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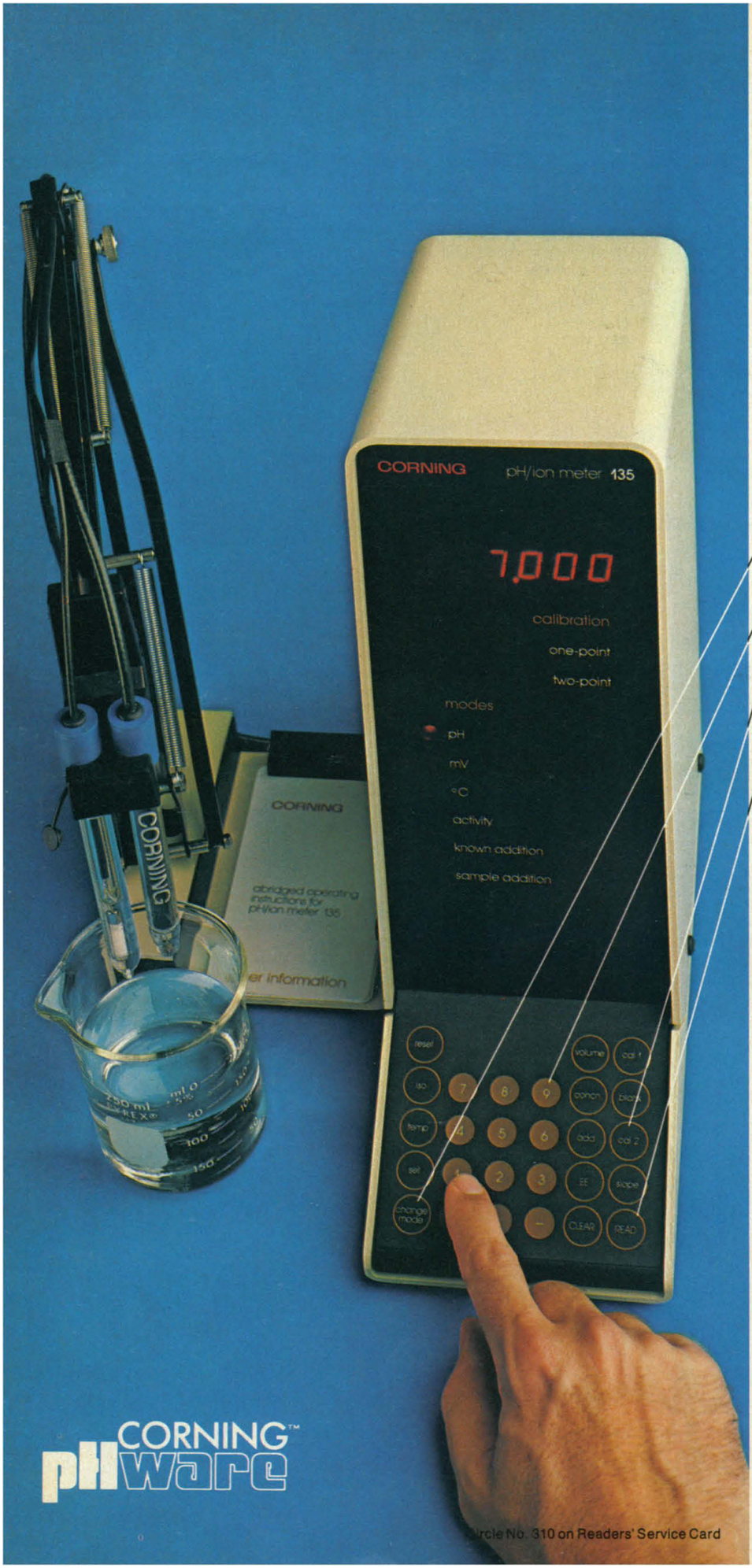

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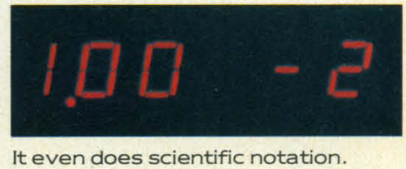

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14 September 1979

Volume 205, No. 4411

SCIENCE

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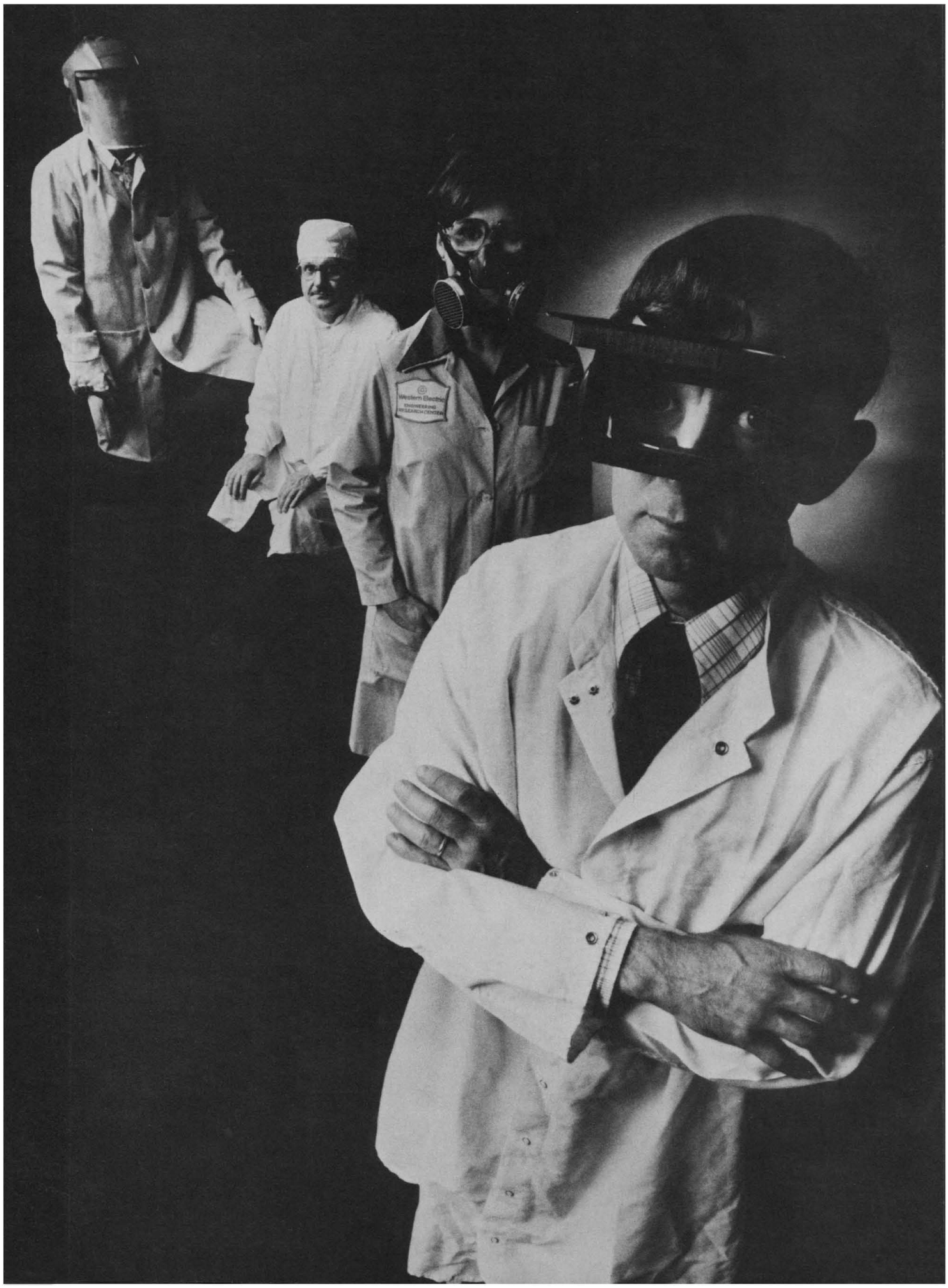
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

North American Pleistocene cheetah *Acinonyx trumani*. Reconstruction based on the living cheetah, *Acinonyx jubatus*, and skeletons of *A. trumani* from Natural Trap Cave, Wyoming. See page 1155. [Drawing by Dawn A. Adams]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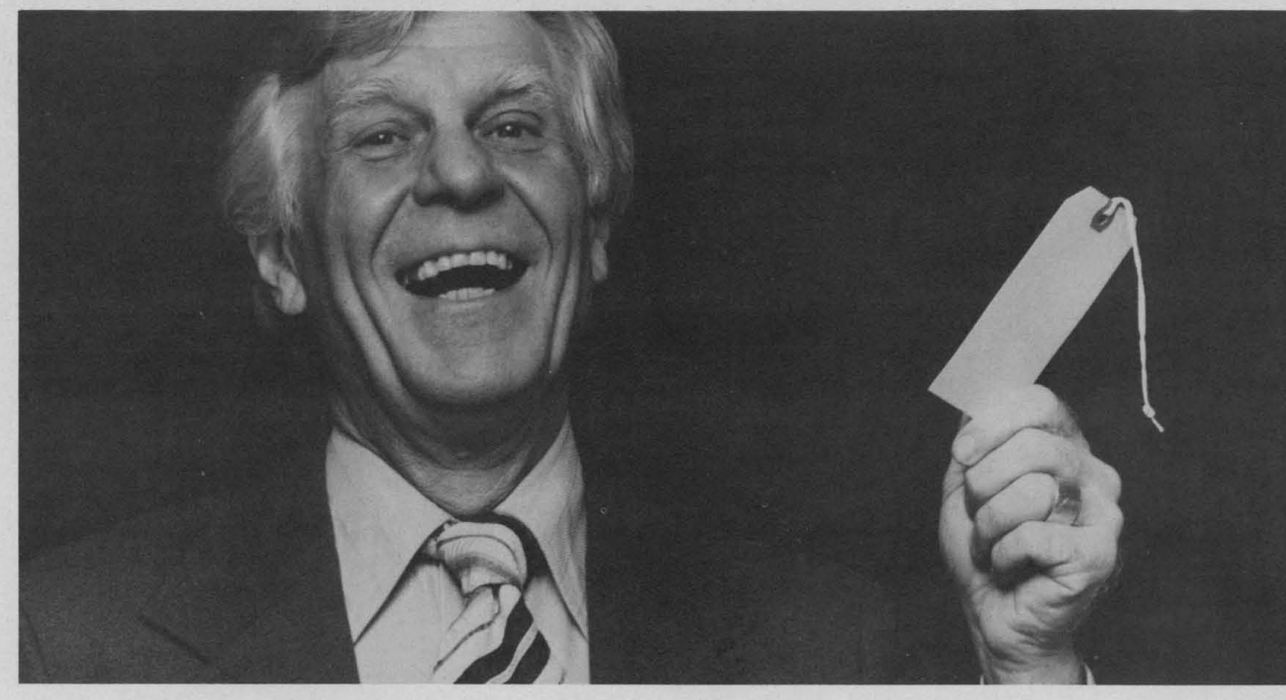

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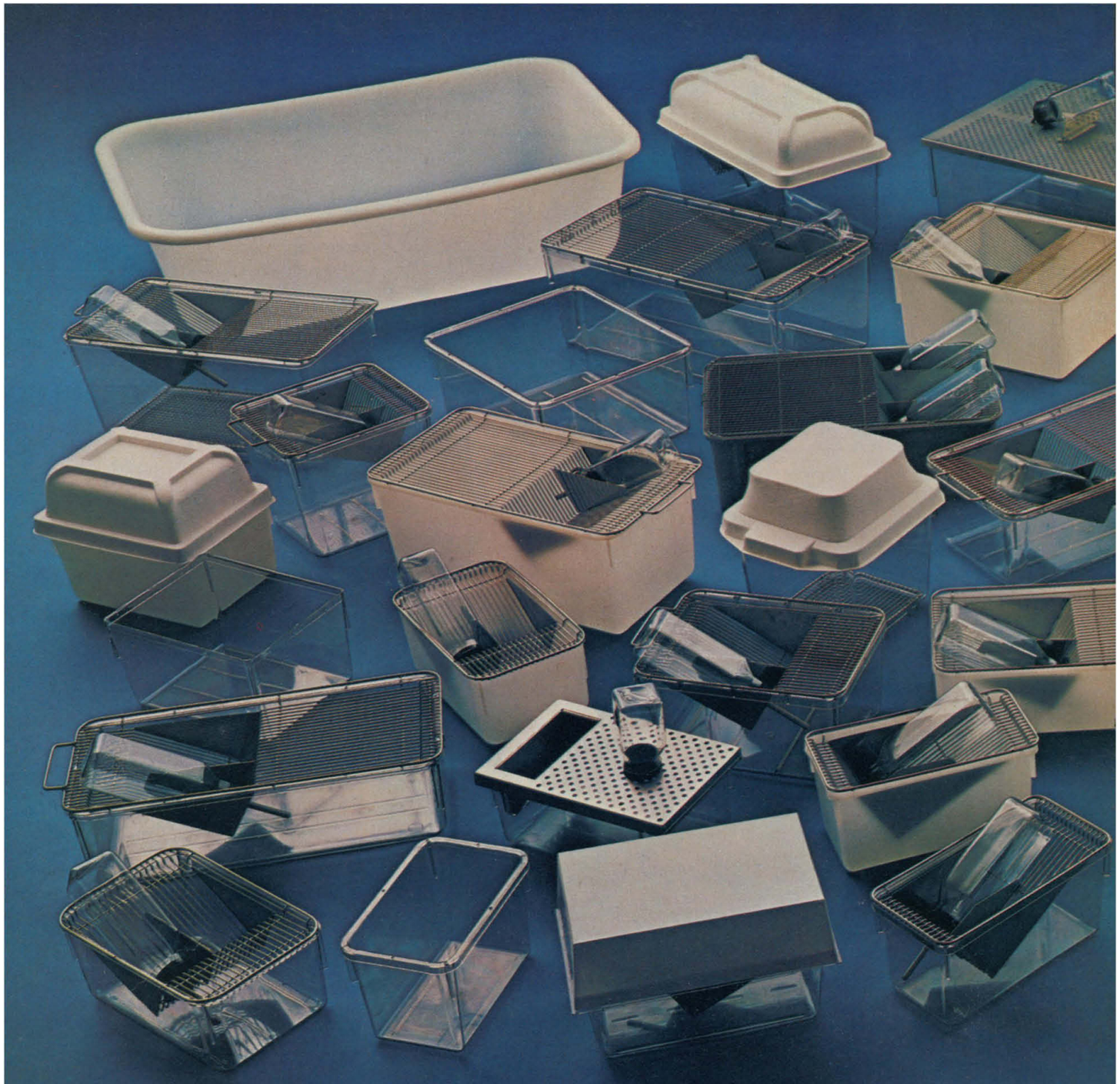

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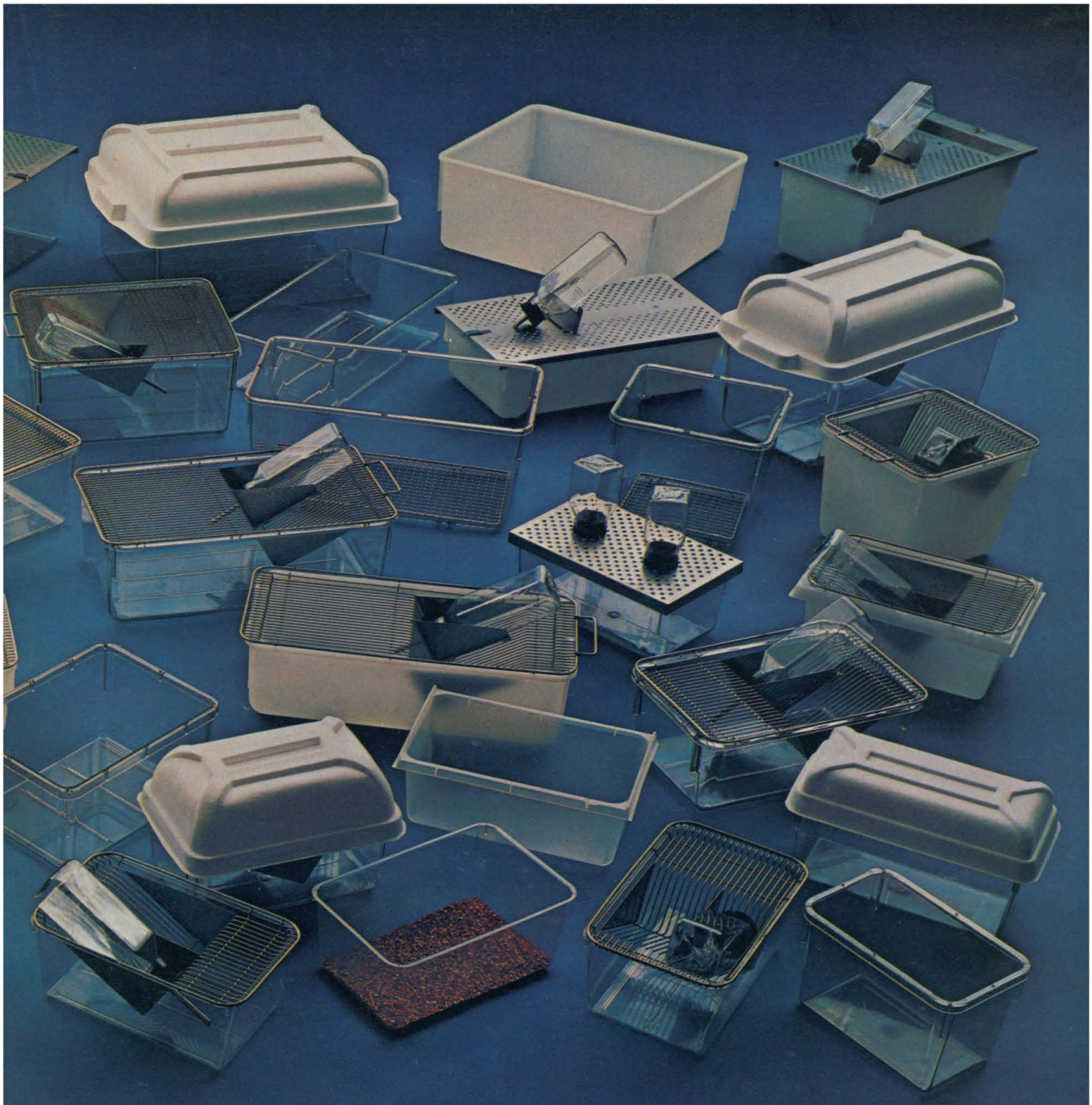

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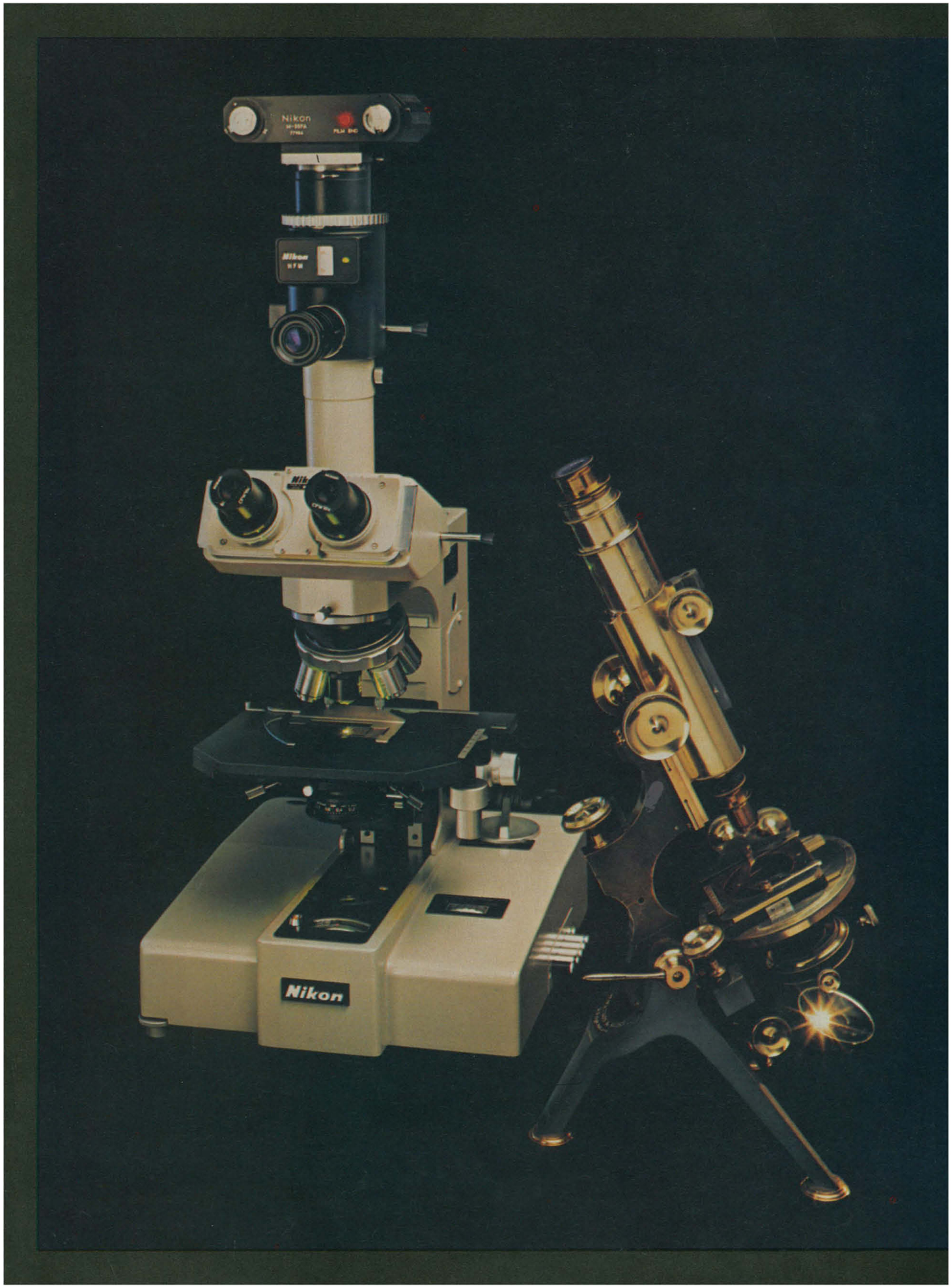
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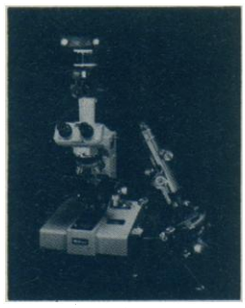

From the beginnings of biomedical research, instruments have played an important role in the drama of discovery. Crude though they were, early microscopes served to extend the vision of the determined researchers who, in turn, extended our understanding of life itself.

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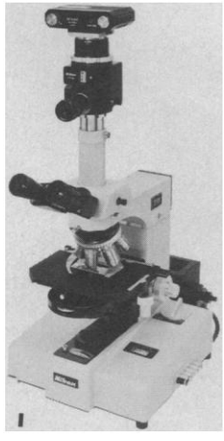
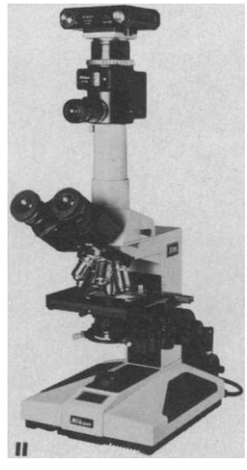
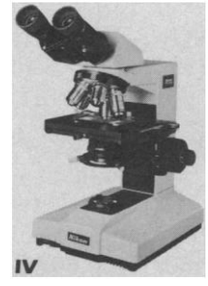
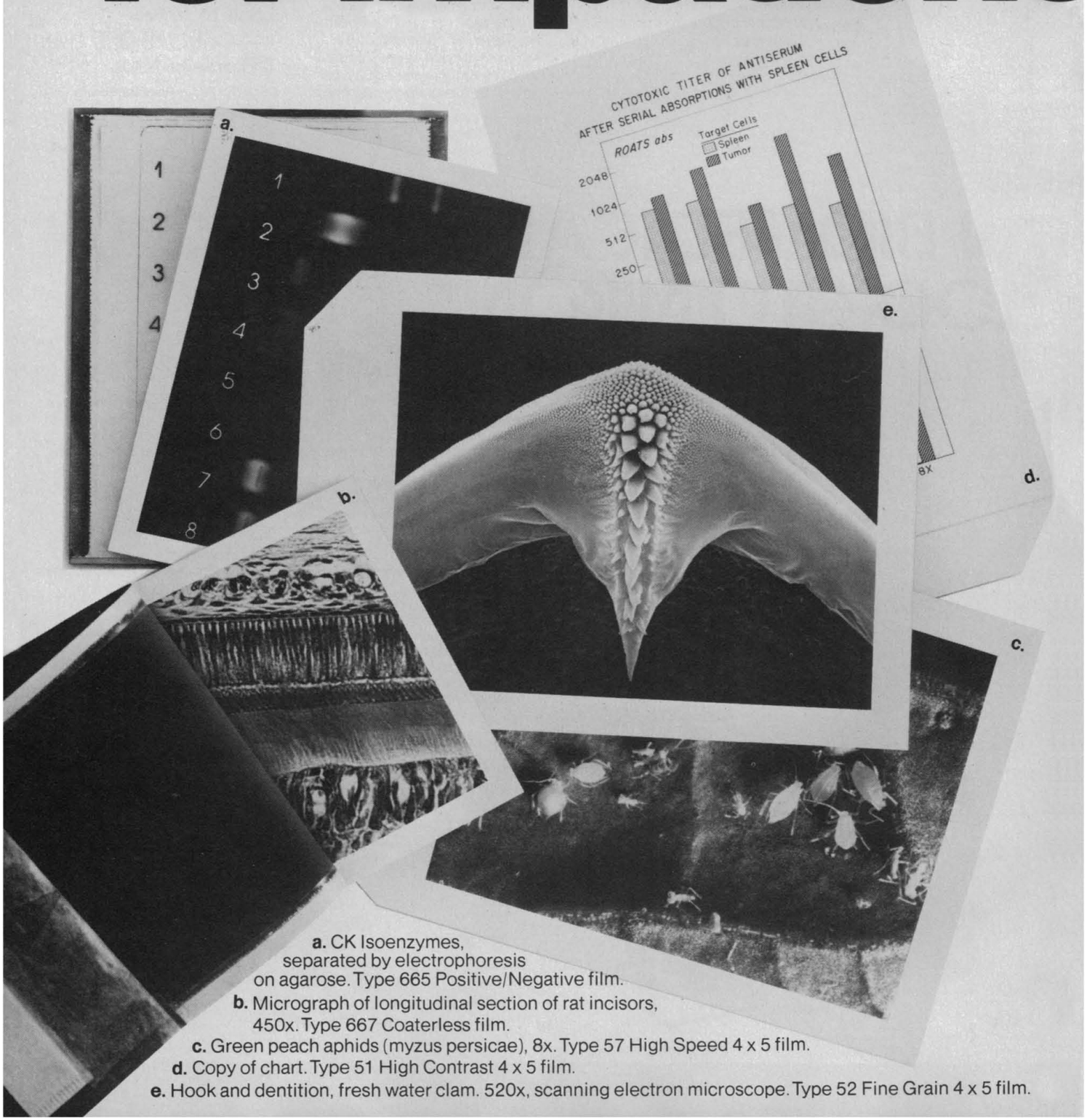






Research for impatient



a. CK Isoenzymes, separated by electrophoresis on agarose. Type 665 Positive/Negative film.

b. Micrograph of longitudinal section of rat incisors, 450x. Type 667 Coaterless film.

c. Green peach aphids (myzus persicae), 8x. Type 57 High Speed 4 x 5 film.

d. Copy of chart. Type 51 High Contrast 4 x 5 film.

e. Hook and dentition, fresh water clam. 520x, scanning electron microscope. Type 52 Fine Grain 4 x 5 film.

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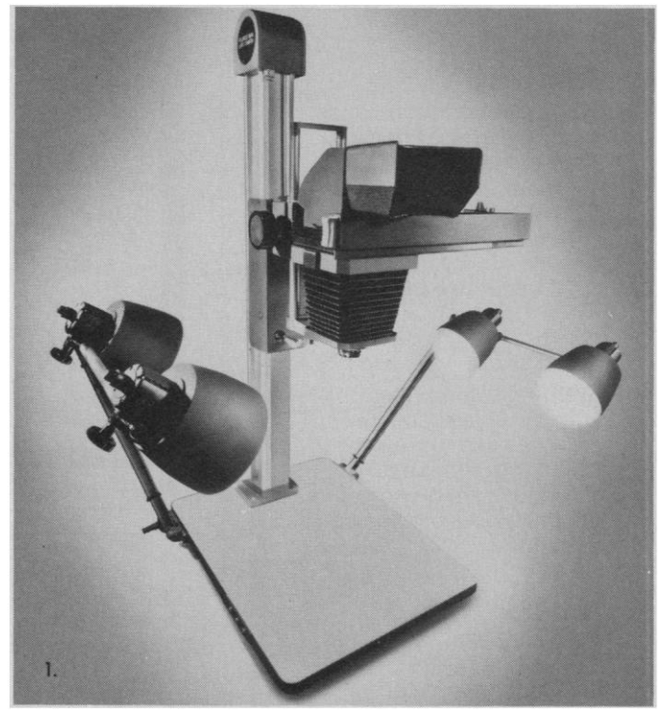
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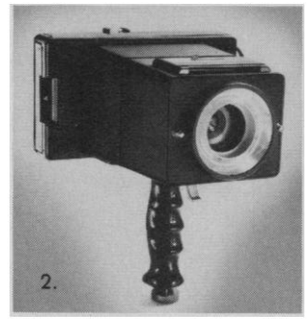
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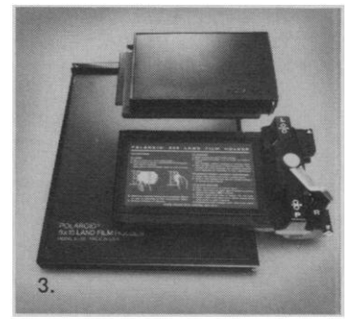
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- ☐ Other people let the reference dry out.
- ☐ Cosmic forces de-energize them.

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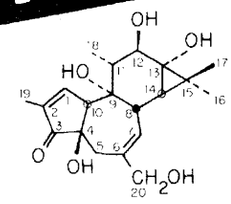

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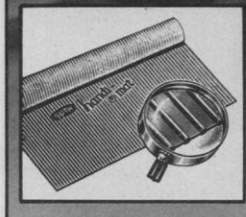

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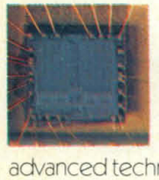

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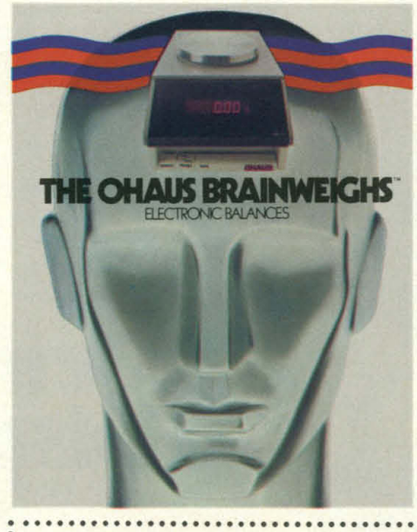

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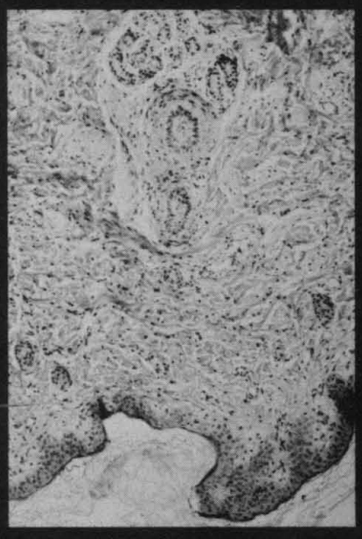

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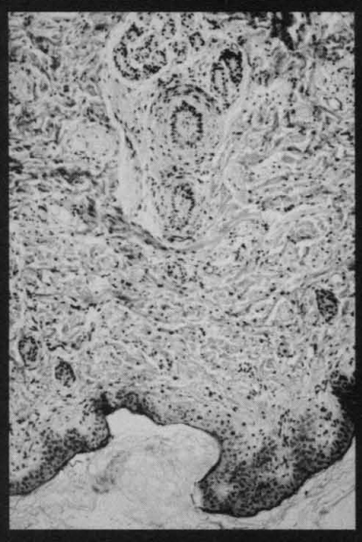

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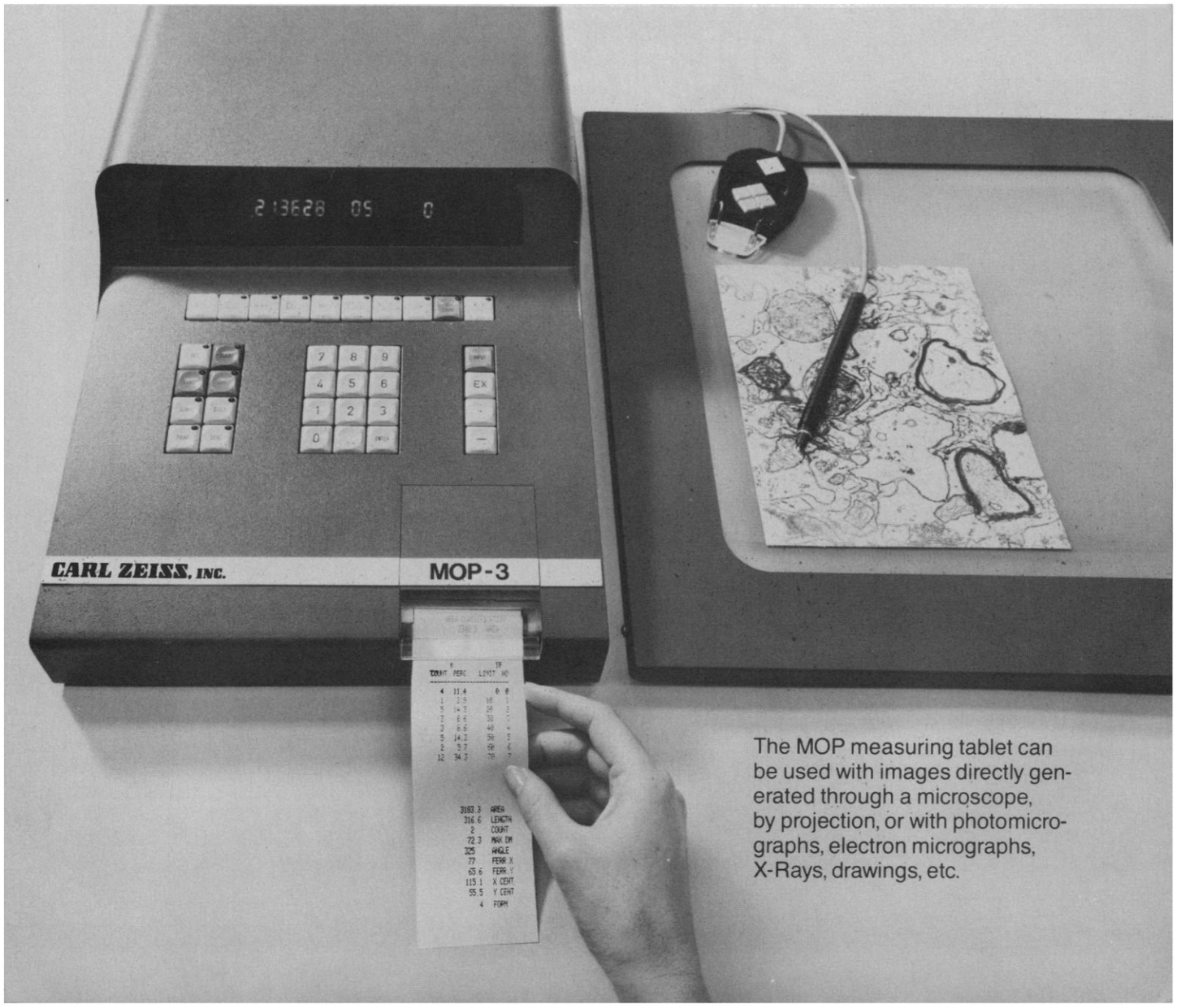

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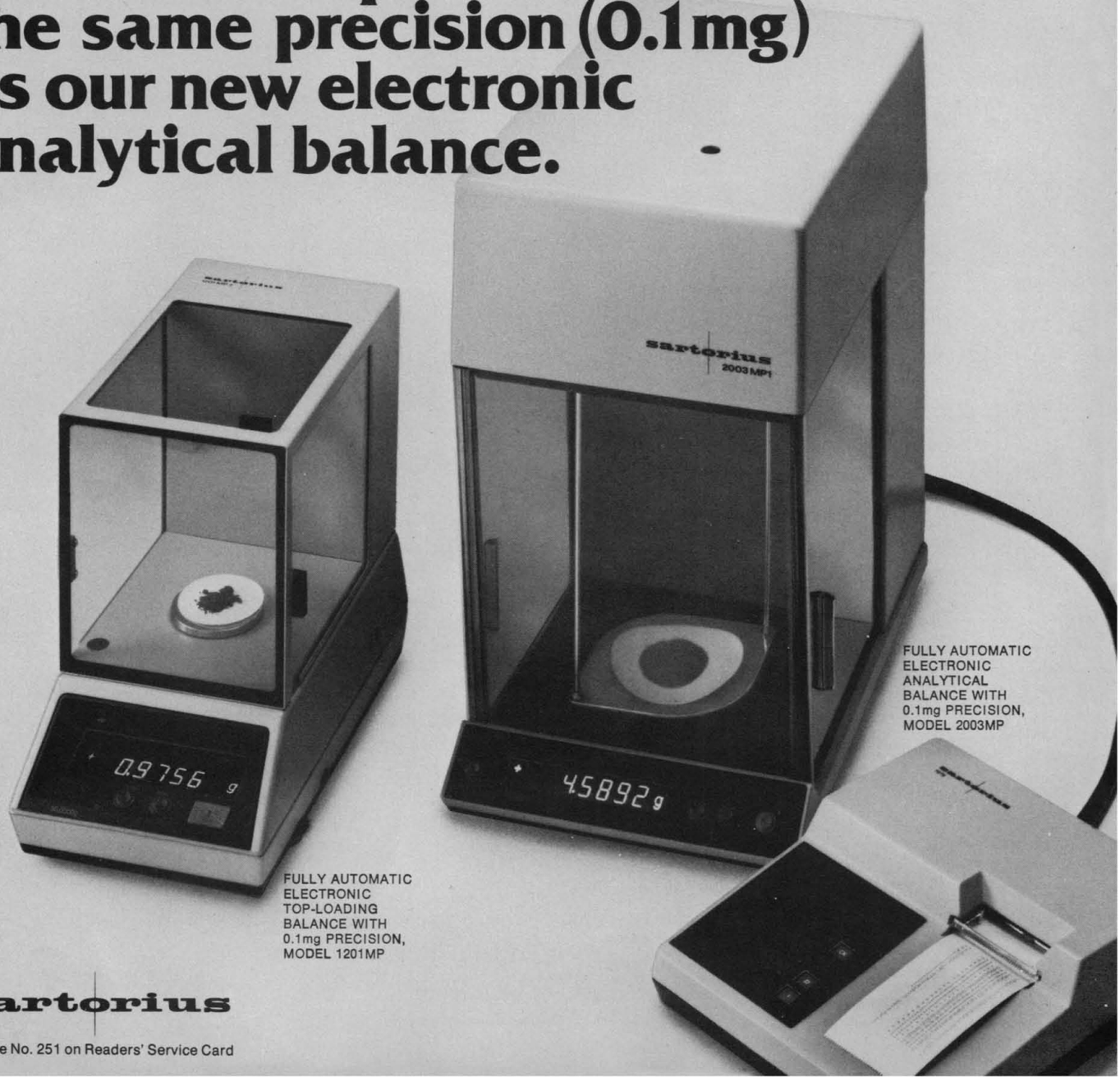

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LETTERS

Lunar Studies

Richard A. Kerr's carefully constructed article "Ten years later: Whence the moon?" (Research News, 20 July, p. 292) treats the scientific study of the moon—discovery, solution, and enigma—as a matter of geology and geochemistry. To a substantial degree, our present understanding of the moon arises as well from the extensive program of physical measurements that has always been an integral and substantial part of lunar science. In the space program, the work in lunar physics began even before Apollo, and included Explorer 35 as well as earlier attempts, although unsuccessful, extending back to the late 1950's (Pioneers 1 and 2 and Atlas-Able). In the Apollo program the physical exploration of the moon included automated observatories at fixed locations on the lunar surface (ALSEP), instruments carried by the astronauts, experiments set up by the astronauts and operated subsequently by remote control, the Apollo subsatellites, and, as part of the study of the moon's gravitational field, the Apollo command and service modules themselves. Since the emplacement of hardware and the acquisition of data depended upon the capabilities and expertise of the astronauts, lunar physics shared the manned experience with lunar geology. As with the geochemistry of the moon, the verdict is not in as to the meaning of all the information on the physics of the moon gathered in the course of this remarkable program. Thus, lunar physics shares some of the enigmas of lunar chemistry and geology, as it has shared in the discoveries. Clearly, any viable hypothesis of lunar origin and evolution must account for the relic magnetism of the moon. Even among those physical measurements which are not yet well understood conceptually, important connections have already been made with the other terrestrial planets. These include the absence of a so-far-detectable dipole moment, the seismicity of the crustal scattering layer, the structural support for the mascons, the heat flow from the interior, the rate of retreat of the moon from Earth, the interaction of solar wind with the moon and the associated downstream cavity and reimplantation of argon into lunar rocks by the associated electric field, and the gravitational field of the moon. The last of these has now provided meaningful constraints on the value of the mean moment of inertia, eagerly awaited by aficionados of the moon for some 200 years.

By way of emphasizing the interdisci-

plinary nature of lunar science, we note that the dating of samples places the remanent magnetic field in a chronological sequence, showing that the field was acquired very early (3.2 to 3.95 billion years ago) in lunar history. If the source of the background field is eventually found to have been the result of a regenerative dynamo operating within the moon, then, to a considerable degree, the very early thermal regime leading to the iron fractionation required for core formation, and the subsequent source of power for this dynamo, become fundamental problems in selenophysics and selenochemistry, jointly associated with the very young moon. Their answers would place serious constraints upon models of early lunar evolution and, in turn, of the evolution of the early solar system.

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Soviet Anti-Semitism: Reply by Pontryagin

My name was mentioned several times in the article "Anti-Semitism alleged in Soviet mathematics" published in *Science* (News and Comment, 15 Dec. 1978, p. 1167). Except for the unfounded statement that I am an anti-Semite based on the evidence of persons unknown to me, the concrete accusations consist of the following:

1) "Pontryagin represents the Soviet Union in the International Mathematical Union."

2) "He leads the editorial board that makes the final decision on every book in mathematics proposed for publication."

3) "He is editor of the prestigious journal *Matematicheski Sbornik*."

4) "He controls a voting bloc on the National Committee of Soviet Mathematicians and thereby determines the international contacts of Russian mathematicians."

5) "Two independent sources say that Soviet authorities were embarrassed by Pontryagin's denial of a visa to Margoulis, whose absence at the International Congress highlighted Pontryagin's policies."

6) "Pontryagin . . . was called to account for Margoulis' absence. Pontryagin angrily said that Margoulis could not be nominated for a Fields Medal because he was not a Russian nominee."

7) "The sources say he then got himself in deeper trouble by writing to every Soviet satellite, telling them they must support him in his threat."

8) " . . . Pontryagin invited a writer, Ivan Shetsov, . . . to speak at the prestigious Steklov Institute."

9) " . . . Soviet émigrés . . . report that since 1975 the number of published papers by Jewish authors in *Matematicheski Sbornik* has declined to zero."

10) "Particulary offensive to the Jewish mathematicians, sources say, is the habit of Pontryagin and his supporters of referring privately to this and several other journals as 'judenfrei'—the German expression for 'free of Jews.' "

I answer point by point:

1) I actually represented the Soviet Union on the executive committee of the International Mathematical Union from 1971 till 1978. But I have never done anything which could be considered as anti-Semitism. I believe my colleagues from the executive committees of 1971 to 1974 and 1975 to 1978 will confirm this.

2) I lead the mathematical group of one of the sections of the publishing house Nauka. This group inspects only a small part of the mathematical books printed in the Soviet Union and only prepares all necessary documentation for the mentioned section. I believe that this group has actually improved the publication activity, but it does not undertake any actions against Jews.

3, 9) I have actually been the editor-in-chief of the journal *Matematicheski Sbornik* since 1975. It may be seen from the table in *Science* that from 1970 till 1974 the number of Jewish papers in the journal constituted 36 percent of the total amount and from 1975 till 1978, 9 percent. I cannot consider that evidence of edito-

rial anti-Semitism. The statement contained in 9) that the number of the Jewish papers has diminished to zero is false, as may be seen from those data. I emphasize that I cannot check the truthfulness of the information in the table, since we do not consider our authors from the point of view of their nationality.

4) I am actually a member of the National Committee of Soviet Mathematicians, which includes 25 persons; as one of them I really have an influence 1/25 the size of the committee.

5) The negative decision about Margoulis' participation in the International Congress was unanimously made at a sitting of the National Committee of Soviet Mathematicians.

6) I have not been asked any questions about Margoulis' absence from the congress, and I have not given any answers about that subject.

7) I have not written any letters to the socialist countries ("satellites") concerning the organization of the congress.

8) I did not invite the writer Shetsov to speak at the Steklov Institute.

10) I never use the expression "judenfrei," which is foreign to my native language; nor do I use any Russian expression equivalent to that.

I consider the article in *Science* to be founded on false information and to be a personal, malicious slander against me.

L. S. PONTRYAGIN
Steklov Institute, Vavilov Street 33, Moscow, Soviet Union

Academic Ties with the Middle East

R. Jeffrey Smith's article on the controversies over Middle East investments in American universities (News and Comment, 2 Feb., p. 421) has recently come to my attention. As the article notes, a proposed agreement between the University of Pennsylvania and the Arab Development Institute in Libya was under consideration when the above institute withdrew the proposal. It was a controversial issue on our campus, and opinions were divided. However, I wish to state publicly my confidence in the fairness of the review process, which was taking place under procedures developed by our faculty, and my confidence in the judgment of the members of our faculty who were involved in the process, both the sponsors of the proposal and those who were reviewing it. There were no improper political pressures or discriminatory actions.

The University of Pennsylvania will maintain a strong interest in the Middle East, as in many other areas of the world, and will welcome research and training programs that are consistent with its mission, standards, and policies.

VARTAN GREGORIAN
Office of the Provost, University of Pennsylvania, Philadelphia 19104

Nutrition Program

In a recent article, William J. Broad (News and Comment, 8 June, p. 1060) cites the infant nutrition program of the U.S. Department of Agriculture (USDA) at the Baylor College of Medicine and that of the National Institute of Child Health and Human Development (NICHD) as examples of needless duplication of research and lack of coordination. Unfortunately, the article does not acknowledge the efforts we have made to avoid these problems.

The language of the Conference Report of the House of Representatives No. 95-1579, 18 September 1978, directs the Children's Nutrition Laboratory (CNL) of USDA at Baylor "to insure that there is close cooperation and coordination" with NICHD. The Conference Report further stipulates "that the USDA and the NIH develop appropriate interagency mechanisms to insure coordination of this program" and that our two agencies make the "research and program plan of [the CNL] consistent with the purposes of the [NICHD]." In order to carry out these directives, we and our staffs have met six times within the past year and have established a firm working relationship. In November 1978 we held a series of intensive discussions with the staff of the CNL in Houston. During these meetings we worked out a cooperative agreement among USDA, NICHD, and the Baylor College of Medicine. This agreement establishes an interagency advisory committee for the CNL. Both of us belong to this advisory committee, which is designed to foster cooperation and avoid unnecessary duplication of research on infant nutrition.

In addition to this arrangement, we agreed that both agencies must concur in the selection of a director of the CNL. We also agreed which areas of infant nutrition research each agency will emphasize. NICHD will continue to foster research on the clinical aspects of infant nutrition, especially those relating to prevention, diagnosis, and treatment. The CNL will devote its research efforts to ascertaining nutritional requirements of normal infants and to defining stan-

dards for nutrient intake during infancy. The CNL will also work to develop precise methodology for such determinations.

Our agencies share a keen interest in research on lactation, human milk, and colostrum. In fact, NICHD has contracted with the Baylor College of Medicine to develop procedures for the collection, storage, processing, and distribution of milk for clinical research. Some of the staff of the CNL work on this project, and the staff of the Human Nutrition Center of USDA follow the progress of this contract with interest. Cooperation, not competition, best describes this venture.

We are now in the midst of planning a conference on optimal nutrition during pregnancy that our agencies will sponsor jointly. We anticipate more such cooperative enterprises in the near future.

NORMAN KRETCHMER
National Institute of Child Health and Human Development, Bethesda, Maryland 20205
D. MARK HEGSTED
Human Nutrition Center, Science and Education Administration, U.S. Department of Agriculture, Washington, D.C. 20250

Interferon

In her two articles on interferon research (Research News, 15 June, p. 1183; 22 June, p. 1293), Jean L. Marx does an admirable job summarizing the many aspects of work in a most active field. I realize it is impossible to mention all investigators who made significant contributions. However, I would like to point out the omission of the name of Kurt Paucker of the Medical College of Pennsylvania, who has made many important original observations in interferon research. One of his milestone contributions (with K. Cantell and W. Henle) was the demonstration that interferon can inhibit cell division.

In Marx's first article, Edward Havell and I are given credit for finding "that the principal interferon made by leukocytes is not the same as the major form of interferon produced by fibroblasts." Although Havell and I did make contributions in this area, I believe the major portion of work elucidating antigenic differences between leukocyte and fibroblast interferon was done in Paucker's laboratory.

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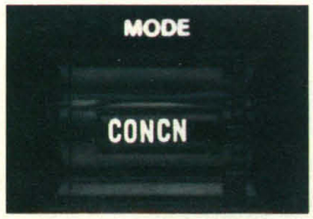

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14 September 1979, Volume 205, Number 4411 **SCIENCE**

Education for the 21st Century

Education stands out as the best basis for hope that this country and others will somehow manage to avoid enormous trauma during the transitions that lie ahead. But are young people being well counseled in preparation for the 21st century? What will be the shape of the future and the corresponding demands for trained people?

We have lived in an era of conspicuous consumption, rising expectations, and exponential growth. We have entered a period of uncertainty, conflicts in value systems, and possible decline in living standards. We face the necessity of creating an economy based on less oil, less energy, and changed raw materials. Society will not and cannot return to the Stone Age or even to a universal simple agrarian existence. It will not abandon knoweldge nor the ability to harness it. There will be no shortage of people ready to tell the politicians what should be done. There will be no shortage of instant solutions. But there may be a shortage of trained people capable of meeting society's physical needs.

In many ways the educational system is excellent, but in at least one respect it can be faulted. Its overall performance in counseling the young has been mediocre. Universities have practiced a policy of conducting an intellectual smorgasbord.

Since the students have not received adequate guidance from the educational institutions, their decisions have been based on other sources of information, notably the media. In the past this has resulted in some tragic wastes of talent. The hoopla of the "space age" led to career decisions that brought later disappointments. A lesser example was a vogue in oceanography. Currently it is fashionable to attempt to go to medical school. The pressures are easing somewhat but an enormous wastage continues. Stories appearing in the media can now attenuate the flow. A notable example a decade ago was the impact of a few stories about engineers driving taxicabs. Only now have enrollments in engineering recovered from the slump.

A basic problem in providing career guidance is that no one knows precisely what will be needed decades hence. In addition, at the universities campus politics gets in the way. At a time of budget squeezes and of departmental support based on enrollments, the fight for survival makes it difficult for faculty to be objective in advice. Another problem is that neither individual students nor their potential counselors can accurately gauge aptitudes, talents, drive, and judgment at the time of entry into the university. Few students are aware of their own potentials or are in command of themselves. An additional complication for potential scientists and engineers is that many curricular decisions are, in practice, irreversible. Basic courses in mathematics, chemistry, and physics must be taken in a timely fashion or options are foreclosed.

Whatever the changing shape of society, scientists and engineers will have essential roles. The uncertainties, though, make it advisible to caution against excessive specialization. In contrast, it seems desirable to adopt policies of maximum flexibility, of preservation of options, of being prepared to pursue lifelong learning.

For those who are capable of handling mathematics and abstract reasoning, this means building the necessary foundation in mathematics, chemistry, physics, and engineering design as well as obtaining adequate competence in verbal and written communications. Those with the necessary aptitudes should also be exposed to biology, earth sciences, behavioral sciences, and the humanities.

One cannot insist that students with no aptitude for the hard sciences take the fundamental courses, but it is difficult to visualize how they could be comfortable in the world of tomorrow without some inkling of the forces shaping their lives.

For their part, the universities should have a searching look at their counseling policies. There must be better ways than entrusting young lives to a hit-or-miss system.—PHILIP H. ABELSON

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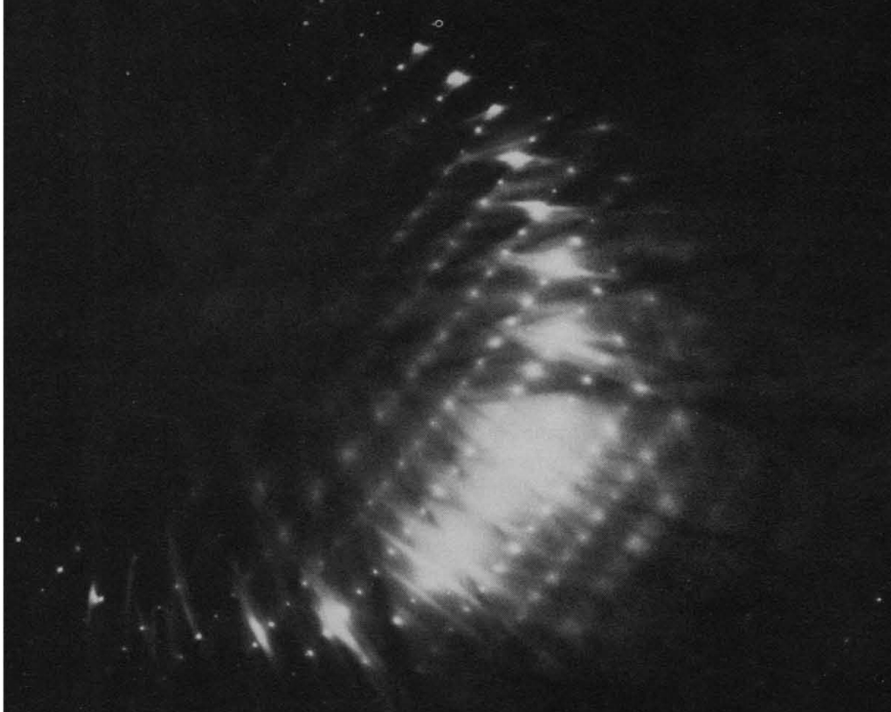

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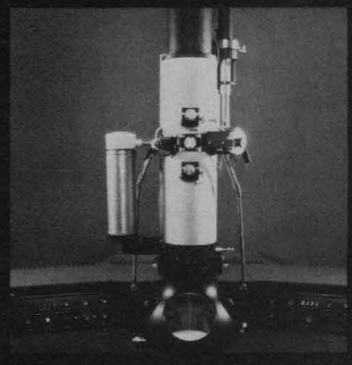

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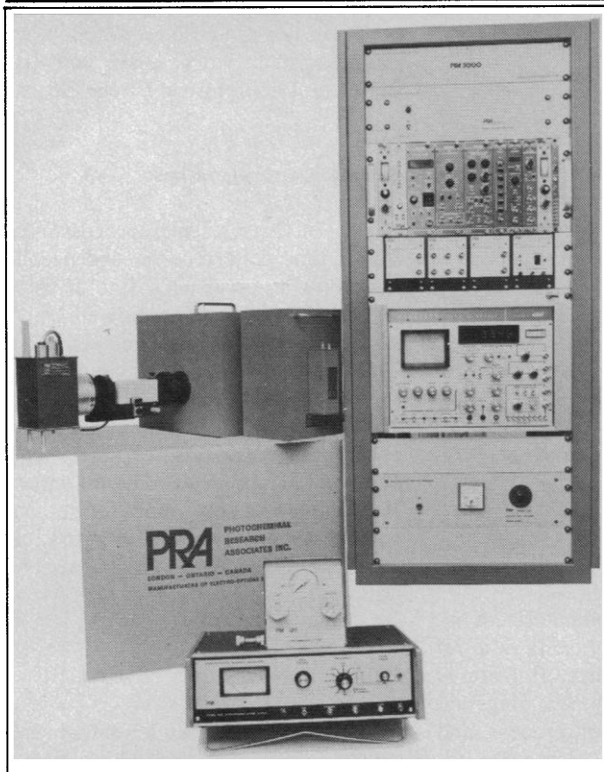

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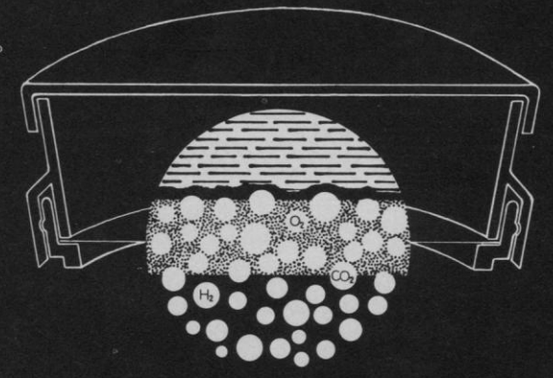


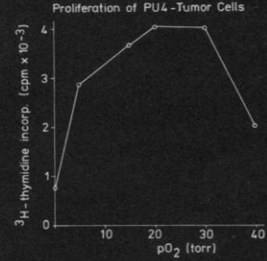
PETRIPERM

a novel culture dish with gas permeable membrane as cellular support

Additional advantages of the PETRIPERM membrane are:

- UV permeable 200 nm
- Suitable for high power light and fluorescence microscopy
- The membrane can be cut for cell cloning, electron microscopy, staining and documentation
- Chemically resistant to acids, bases and organic solvents

PETRIPERM is available either with a hydrophilic surface for optimal attachment, or with a hydrophobic surface for easy detachment of adherent cells.



In the intact animal, the pH, and the partial pressure of both oxygen and CO_2 of the cell environment are under total biochemical and physiological control. This state is not even approximated by available techniques of monolayer cell culture in conventional tissue culture ware. Continuously changing gradients of these parameters in the micro-environment of cultured cells will obscure the biological significance of culture dependent phenomena. PETRIPERM is the prerequisite for the precise control of pO_2, pCO_2 and pH in the cellular environment as gases reach the cultured cells directly through the highly gas permeable 25 μm thick membrane.

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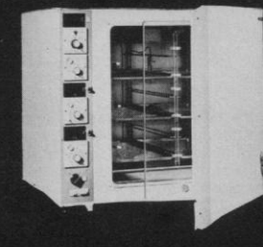

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The Critical Applications Adsorption column removes organic material from deionized or distilled water for high-performance liquid chromatography or gas chromatography–mass spectrometry. It consists of a column packed with an adsorbent medium, a diaphragm control valve, a membrane filter, a holder, and mounting accessories. Filtering is done with activated carbon and a 0.2-micrometer polycarbonate membrane filter. Hydro Service & Supplies. Circle 798.

Sampler for Respiratory and Metabolic Studies

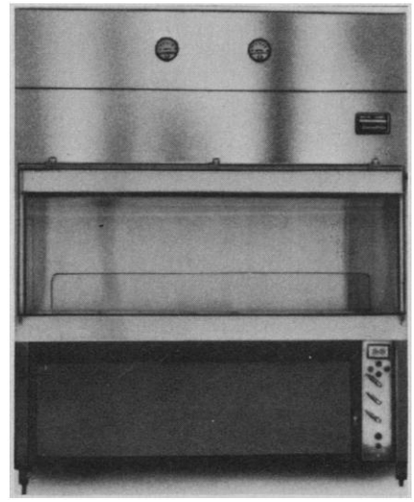
Douglas bags are used for collecting expired air for volume analysis and composition studies. This line is constructed of 0.020-inch polyvinyl chloride with electrically sealed seams. Advantages include light weight, flexibility, durability, and retentive power. Inside diameter of the tubing that connects the mouthpiece to the bag is 30 millimeters. The mouthpiece features a one-way valve and is removable for sterilization. Bags are offered in 50-, 100-, and 150-liter capacities, and in a 2-liter sampling size. Ealing. Circle 799.

Spectrophotometer

Model 100-80 is a computerized, ultraviolet-visible, double-beam, ratio-recording spectrophotometer. It features flexibility in wavelength scanning and expanded ability to collect, process, and report quantitative data. An x-y recorder and a digital printer are integral. Standard functions include wavelength scanning, repetitive scanning, calculation of derivatives, wavelength programming, time scan, automatic correction for base line, correction of curves, and automatic printing. A complete line of accessories is available. NSI Hitachi Scientific Instruments. Circle 794.

Total Exhaust Hood

The Biofume model is a laminar-flow biological safety cabinet and fume hood of class II type B. No air recirculates in the cabinet. The supply HEPA filter is located above the work area. Additional ambient air enters an opening at the bottom of the viewing panel at sufficient velocity to contain airborne hazards within. There are 4- and 6-foot models with stainless steel work areas and trim. Germfree Laboratories. Circle 796.



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The SCC is a microprocessor-controlled time code receiver and decoder. It derives its precision (30 to 50 microseconds relative to Coordinated Universal Time) from a signal relayed by the GOES east or west synchronous satellite to virtually any location in the Western Hemisphere. The instrument requires no calibration, correction, or initial setting once latitude and longitude are entered. In addition to a selection of pulse-coded outputs, time is displayed in hours, minutes, and seconds on a digital readout. LaBarge. Circle 797.

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Model 1850 features a solvent-resistant, stainless steel tray which may be lifted out for sample processing and storage or for washing. Test tubes from 12 to 18 millimeters in diameter are held in 35 small self-standing racks; total capacity is up to 210 tubes. Digital displays continuously indicate fraction intervals in time, drop, or volumetric units. Number of units deposited per tube and number of tubes filled are also indicated. ISCO. Circle 800.

Literature

Ultra-Low Temperature Freezers includes chest, upright, and walk-in models with guaranteed performance to −85°C in a 32.2°C ambient. Forma Scientific. Circle 801.

Gel Filtration Theory and Practice is a handbook of experimental design, procedures, and applications. Pharmacia Fine Chemicals. Circle 802.

Incident Light Microscopy covers theory and principles from sample preparation through optics and photography. Carl Zeiss. Circle 804.

Gas Chromatograph is devoted to the model 560 glass capillary GC's features, applications, and specifications. Tracor Instruments. Circle 805.

Glassware and Equipment is a catalog of scientific apparatus for general laboratories. Reliance Glass Works. Circle 806.

Spectrodensitometer describes the SD 3000 instrument for quantitative analysis of thin-layer chromatograms. Schoeffel Instrument Division, Kratos. Circle 807.

Newly offered instrumentation, apparatus, and laboratory materials of interest to researchers in all disciplines in academic, industrial, and government organizations are featured in this space. Emphasis is given to purpose, chief characteristics, and availability of products and materials. Endorsement by *Science* or AAAS is not implied. Additional information may be obtained from the manufacturers or suppliers named by circling the appropriate number on the Reader Service Card (on pages 1074A and 1170E) and placing it in the mailbox. Postage is free.

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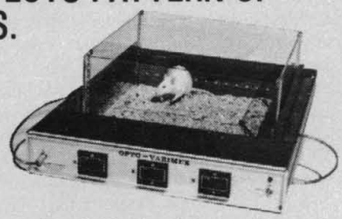

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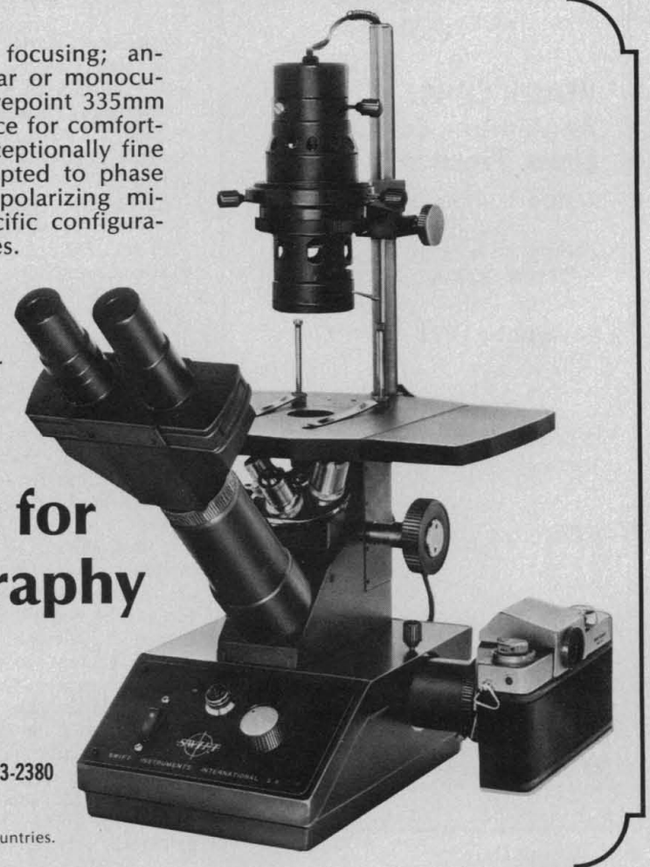

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