabolic conversion of dimethyl to monomethyl mercury in the mammalian organism is reported to be less than 10 percent. To my knowledge, only the higher monoalkyl mercury salts ethyl mercury and propyl mercury, are toxic. The body finds it easy to metabolize the dialkyl and higher monoalkyl salts, breaking the carbon-mercury bond and rendering these lipid-soluble agents harmless in the low concentrations of inorganic mercury presented to the brain. The body cannot, however, metabolize the lower monoalkyl mercury salts.

Undoubtedly there is an element of biological variability involved in susceptibility to these compounds, but it is not rational, in the face of overwhelming evidence, to consider individual susceptibility as large a factor in

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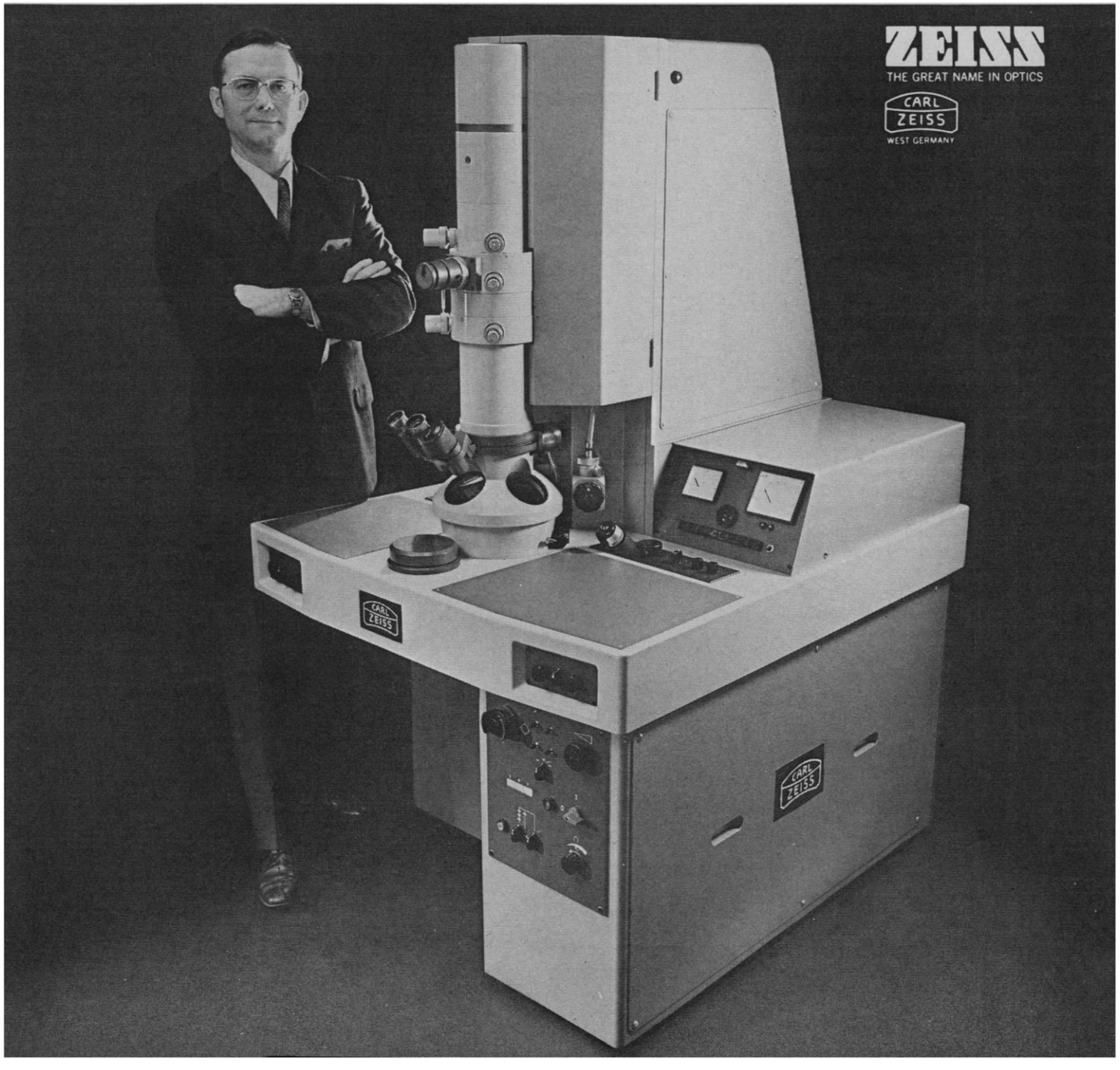

gross toxicity as Wright implies. (It may be, however, that intellectual capability is lessened in those who are susceptible to the effects of such heavy metal compounds. More obvious would be the effect in younger organisms, whose intellectual capacity is forming. All men may be created equal but metabolize differently.)

MURRAY S. JACOBSON
33 East Elm Street,
Chicago, Illinois 60611

Reference

1. L. Fishbein, *Chromatogr. Rev.* **13**, 100 (1970).

We should like to offer the following criticisms of George Wright's letter:

1) Experience with dibutyl homolog cannot be extrapolated to the short-chain alkyl mercurials. The toxicity of the alkyl mercurial diminishes sharply when the carbon chain exceeds three carbon atoms.

2) Wright does not state the air levels in his experiments with rats exposed to dimethyl mercury. He does not record any blood levels. It seems impossible from the data he supplies to estimate the dose to the rats or the amount of mercury absorbed by these rats.

3) Wright does not draw any distinction between organomercurials and alkyl mercurial compounds. The alkyl mercurials are unique in their toxic effects. Probably the main reason for this distinction is that the alkyl mercurials are metabolically stable in contrast to all the other mercurial compounds, which break down rapidly to inorganic mercury.

4) Wright makes the point that in some experiments at Iowa State University it was found that the absorption of mercury was balanced by elimination. We do not see what this has to do with toxicity. It is well established that people exposed to methyl mercury reach an approximate state of balance in 1 year. For example, those who regularly ingest 300 micrograms per day will have a steady-state body burden of 30 milligrams after approximately 1 year. Those who ingest 30 micrograms per day will have a steady-state body burden of 3 milligrams. Both individuals will be in steady state, that is, in elimination and absorption balance. But one will have ingested a toxic dose and the other will not.

5) Wright's reference to penicillin is misleading. Penicillin is lifesaving in many situations, and therefore the risk of adverse response to penicillin is well worth taking. Although swordfish and tuna fish are important sources of food, they are certainly not lifesaving.

Very little is known of the efficiency of pulmonary absorption of alkyl mercury compounds. Wright quotes cases of undefined human and animal exposure in which no adverse effects were reported. In rebuttal, one might quote cases where serious or fatal poisonings have resulted from inhalation. The first two fatal cases to be reported were chemists who synthesized dimethyl mercury back in the 1860's. Last year a similar tragedy took place in Czechoslovakia. Many more cases are known of serious poisonings due to occupational exposure to the vapor or dust (*1*). However, the whole issue is misleading when raised in response to our present concern with the presence of methyl mercury compounds in certain foodstuffs—a concern stemming from the epidemics of poisoning in Minamata and Niigata, Japan, that resulted from the ingestion of contaminated fish. Absorption of methyl mercury compounds from food has been carefully measured in both animals and human subjects. All the ingested mercury is absorbed into the blood stream.

We agree that the majority of people do not face a significant hazard from the presence of methyl mercury in food. The average daily dose, according to our estimations, is about 6 micrograms of mercury per day as methyl mercury compounds; this is below the advised safety limit of 30 micrograms per day and very much below the estimated lowest toxic intake of 300 micrograms per day. The question is how to protect the few who, because of unusually high consumption of certain types of fish, are ingesting methyl mercury at an average daily rate of more than 30 micrograms per day. Wright's letter poses the question, but contains nothing that would help our overextended government agencies supply the answer!

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LASZLO MAGOS
Toxicology Unit, MRC Laboratories, Carshalton, Surry, England
GEORGE G. BERG
Department of Radiation Biology, University of Rochester

Reference

1. L. Friberg *et al.*, *Nord. Hyg. Tidskr.* **52**, Suppl. 4 (1971).

Wright is evidently unaware of K. Östlund's work (*1*), in which the drastically different metabolic pathways

of dimethyl mercury and methyl mercury in mice are clearly demonstrated. Dimethyl mercury, being fat-soluble and nonionizable, is taken up by the fatty tissues and rapidly eliminated via exhalation, while the ionizable methyl mercury, when orally ingested, has a high retention rate (95 percent in man) and is concentrated, in cases of chronic intake, in the central nervous system, especially in the brain.

Wright also seems unaware that the behavior of methyl mercury in the body is quite different from that of the diuretics, which are relatively easily eliminated via the urine, either unchanged or, after breakdown, as inorganic mercury. The use of diuretics is also not without risk and has led to many fatal cases of "mercurialism" (*2*).

Wright wants to see evidence in support of the limit of 0.5 part per million set for the mercury content of fish. Such evidence is extensively described in the report "Methyl mercury in fish" (*3*), and also, quite adequately, in the report of Norton Nelson's study group (*4*).

These reports also describe the fatal poisoning of large numbers of Japanese fish-eaters, who frequently consumed fish with an average mercury content (on the basis of fresh weight), during certain periods, of approximately 10 parts per million (as methyl mercury). Tuna and swordfish contain considerably less, about 0.3 and 1.0 part per million, respectively, but 86 percent of the total mercury in tuna is in the form of methyl mercury (*5*). The average mercury content (on the basis of fresh weight) of some species of fish taken from polluted lakes in Canada and Scandinavia is 3 to 6 parts per million (as methyl mercury). Although scarcely any clinical cases of methylmercurialism have been diagnosed in these countries as yet, evidently because of the lower mercury content of fish and more especially the fact that less fish is consumed here than in Japan, nevertheless, the margin of safety was in many instances alarmingly narrow before the application of the "action limit."

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00170 Helsinki 17, Finland

References

1. K. Östlund, *Acta Pharmacol. Toxicol.* **27**, Suppl. 1 (1969).
2. C. V. King, Ed., *Ann. N.Y. Acad. Sci.* **65**, 357 (1957).
3. L. Friberg *et al.*, *Nord. Hyg. Tidskr.* **52**, Suppl. 4 (1971).
4. N. Nelson *et al.*, *Environ. Res.* **4**, 1 (1971).
5. G. Westöö, *Var Föda* **21**, 99 (1969).

9 June 1972, Volume 176, Number 4039 **SCIENCE**

Changes in Latin America

Because of their significance, we should be aware of happenings in Latin America. Most of us have read of a population explosion there. Less well known has been a continuing, rapid migration to the major cities, which is creating social dynamite. At the same time, there have been constructive changes, and it is possible that at least some, if not most, Latin American countries will escape disaster. A basis for hope is the progress most of the countries are making in education and in changing the social structure.

The changing order in Latin America has given advantages to the larger countries, as compared with the smaller ones. Countries such as Brazil, Argentina, and Mexico have internal markets of sufficient size to facilitate the establishment of industrial capacity, and many plants have been located there. The larger countries also have a greater variety of natural resources to draw on. In contrast, a small country such as Uruguay is severely handicapped, both as to size of market and as to resources.

Of all the countries of South America, Argentina has progressed most. It has a literacy rate of 92 percent; reproduction is slowing; resources are present to provide for a larger population; and industrialization is proceeding. Though support for scientific research has been poor by our standards, two Argentine scientists have received Nobel prizes.

The most dynamic country in South America today is Brazil. During the past several years, its gross national product has been growing at the rate of about 9 percent; in 1971, it grew 11 percent, and talk of the "miracle of Brazil" has begun. On the average, Brazil is not nearly as advanced or as literate as Argentina. In the torrid, dry, northeast region of the country, some 30 million people live in poverty; about half of them have a yearly cash income of less than $50. It is in the southern, more temperate region that industry is booming. Production of steel is increasing rapidly and is projected to reach 8 million tons in 1975. Brazil has begun to export motor vehicles. Last year, several million dollars' worth of precision parts for aircraft were exported to the United States.

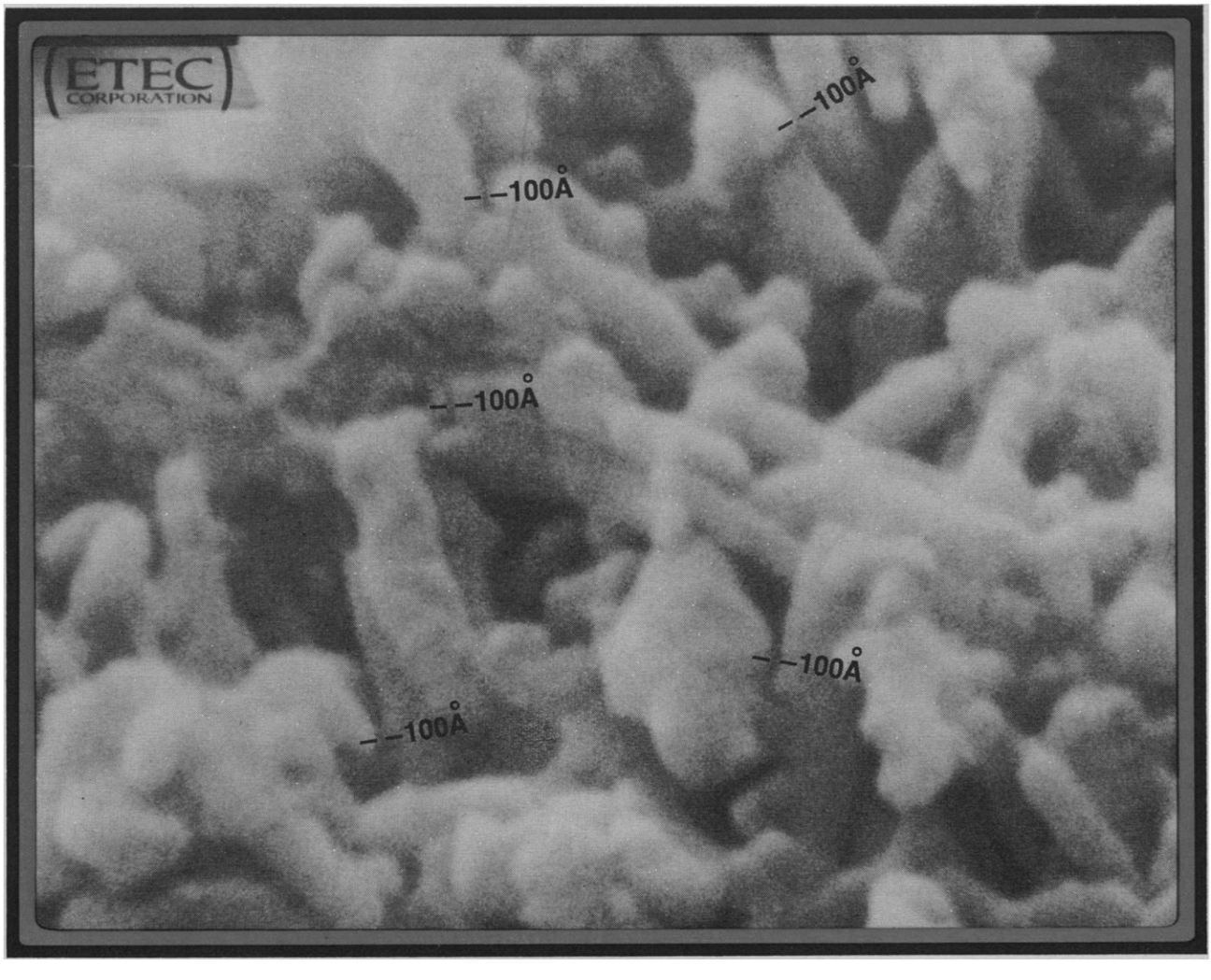
One of the largest Brazilian efforts has been in education. Resources devoted to education have doubled during the last 5 years. During the past 8 to 10 years, the number of students receiving higher education has increased by 500 percent. The tradition of education for the few has been abandoned.

Brazilians have a flair. The great wholesale food distribution center in São Paulo is unsurpassed in convenience, size, and cleanliness. It makes comparable centers in the United States look anachronistic and grubby. Similarly, their huge international exhibit hall outclasses most of ours. The big shocker is the new capital, Brasília. Its construction in the midst of nowhere has opened up a vast region. Its architecture and the city plan are highly imaginative and striking.

By reason of Brazil's geography, the present dynamism of the country could have profound consequences on the rest of South America. Brazil borders every country of the continent except Chile and Ecuador, and its neighbors are highly sensitive to the changes that are occurring. To varying degrees, they are apprehensive and envious of the Portuguese-speaking giant. But they are more likely to look to Brazil as an example than to the United States.

Latin America is on the move. Great changes will be occurring in the next decades. Some we will applaud. Others we will dislike. In either case, we should be aware of the latent power of our southern neighbors.

—PHILIP H. ABELSON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arthropods, although interesting initial studies on an apparent genetic variability in responses of mouse strains to the louse *Polyplax* were presented by the staff of the Rocky Mountain Laboratory.

The immune response of guinea pigs to the cat flea (*Ctenocephalides felis*) has provided a basis for understanding the responses to other blood-sucking arthropods with a discrete period of host contact; examples are mosquitoes, black flies, and biting midges. The response, which progresses from initial nonreactivity through delayed dermal hypersensitivity to immediate hypersensitivity and finally to nonreactivity, is mediated by a hapten of low molecular weight, which requires conjugation with skin collagen before it becomes immunogenic. Each phase of the host reaction may influence the ability of an arthropod-transmitted pathogen to become established. Thus, in a delayed hypersensitivity response to flea salivary hapten, the mononuclear cell infiltrate may provide a milieu that favors growth of the plague bacillus. In an immediate response, scratching and rubbing induced by pruritis may assist entry of disease agents, as in Chagas disease, or microvascular dilation may permit easier access for organisms to the systemic circulation.

In the case of arthropods with long-term host contact, such as ticks, host responses directly or indirectly reject the vector, although the mechanisms are poorly understood. Notwithstanding, these responses are important in disease transmission, especially with agents (for instance, *Babesia* and *Theileria*) that proliferate and reach the infective stage in the salivary glands during engorgement of the tick. With immune hosts, the stage of tick development required for disease transmission may not be reached.

Discussion of such topics identified future research areas with public health importance. With respect to the arthropod, study is needed of genetic variability in vector capacity. Techniques such as isoenzyme analysis were suggested to measure population heterozygosity in species in which conventional genetic analysis is not feasible. A closer study of arboviruses in mosquitoes (for example, genetic variation in the response of *Aedes triserialis* to the agent causing California encephalitis) or studies of *Plasmodium* species in *Anopheles* would be profitable. Greater emphasis is required on tick physiology, especially the neurosecretory and hormonal systems.

A special need is the isolation and chemical and neurophysiological characterization of tick toxin. With respect to the host's response to arthropod bites, delineation of the classes and subclasses of immunoglobulins in the immediate hypersensitivity reactions is required, as is the differentiation between delayed, cell-mediated hypersensitivity and basophil cell responses. Oral secretions of arthropods need to be isolated and characterized immunologically and pharmacologically. A closer study of the cell types and tissue reactions at the bite site is required and physiological studies of the microvascular changes at this site and the adjacent area are warranted.

Such research would add to an understanding of the infection process in systems of arthropod vector, parasite, and host. Novel measures for disease control might result through, for example, desensitization of hosts to arthropod bites, immunization against ticks or mites, and genetic manipulation of vectors. Multidisciplinary approaches are needed to these research problems through active collaboration of different scientists, especially of entomologists, insect physiologists, biochemists, geneticists, immunologists, microbiologists, or parasitologists. In view of the many unexplained significant differences in annual and regional occurrences of vector-borne infections, several systems of host, vector, and infectious agent require attention and research.

E. J. L. SOULSBY
WILLIAM R. HARVEY
School of Veterinary Medicine, University of Pennsylvania, Philadelphia 19104, and Department of Biology, Temple University, Philadelphia 19122

Spontaneously Hypertensive Rat

A seminar on the spontaneously hypertensive rat was sponsored jointly by the National Science Foundation and the Japanese Society for Promotion of Science. The seminar was held in Kyoto, Japan, from 18 to 22 October 1971. In addition to the participants from Japan and the United States, the seminar was also attended by observers from Czechoslovakia, New Zealand, Sweden, Switzerland, Yugoslavia, and West Germany.

Genetic strains of hypertensive animals offer certain advantages as experi-

mental models of hypertension, as the hypertension develops without the intervention of either surgery or other manipulatory practices. By selective breeding, a colony of spontaneously hypertensive rats was developed in the laboratory of Professor Kozo Okamoto, Department of Pathology, Kyoto University, School of Medicine, Kyoto, Japan. With the cooperation of Professor Okamoto, a colony was established at the National Institutes of Health in 1966, under the supervision of Dr. Carl Hansen. From that initial colony in Bethesda, Maryland, there now exist some 40 groups throughout the United States that have established colonies of these hypertensive rats. Colonies exist in many other countries as well.

The basic questions posed at the seminar concerned the pathogenesis of the hypertension in these animals and the questions of whether the progressive hypertension that is seen with increasing age and the course of histopathology that ensues is similar to that of essential hypertension in man. A large proportion of the papers and discussion was centered on the sympathetic nervous system and the renin-angiotension system to determine whether they were implicated in the hypertension. A number of groups reported that, if anything, these systems exhibited reduced activity as a compensatory mechanism for the hypertension. Thus, the spontaneously hypertensive rat appears to be an excellent model of human essential hypertension in that the hypertension has a hereditary component, and does not appear to be of primary renal or simple neurogenic origin.

Studies were also reported on the use of these animals to evaluate the therapeutic efficacy of antihypertensive agents. Despite the availability of many animal models to evaluate hypotensive drugs, the action of many of the commonly used antihypertensive drugs were first observed in man. In general, it was found that the spontaneously hypertensive rat appears to be a sensitive experimental model for evaluating antihypertensive drugs. Studies on two new and interesting drugs, fusaric acid and oudenone, were presented.

Another point repeatedly brought out was that the sequelae of the hypertension in the spontaneously hypertensive rat resemble those seen in essential hypertension. These include the cerebral damage, arteriosclerosis, and cardiac hypertrophy. These changes did not occur in animals in which the pressure was kept from rising by treatment with antihypertensive drugs.

These animals offer an opportunity to answer critical questions in regard to the problem of human essential hypertension. Furthermore, the fact that they are now generally available makes it possible to compare the results of investigators in different laboratories.

SIDNEY UDENFRIEND
SYDNEY SPECTOR
Roche Institute of Molecular Biology, Nutley, New Jersey 07110

Forthcoming Events

July

1–7. International Assoc. of **Medical Labs.**, 10th congr., Vienna, Austria. (Mrs. I. Hertz, Verband dipl und techn Assistentinnen, Spitalgasse 4, 1090 Vienna)

2–5. **Environmental Acoustics**, 2nd symp., London, England. (Meetings Officer, Inst. of Physics, 47 Belgrave Sq., London SW1X 8QX)

2–6. International Congr. of **Physical Medicine**, 6th, Barcelona, Spain. (J. S. Garcia Alsina, IFPM, Ravella 4, Barcelona 6)

2–7. **Environment**, 36th annual conf., Natl. Environmental Health Assoc., New York, N.Y. (N. Pohlit, NEHA, 1600 Pennsylvania Ave., Denver, Colo. 80203)

3–6. **Shell Structures and Climatic Influences**, Intern. Assoc. for Shell Structures, Calgary, Alta., Canada. (P. G. Glockner, Dept. of Civil Engineering, Univ. of Calgary, Calgary 44)

5–8. **Shock Tube** Symp., 8th intern., London, England. (Symp. Secretary, Dept. of Aeronautics, Imperial College, Prince Consort Rd., London, S.W. 7)

6–8. **RF Plasma Heating**, American Physical Soc., Lubbock Tex. (M. O. Hagler, Dept. of Electrical Engineering, Texas Tech Univ., Lubbock 79409)

9–12. **Molecular Beams**, 4th intern. symp., Cannes, France. (F. M. Devienne, Laboratoire de Physique Moléculaire des Hautes Energies, B.P.2 (06), Peymeinade, France)

9–14. American **Malacological** Union, Galveston, Tex. (A. S. Merrill, Biological Lab., Natl. Marine Fisheries Service, Oxford, Md. 21654)

9–14. **Power Engineering** Soc., San Francisco, Calif. (Meetings Officer, Inst. of Electrical and Electronics Engineers, Inc., 345 E. 47 St., New York 10017)

9–14. **Public Transportation in Urban Areas**, Engineering Foundation, Henniker, N.H. (EF, 345 E. 47 St., New York 10017)

10–12. **DNA Synthesis in vitro**, 2nd annual Steenbock symp., Madison, Wis. (Mrs. M. Parker, Dept. of Biochemistry, 420 Henry Mall, Univ. of Wisconsin, Madison 53706)

10–14. **Coastal Engineering**, intern. conf., American Soc. of Civil Engineers, Vancouver, B.C., Canada. (H. R. Hands, ASCE, 345 E. 47 St., New York 10017)

10–14. **Interaction of Radioactive Contaminents with the Constituents of the Marine Envronment**, Seattle, Wash. (J. H. Kane, Div. of Technical Information, U.S. Atomic Energy Commission, Washington, D.C. 20545)

10–14. **Rarefied Gas Dynamics**, 8th intern. symp., Stanford, Calif. (K. Karamcheti, Dept. of Aeronautics and Astronautics, Stanford Univ., Stanford 94305)

11–14. **Society of Nuclear Medicine**, Boston, Mass. (Mrs. M. Glos, SNM, 211 E. 43 St., New York 10017)

11–15. National Soc. of **Professional Engineers**, Denver, Colo. (P. H. Robbins, NSPE, 2029 K St., NW, Washington, D.C. 20006)

12–15. International Soc. of **Clinical Lab. Technologists**, St. Louis, Mo. (D. Bier Birenbaum, ISCLT, 805 Ambassador Bldg., St. Louis, Mo. 63101)

16–19. American Assoc. for **Clinical Immunology and Allergy**, Seattle, Wash. (S. H. Jaros, AACIA, 9705 Louis Dr., Omaha, Neb. 68114)

16–20. American **Veterinary Medical** Assoc., New Orleans, La. (M. R. Clarkson, AVMZ, 600 S. Michigan Ave., Chicago, Ill. 60605)

16–21. International Soc. of **Hematology**, intern. congr., São Paulo, Brazil. (World Federation of Hemophilia, Suite 806, 1420 St. Mattieu, Montreal 108, P.Q., Canada)

16–28. **Technology and the People**, Inst. on Man and Science, Rensselaerville, N.Y. (G. A. Enk, IMS, Rensselaerville 12147)

17–20. International Symp. on **Sex Education**. Tel Aviv, Israel. (E. Chigier, P.O. Box 16271, Tel Aviv, Israel)

17–21. **Electron Probe Analysis** Soc. of America, 7th natl. conf., San Francisco, Calif. (C. G. Cleaver, General Electric Co., Vallecitos Nuclear Center, Bldg. 105, Pleasanton, Calif. 94566)

17–22. **American Medical Technologists**, Philadelphia, Pa. (C. B. Dziekonski, AMT, 710 Higgins Rd., Park Ridge, Ill. 60068)

18–21. **Cyclotron** Conf., 6th intern., Vancouver, B.C., Canada. (N. Brearley, Univ. of British Columbia, Vancouver 8)

18–21. **Hormones, the Brain, and Behavior**, 3rd intern. symp., Intern. Soc. of Psychoneuroendocrinology, London, England. (R. P. Michael, Inst. of Psychiatry, De Crespigny Park, Denmark Hill, London SE5 8AF)

19–21. **Defects in Semiconductors**, intern. conf., Reading, England. (Meetings Officer, Inst. of Physics, 47 Belgrave Sq., London S.W.1, England)

19–22. **Calorimetry** Conf., 27th, Park City, Utah. (J. M. Sturtevant, Dept. of Chemistry, Yale Univ., New Haven, Conn. 06520)

20–22. **Modern Instrumental Methods in Natural Products Research**, American Soc. of Pharmacognosy, Columbus, Ohio. (J. E. Robbers, School of Pharmacy and Pharmacal Science, Purdue Univ., Lafayette, Ind. 47907)

23–28. **Control Strategies for Power Systems**, Engineering Foundation, South Berwick, Maine. (EF, 345 E. 47 St., New York 10017)

23–28. **Illuminating Engineering** Soc., Tulsa, Okla. (P. C. Ringgold, IES, 345 E. 47 St., New York 10017)

23–28. **Pharmacology and the Future of Man**, 5th intern. congr., American Soc. for Pharmacology and Experimental Therapeutics, San Francisco, Calif. (E. B. Cook, ASPET, 9650 Rockville Pike, Bethesda, Md. 20014)

24–29. **Foetal and Neonatal Physiology**, Sir Joseph Barcroft Centenary Symp., Physiological Soc., Cambridge, England. (P. W. Nathanielsz, SJBCS, Physiological Lab., Cambridge, England)

24–30. **Angiology**, 8th intern. congr., Rio de Janeiro, Brazil. (D. F. M. Bunce, Dept. of Physiology, College of Osteopathic Medicine and Surgery, Sixth at Center, Des Moines, Iowa 50309)

26–29. American **Dairy Science** Assoc., Blacksburg, Va. (C. Cruse, ADSA, 425 Illinois Bldg., 113 N. Neil St., Champaign, Ill. 61820)

26–31. Inter-American Meeting of **Neuroradiology**, Rio de Janeiro, Brazil. (A. Tomax Rezende, Caixa Postal 9031, ZC-02, Rio de Janeiro, Gb)

27–29. **Extra-Corporeal Technology**, 10th intern. conf., New York, N.Y. (E. C. Berger, American Soc. of Extra-Corporeal Technology, Inc., 287 E. 6 St., St. Paul, Minn. 55101)

27–29. **Intracranial Pressure**, 1st intern. symp., Hannover, Germany. (M. Brock, Neurochirurgische Klinik, Medizinische Hochschule Hannover, 3 Hannover-Kleefeld, Roderbruchstrasse 101, Germany)

29–5. **Technology and Human Future**, 19th annual, Inst. on Religion in an Age of Science, Star Island, N.H. (F. Nesbett, 219 Harvard St., Brookline, Mass. 02146)

30–2. American Soc. of **Animal Science**, Blacksburg, Va. (G. P. Lofgreen, Imperial Valley Field Sta., 1004 E. Holton Rd., El Centro, Calif. 92243)

30–3. **Crystal Growth**, 2nd natl. conf., American Assoc. for Crystal Growth, Princeton, N.J. (D. Richman, RCA Labs., David Sarnoff Research Center, Princeton, 08540)

30–3. Society for **Cryobiology**, 9th annual, Washington, D.C. (D. M. Robinson, Red Cross Blood Research Lab., 9312 Old Georgetown Rd., Bethesda, Md. 20014)

30–3. National **Dental** Assoc., New Orleans, La. (NDA, P.O. Box 197, Charlottesville, Va. 22902)

30–4. International Organization for **Medical Physics**, 3rd, Göteborg, Sweden. (R. Kadefors, Dept. of Applied Electronics, Chalmers Univ. of Technology, 402 20 Göteborg)

31–4. **Emergency Medical Services**, American Paramedical Inst., Honolulu, Hawaii. (J. Galbreth, API, P.O. Box 4496, Honolulu 96813)

31–4. Use of **Nuclear Techniques in the Basic Metal Industries**, Intern. Atomic Energy Agency, Helsinki, Finland. (J. H. Kane, Div. of Technical Information, Atomic Energy Commission, Washington, D.C. 20545)

August

2–4. **Applications of X-ray Analysis**, 21st conf., Denver, Colo. (C. O. Ruud, Metallurgy and Materials Science Div., Denver Research Inst., Univ. of Denver, Denver 80210)

4–7. **Poultry Science** Assoc., Columbus, Ohio. (C. B. Ryan, Texas A&M Univ., College Station 77843)

6–9. **Soil Conservation** Soc. of America, Portland, Ore. (H. W. Pritchard, 7515 NE Ankeny Rd., Ankeny, Iowa 50021)

6–10. American **Phytopathological** Soc., Mexico City, Mexico. (R. J. Green, Jr., Dept. of Botany and Plant Pathology, Purdue Univ., Lafayette, Ind. 47907)

7–9. **Anatomic Pathology of Fish**, Registry of Comparative Pathology and Univ. of Wisconsin Sea Grant Program, Washington, D.C. (G. Migaki, Comparative Pathology Branch, Armed Forces Inst. of Pathology, Washington, D.C. 20395)

7–9. **Atmospheric Radiation**, American Meteorological Soc., Fort Collins, Colo. (AMS, 45 Beacon St., Boston, Mass.)

7–10. American **Health** Congr., jointly by American Hospital Assoc., Catholic Hospital Assoc., American Nursing Home Assoc., and Health Industries Assoc., Chicago, Ill. (G. F. Schuyler, AHC, 840 N. Lake Shore Dr., Chicago 60611)

7–11. **Atomic Physics**, 3rd intern. conf., Boulder, Colo. (S. J. Smith, Joint Inst. for Lab. Astrophysics, Univ. of Colorado, Boulder 80302)

7–11. **Engineering in Medicine—Automatic Cytology**, Engineering Foundation, Saxtons River, Vt. (EF Confs., United Engineering Center, 345 E. 47 St., New York 10017)

7–11. **Fundamentals of Transport Phenomena in Porous Media**, 2nd symp., Intern. Assoc. for Hydraulic Research and Intern. Soc. of Soil Science, Guelph, Ont., Canada. (D. E. Elrick, Dept. of Soil Science, Univ. of Guelph, Guelph)

7–14. **Biophysics** Congr., 4th intern., Intern. Union for Pure and Applied Biophysics, Moscow, U.S.S.R. (L. P. Kayushin, Profsoyuznaya 7, Moscow)

9–11. **Cryogenic Engineering** Conf., Boulder, Colo. (L. K. Armstrong, National Bureau of Standards, Boulder 80302)

9–11. **Reindeer/Caribou** Symp., 1st intern., Inst. of Arctic Biology and Alaska Cooperative Wildlife Research Unit, Fairbanks, Alaska. (R. G. White, IAB, Univ. of Alaska, Fairbanks 99701)

10–17. International **Geographical** Union, 22nd intern. congr., Montreal, P.Q., Canada. (J. K. Fraser, IGU, P.O. Box 1972, Ottawa, Ont., Canada)

11–13. **Marine Technology** Soc., Washington, D.C. (R. W. Niblock, MTS, Suite 412, 1730 M St., NW, Washington, D.C. 20036)

12. American Soc. of **Naturalists**, Minneapolis, Minn. (Miss J. B. Spofford, Dept. of Biology, Univ. of Chicago, Chicago, Ill. 60637)

13–17. **Biology of the Seal**, intern. symp., Intern. Council for the Exploration of the Sea, Intern. Commission for the Northwest Atlantic Fisheries, and Intern. Biological Programme, Guelph, Ont., Canada. (K. Ronald, College of Biological Sciences, Univ. of Guelph, Guelph, Ont.)

13–17. **Biometric** Soc., Eastern North American Region, Montreal, P.Q., Canada. (F. B. Cady, Biometric Unit, 337 Warren Hall, Cornell Univ., Ithaca, N.Y. 14850)

13–18. **Engineers' Role in Today's Society**, Engineering Foundation, Henniker, N.H. (EF Confs., United Engineering Center, 345 E. 47 St., New York 10017)

13–18. **Improving Indoor Air Quality**,

Engineering Foundation, South Berwick, Maine. (EF Confs., United Engineering Center, 345 E. 47 St., New York 10017)

13–19. International Congr. of **Psychology**, 20th, Tokyo, Japan. (Science Council of Japan, 22-34 Roppongi 7 chome Minato-ku, Tokyo 106)

14–16. Association for **Computing Machinery**, Boston, Mass. (C. Giltner, Lincoln Lab., Massachusetts Inst. of Technology, P.O. Box 73, Lexington 02173)

14–17. **Biometric** Soc., Western North American Region, Montreal, P.Q., Canada (J. W. Kuzma, Dept. of Biostatistics, Loma Linda Univ., Loma Linda, Calif. 92354)

14–17. American **Statistical** Assoc., Montreal, P.Q., Canada. (J. W. Lehman, ASA, 806 15th St., NW, Washington, D.C. 20005)

14–18. Australian and New Zealand Assoc. for the **Advancement of Science**, 44th cong., Sydney, Australia. (Mrs. D. Stretton, Dept. of Physiology, Univ. of Queensland, St. Lucia 4067, Brisbane, Australia)

14–18. Symposium on **Cosmochemistry**, Intern. Assoc. of Geochemistry and Cosmochemistry, Cambridge, Mass. (A. G. W. Cameron, Belfer Graduate School of Science, Yeshiva Univ., Amsterdam Ave. and 186 St., New York 10033)

14–18. American **Ornithologists'** Union, Grand Forks, N.D. (R. C. Banks, Bird and Mammal Labs., National Museum of Natural History, Washington, D.C. 20560)

14–18. **Physics and Chemistry of Ice**, intern. symp., Royal Soc. of Canada, Ottawa, Ont., Canada. (M. K. Ward, National Research Council, Ottawa K1A OR6)

14–18. **Social Science and Medicine**, 3rd intern. conf., Elsinore, Denmark. (P. J. M. McEwan, Center for Social Research, Univ. of Sussex, Falmer, Brighton, BN1 9QN, Sussex, England)

15–17. **Science and Policy in the North**, 23rd Alaska science conf., Alaska Div., American Assoc. for the Advancement of Science, Fairbanks. (G. S. Harrison, Inst. of Social, Economic and Government Research, Univ. of Alaska, College 99701)

15–17. Society for the **Study of Amphibians and Reptiles** (15th annual) and **Herpetologists** League, Lake Texoma, Okla. (V. H. Hutchinson, Dept. of Zoology, Univ. of Oklahoma, Norman 73069)

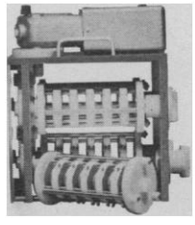
15–18. American **Astronomical** Soc., East Lansing, Mich. (H. M. Gurin, AAS, 211 FitzRandolph Rd., Princeton, N.J. 08540)

15–18. **Primatology**, 4th intern. congr., Intern. Primatological Soc., Portland, Ore. (W. Montagna, Oregon Regional Primate Research Center, 505 NW 185 Ave., Beaverton 97005)

15–25. International **Cartographic** Assoc., 4th general assembly, Montreal, P.Q., Canada. (B. Timmermans, Public Relations and Information Services, Dept. of Energy, Mines, and Resources, Ottawa, Ont., Canada)

16–18. **Radiationless Processes in Gas-Phase Molecules**, intern. conf., Boulder, Colo. (W. C. Lineberger, Joint Inst. for Laboratory Astrophysics, Univ. of Colorado, Boulder 80302)

16–19. **Strontium Metabolism**, 2nd intern. conf., Glasgow, Scotland. (J. M. A.



Lenihan, Dept. of Clinical Physics and Bioengineering, Western Regional Hospital Board, 11 W. Graham St., Glasgow G4 9LF)

17–19. American Acad. of **Clinical Toxicology**, Chicago, Ill. (E. G. Comstock, AACT, P.O. Box 2565, Houston, Tex. 77001)

17–22. **Jaw Tumors/Baro Pathology**, Intern. Soc. of Geographical Pathology, 11th conf., Newcastle upon Tyne, England. (I. Rannie, Sutherland Dental School, Newcastle upon Tyne)

20–22. American Acad. of **Physical Medicine and Rehabilitation**, Denver, Colo. (C. C. Herold, AAPMR, 30 N. Michigan Ave., Chicago, Ill. 60602)

20–23. **Food-Drugs from the Sea**, 3rd conf., Kingston, R.I. (E. Miller, Hoffmann-La Roche, Inc., Nutley, N.J.)

20–25. American Assoc. of **Clinical Chemists**, Cincinnati, Ohio. (D. A. H. Roethal, AACC, 1155 16th St., NW, Washington, D.C. 20006)

20–25. **Combustion**, 14th intern. symp., Combustion Inst., University Park, Pa. (CI, 986 Union Trust Bldg., Pittsburgh, Pa. 15219)

20–25. Federation of **European Biochemical** Socs., 8th annual, Amsterdam, Netherlands. (FEBS-BIOCHEM 72, RAI Gebouw N.V., Europaplein 8, Amsterdam)

20–26. **Low Temperature Physics**, 13th intern. conf., Intern. Union of Pure and Applied Physics, Boulder, Colo. (D. G. McDonald, National Bureau of Standards, Boulder 80302)

21–23. **Polymer Characterization**, 2nd intern. symp., Battelle Memorial Inst., Seattle, Wash. (F. A. Sliemers, Battelle, 505 King Ave., Columbus, Ohio 43201)

21–24. International Assoc. of **Milk, Food and Environmental Sanitarians**, 59th annual, Milwaukee, Wis. (H. H. Thomasson, IAMFE, Shelbyville, Ind. 46176)

21–25. **Cloud Physics**, intern. conf., American Meteorological Soc., London, England. (AMS, 45 Beacon St., Boston, Mass.)

21–25. **Extended Atmospheres and Circumstellar Matter in Spectroscopic Binary Systems**, Intern. Astronomical Union, Victoria, B.C., Canada. (K. O. Wright, Dominion Astrophysical Observatory, R.R. 7, Victoria)

21–25. **Histochemistry and Cytochemistry**, 4th intern. congr., Kyoto, Japan. (K. Ogawa, Dept. of Anatomy, Kansai Medical School, Moriguchi, Osaka, Japan)

21–25. International Conf. on **Hydrogen Bonding**, Chemical Inst. of Canada, Ottawa, Ont. (M. K. Ward, Div. of Chemistry, National Research Council of Canada, Ottawa K1A OR6)

21–25. **Liquid Crystal**, 4th intern. conf., Kent, Ohio. (G. H. Brown, Liquid Crystal Inst., Kent State Univ., Kent 44240)

21–25. International Congr. on **Photobiology**, 6th, Bochum, Germany. (H. Tronnier, Universitäts-Hautklinik, D-7400 Tübingen, Germany)

21–25. **Science of Catalysis**, 5th intern. congr., North American Catalysis Soc., Miami Beach, Fla. (V. Haensel, Universal Oil Products Co., 30 Algonquin Rd., Des Plaines, Ill. 60016)

21–25. **Underwater Physiology**, 5th symp., Undersea Medical Soc., Freeport, British Bahamas. (C. J. Lambertsen, Inst.

for Environmental Medicine, Univ. of Pennsylvania, Philadelphia, Pa. 19104)

21–26. **Theoretical and Applied Mechanics**, 13th intern. congr., Moscow, U.S.S.R. (G. K Mikhailov, Leningradskii Prospekt 7, Moscow A-40)

21–30. International **Geological** Congr., 24th, Montreal, P.Q., Canada. (Secretary-General, 24th Intern. Geological Congr., 601 Booth St., Ottawa 4, Ont., Canada)

22–26. International Soc. on **Thrombosis and Haemostasis**, 3rd congr., Washington, D.C. (H. R. Roberts, Box 630, Chapel Hill, N.C. 27514)

22–30. International Congr. of **Entomology**, 14th, Canberra, Australia. (C. N. Smithers, Australian Museum, College St., Sydney 2000)

23–25. **Aspects of Biological Gerontology**, 2nd annual Rocky Mountain symp. on aging, Fort Collins, Colo. (Office of Conferences and Institutes, Room 178, Student Center, Colorado State Univ., Fort Collins 80521)

23–25. **Chemical Education** Conf., Div. of Chemical Education, American Chemical Soc., South Hadley, Mass. (Miss A. J. Harrison, Dept. of Chemistry, Mt. Holyoke College, South Hadley 01075)

23–25. American Congr. of **Rehabilitation Medicine**, Denver, Colo. (C. C. Herold, ACRM, 30 N. Michigan Ave., Chicago, Ill. 60602)

25–27. **Rural Sociological** Soc., Baton Rouge, La. (H. M. Sauer, Dept. of Rural Sociology, South Dakota State Univ., Brookings 57006)

27. **Genetics** Soc. of America, Minneapolis, Minn. (M. W. Shaw, Room 523, Dept. of Biology, M. D. Anderson Hospital and Tumor Inst., Houston, Tex. 77025)

27–30. American Inst. of **Chemical Engineers**, 73rd natl., Minneapolis, Minn. (AICE, 345 E. 47 St., New York 10017)

27–1. American Inst. of **Biological Sciences**, Minneapolis, Minn. (J. R. Olive, AIBS, 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

27–1. American **Chemical** Soc., New York, N.Y. (F. T. Wall, ACS, 1155 16th St., NW, Washington, D.C. 20036)

27–1. **General and Molecular Genetics**, Genetics Soc. of America, 41st annual, Minneapolis, Minn. (P. Snustad, Dept. of Genetics, 301 Snyder Hall, Univ. of Minnesota, St. Paul 55101)

27–1. American Soc. for **Horticultural Science**, St. Paul, Minn. (C. Blackwell, ASHS, P.O. Box 109, 914 Main St., St. Joseph, Mich. 49085)

27–1. Society for **Industrial Microbiology**, St. Paul, Minn. (W. M. Stark, Lilly Research Labs., Eli Lilly & Co., Indianapolis, Ind. 46206)

27–1. American **Physiological** Soc., University Park, Pa. (R. G. Daggs, APS, 9650 Rockville Pike, Bethesda, Md. 20014)

27–1. American Soc. of **Plant Physiologists**, Minneapolis, Minn. (W. H. Klein, Smithsonian Radiation Biology Lab., 12441 Parklawn Dr., Rockville, Md. 20852)

27–1. American Soc. of **Plant Taxonomists**, Minneapolis, Minn. (D. M. Porter, Missouri Botanical Garden, 2315 Tower Grove Ave., St. Louis 63110)

27–1. Society of **Protozoologists**, Minneapolis, Minn. (D. M. Hammond, Zoology Dept., Utah State Univ., Logan 84321)

27–1. World Congr. of **Rehabilitation** International, 12th intern., Sydney, Australia. (Rehabilitation International, 219 E. 44 St., New York 10017)

27–1. Society for the **Study of Evolution**, Minneapolis, Minn. (D. L. Jameson, Dept. of Biology, Univ. of Houston, Houston, Tex. 77004)

27–1. American Soc. of **Zoologists**, Minneapolis, Minn. (G. Sprugel, Jr., Illinois Natural History Survey, 179 Natural Resources Bldg., Urbana 61801)

27–2. International Soc. of **Electrochemistry**, 23rd congr., Stockholm, Sweden. (G. Wranglén, Royal Inst. of Technology, 100 44 Stockholm 70)

27–2. **Transfusion** Congr., American Assoc. of Blood Banks and Intern. Soc. of Blood Transfusions, Washington, D.C. (AABB, Suite 401, 915 19th St., NW, Washington, DC. 20006)

28. American **Fern** Soc., Minneapolis, Minn. (R. L. Hauke, Dept. of Botany, Univ. of Rhode Island, Kingston 02881)

28–29. Use of **Tracers to Study Heterogeneous Catalysis**, intern. conf., New York Acad. of Sciences, New York, N.Y. (W. Likely, NYAS, 2 E. 63 St., New York 10021)

28–30. **Mathematical** Assoc. of America, Hanover, N.H. (H. Adler, Dept. of Mathematics, Univ. of California, Davis 95616)

28–31. American **Sociological** Assoc., New Orleans, La. (N. J. Demerath, ASA, 1001 Connecticut Ave., NW, Washington, D.C. 20036)

28–1. **Advances in Microbial Engineering**, 1st intern. symp., Mariánské Lázné, Czechoslovakia. (Microbiological Inst., Czechoslovak Acad. of Sciences, Budějovická 1083, Prague 4)

28–1. **Biochemistry of Lipids**, 15th intern. conf., The Hague, Netherlands. (B. H. Tritten, Unilever Research, P.O. Box 114, Vlaardingen, Netherlands)

28–1. **Cybernetic Modeling of Adaptive Organizations**, Science Committee, North Atlantic Treaty Organization, Porto, Portugal. (D. Howland, College of Administrative Science, Ohio State Univ., 1775 S. College Rd., Columbus 43210)

28–1. **Electron Microscopy** Soc. of America, Los Angeles, Calif. (G. C. Cocks, Olin Hall, Cornell Univ., Ithaca, N.Y. 14850)

28–2. **Antibiotics: Biosynthesis and Function**, EUCHEM conf., Aarhus, Denmark. (J. Hedegaard, Dept. of Microbiology, Polytechnical Univ., DK 2800 Lyngby, Copenhagen, Denmark)

28–3. **Phycological** Soc. of America, Minneapolis, Minn. (Miss P. L. Walne, Dept. of Botany, Univ. of Tennessee, Knoxville 37916)

29–1. **Discharges and Electrical Insulation in Vacuum**, 5th intern. symp., Poznan, Poland. (A. S. Denholm, Energy Sciences Inc., 111 Terrace Hall Ave., Burlington, Mass. 01803)

30–2. **Status of Physicians and Paramedical Staff**, intern. conf., Bratislava, Czechoslovakia. (Czechoslovak Medical Soc., Michiewiczova 18, Bratislava)

31–3. **High-Resolution Infrared Spectroscopy**, 2nd intern., Prague, Czechoslovakia. (Inst. of Physical Chemistry, Czechoslovak Acad. of Sciences, Máchova 7, Prague)