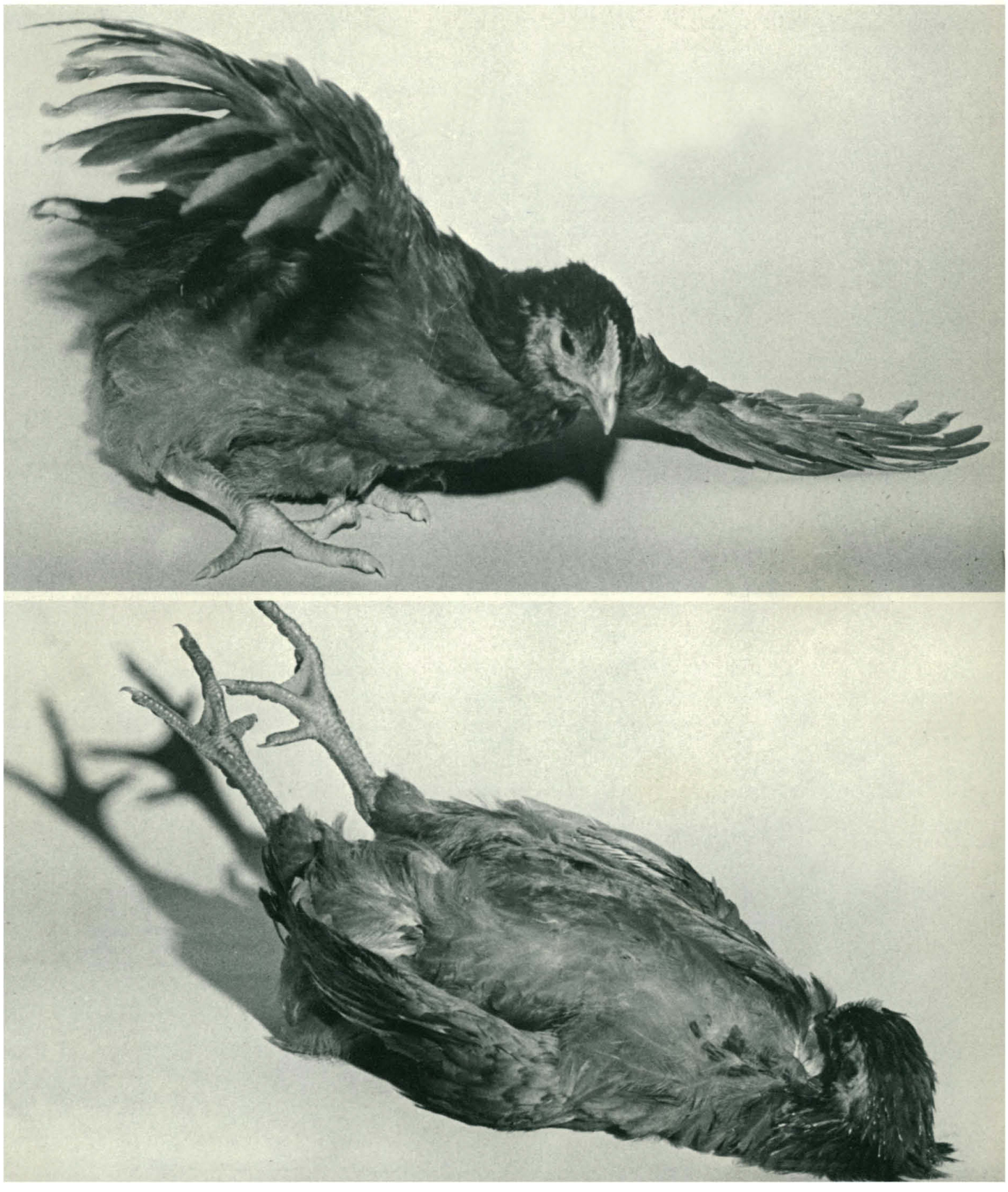
SCIENCE

18 June 1971

Vol. 172, No. 3989

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



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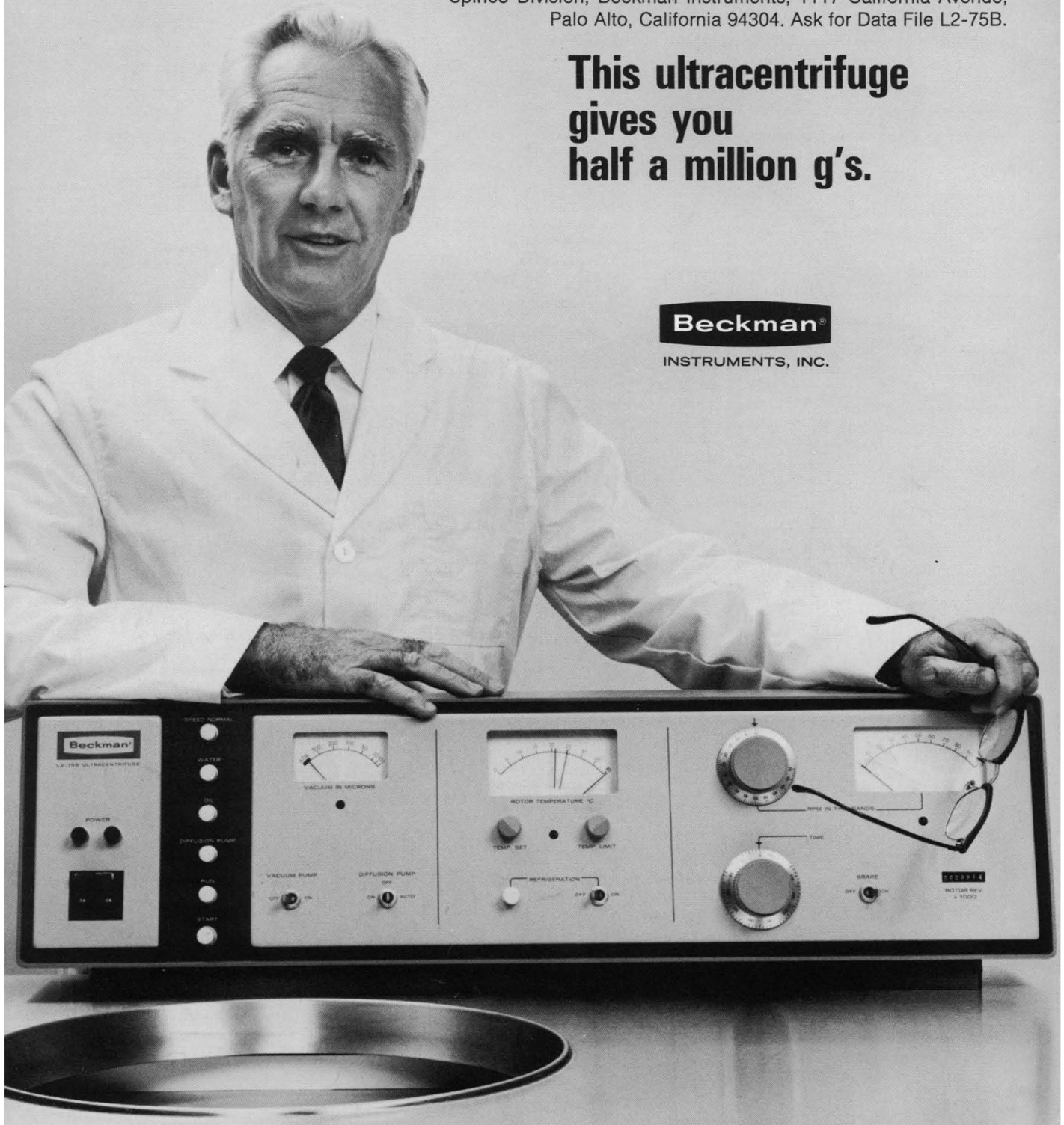

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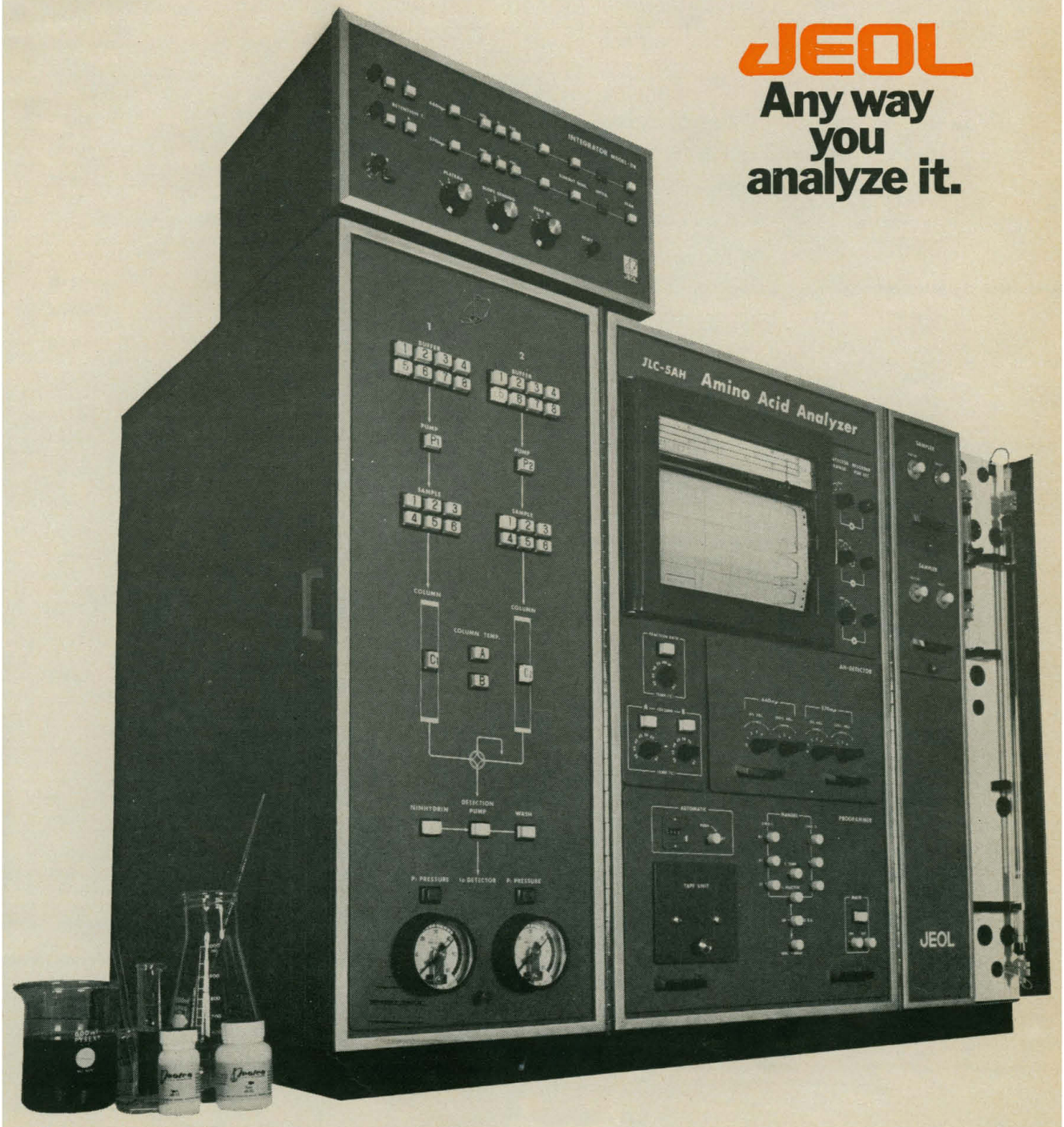

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18 June 1971
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SCIENCE

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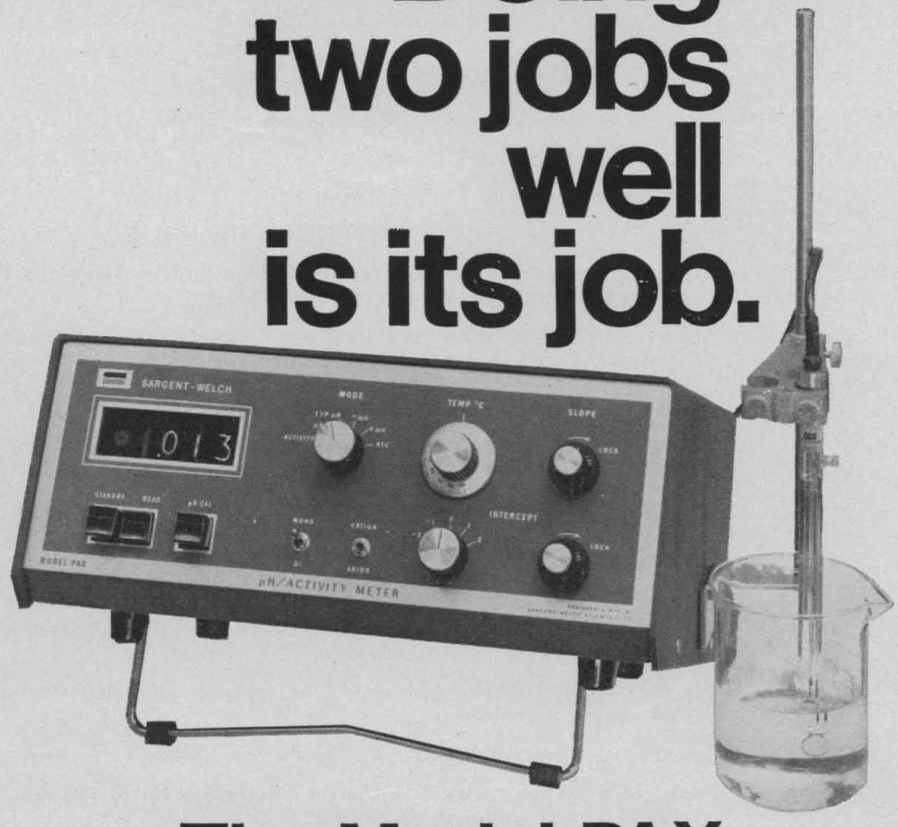
COVER

Normal (top) and dystrophic (bottom) chickens. The inability of the dystrophic chicken to perform muscular movements in order to maintain normal posture and to right itself when placed on its back may be correlated with an alteration in the ionic permeability of the pre- and postsynaptic membranes of *fast* twitch muscles. The dystrophic bird appears to lack some neurotrophic factor which regulates the properties of excitable membranes. See page 1260. [E. L. Nowak, Information Services, State University of New York at Buffalo]

Doing two jobs well is its job.



The Model PAX Digital-Indicating pH/Activity Meter. $995.

Job No. 1 — the measurement of pH.

Which the Model PAX accomplishes as both a full-range (0 to 14 pH) instrument *and* as an expanded-scale meter (span: 1.999 pH).

How well does the Model PAX do here? Its accuracy over the 0-14 pH range is 0.01 pH. When used as an expanded-scale meter, the Model PAX reads to 0.001 pH (especially useful where changes of a few thousandths of a pH unit are of critical interest).

Further, the Model PAX functions as a high-impedance millivoltmeter, giving direct indication of electrode potentials to 1 mv in the 0 to ± 1999 mv range.

Job No. 2 — the measurement of activity.

With proper reference and ion-selective electrodes, the Model PAX derives and displays ionic activity over a range of three decades (1:1000).

In this switch-selectable operating mode, the Model PAX exhibits an accuracy of ± 0.25% (reference conditions). And perhaps most importantly, activity readout is digital and direct, requiring no subsequent calculations.

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The Model PAX, the all-purpose digital meter for pH and specific ion potentiometry, costs only $995, about half of what you would expect to pay for a meter doing the same job(s). Investigate—ask your Sargent-Welch representative. Or write. 1-211

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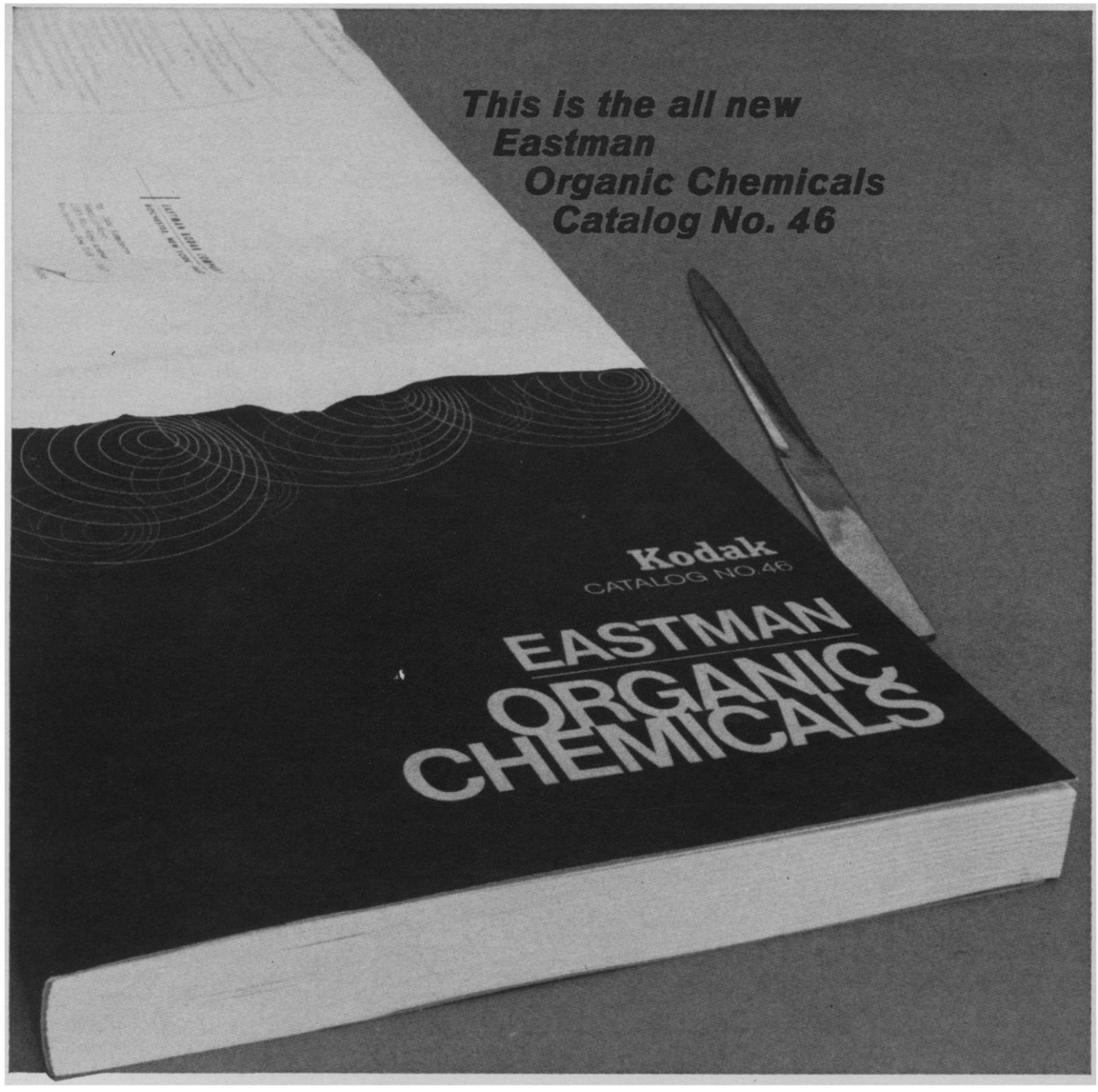

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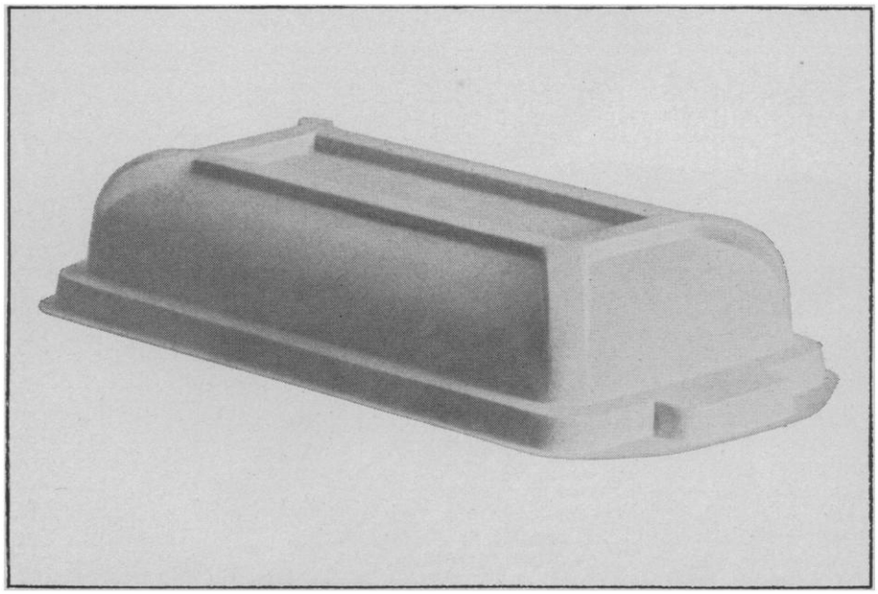
New Econo-Filter Covers improve animal production, protect long-term experiments



Improved breeding rates; greater protection for long-term experiments; generally healthier animals. These are some of the benefits you get by using Econo-Filter Covers on your animal cages. Molded in one piece from nonwoven spun polyester, they are the simplest, most effective way to protect animals against airborne infection, cross contamination and environmental stress. Econo-Filter Covers meet all published standards for porosity, air-permeability, and filtration of air-borne organisms, dust and other contaminants. They are available for all standard Econo-Cages and are reusable.

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What do you want? Healthier animals; increased animal production; or more protection for long-term experiments. You get them all with Econo-Filter Covers. For all the facts, contact your Econo-Cage/Econo-Filter Distributor or write the Scientific Division, Maryland Plastics, Inc., 9 East 37th Street, New York, New York 10016.

MP

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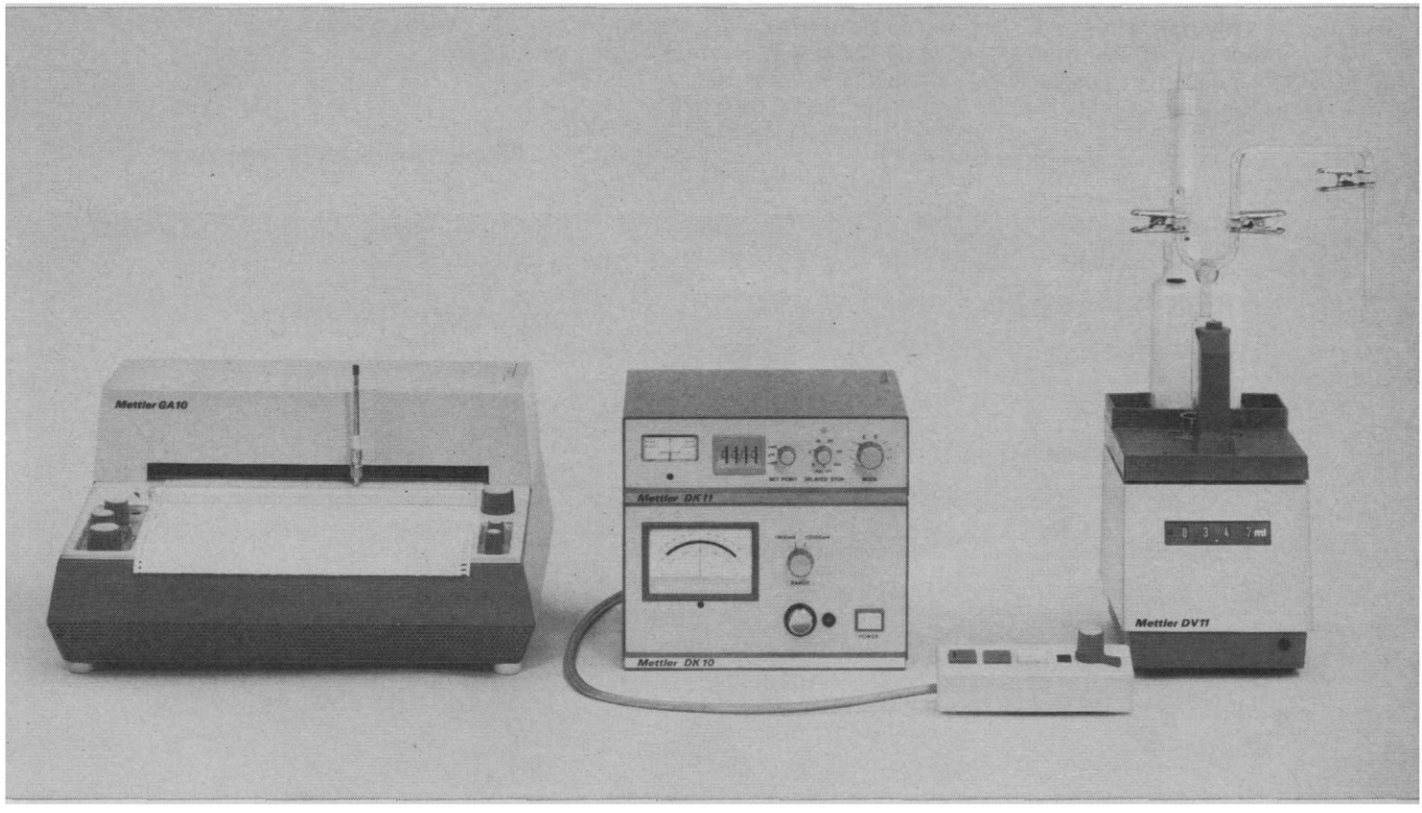
New from Mettler:
More automatic titration capability than any other single system



Mettler's Automatic Titrator, a six-module system, is more versatile than any other available today. For instance, you get fixed end-point titration, titration curve or first derivative recording, pH stat recording, manual fixed-increment titration, manual titration . . . all in one system.

It's push-button easy to operate. Just start it up, press a button, and you're under way with continuous, automatic control. Programming controls are simple.

Do you use more than one titrant? Rapidly interchangeable burettes snap-in, snap-out, of the drive to speed titrant changes.

Modules are linked electronically by cables. So you can separate electronic controls from wet chemistry areas, hoods, and glove boxes. For remote control, remote recording, or both.

This new system is designed for *all* potentiometric needs with both aqueous and nonaqueous solutions. It also provides for direct entry into data processing systems.

If you don't need all six modules now, get those that meet your current requirements and add the rest later.

There are more impressive features about this new Mettler system. And the best way to find out about them is to see for yourself with a demonstration. For starters, we have a brochure that gives you all the details on the Mettler Automatic Titrator. Ask for it.

We are Mettler Instrument Corporation, Box 3000, Princeton, New Jersey 08540, 609/448-3000.

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Only the Nikon Model M has a time-lapse exposure system that automatically adjusts for both the lighting and density of your culture. Once set up, the Nikon Model M literally works by itself, recording uniform exposures of your tissue culture. All through the night and day.

Our secret is the unique Nikon CFMA microflex attachment that integrates the functions of an intervalometer, motor drive and automatic exposure control with computer-like efficiency. So small it's hidden behind the camera.

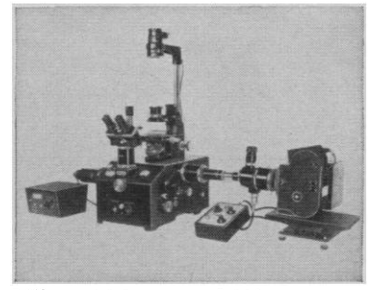
But that's not all. There's Nikon's impressive dual optics which permit simultaneous observation, cinemicrography and still photomicrography. You can see and manipulate the culture at eye level and take pictures at the same time.

There's rock-like stability assuring vibration-free photographic results with easy accommodation of flasks, petri dishes, culture chambers and incubators.

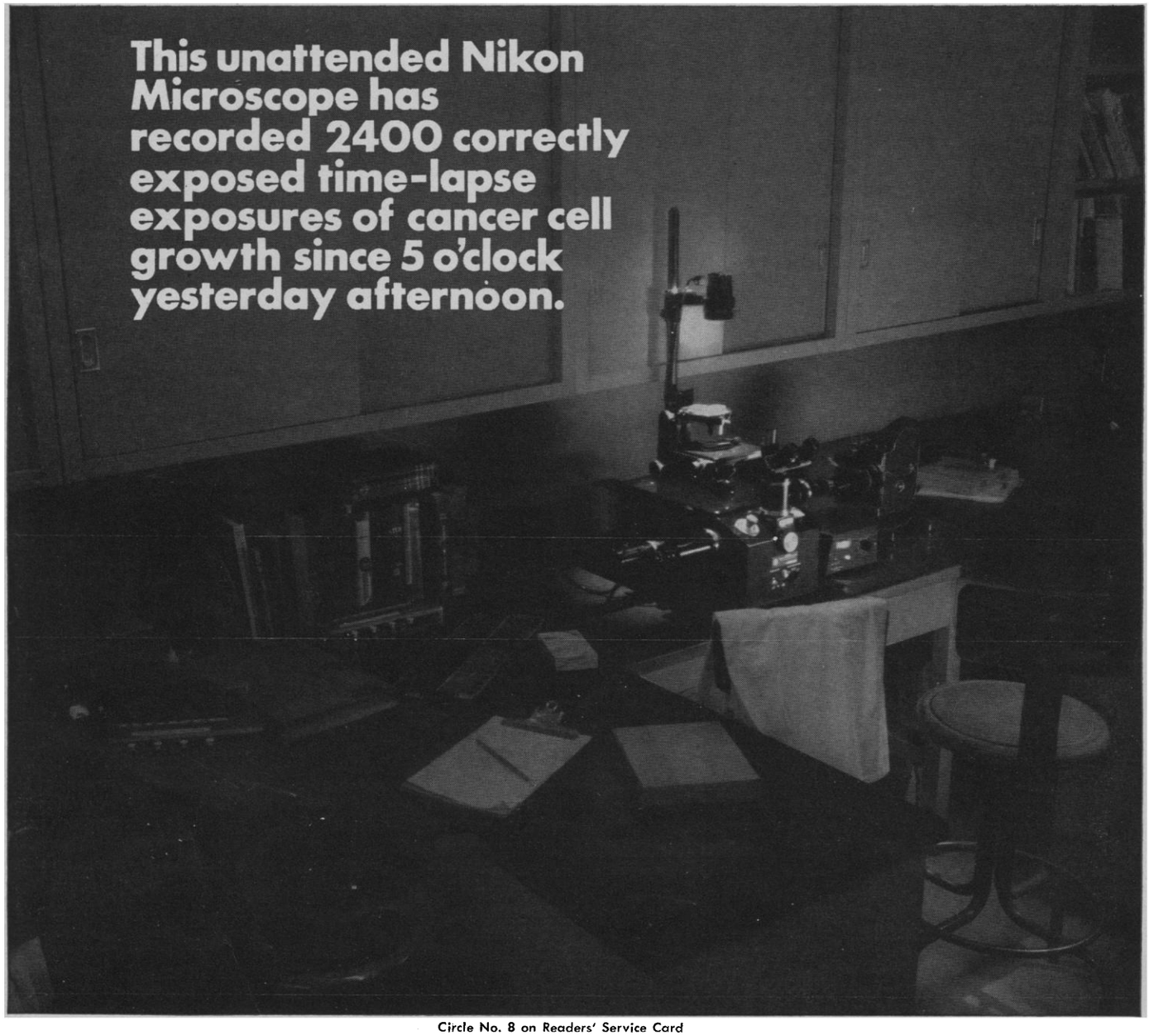
There's the wide variety of Nikon attachments—the data illuminator, the long working distance phase contrast condensers, the differential interference contrast attachment and the interference phase attachment—all exclusively devised for the Model M. And like all Nikon optical instruments, the focusing controls are located for easy, precise adjustments.

Then there's the extra plus of our quartz-iodine lamp which permits shorter exposure times without having to use electronic flash for stop motion photography.

In fact, the Nikon Model M is the kind of microscope you'd probably design for yourself. Write for information to: Nikon, Inc., Instrument Division, Subsidiary of Ehrenreich Photo-Optical Industries, Inc., Garden City, New York 11530. (516) 248-5200. (In Canada: Anglophoto Ltd., Ontario)



Nikon M Inverted Microscope



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Douse your flame and increase your sensitivity.

As an atom source in atomic spectroscopy, the flame is far from dead. It's just that there's a new flameless technique called carbon rod atomization. A whole new approach to atomic absorption spectroscopy with several very important advantages going for it. Especially in the clinical and pollution areas.

First, there's sensitivity. For many elements, the carbon rod atomizer produces detection limits *200 times better* than those obtained using orthodox flame techniques. Figure 2, for example, compares responses for a sample containing lead at a concentration of 0.2 ppm. Reproducibility using a carbon rod atomizer is also excellent (typically 3-5% RSD).

Then there's the sample volume requirement. For example, in blood analysis you may have very little sample to work with. Or, would just prefer to use very little. Well, 0.5μl and a syringe is all you need. For the analysis of lubricating oils, whole blood or other organic matrices, no sample preparation is required.

How It Works

Basically our Model 61 Carbon Rod Atomizer consists of a carbon rod work head, a power supply and a gas control unit.

In practice, the sample is syringed into an orifice in the rod (Figure 1). Then, electric current is applied in a preprogrammed sequence. The resulting heat causes the sample to be dried, ashed and finally atomized. (We might mention that the drying-ashing-atomizing sequence for the analysis in Figure 2 was accomplished in just 40 seconds.)

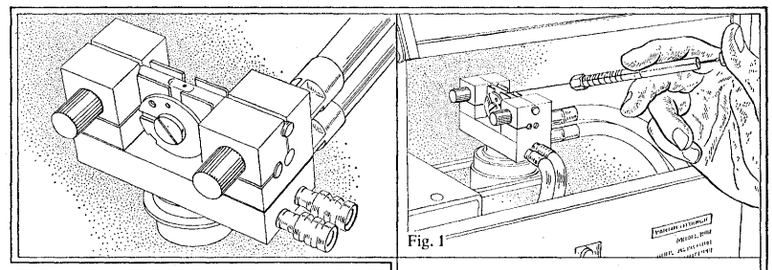

Fig. 1

The gas control unit provides metering and control of inert sheathing gas while the power unit provides the necessary operating current (only 3kW intermittent maximum current).

With carbon rod atomizing, once the parameters are established and the controls duly set, the entire three-cycle sequence is wholly automatic.

Fits Any AA Instrument

The Model 61's carbon rod work head is designed to fit directly onto any commercially available AA spectrophotometer. Fitting the Model 61 is as simple and quick as changing a burner head and absolutely no instrument modification is required.

See The Model 61 In Action

If you'd like to witness a live demonstration of the Model 61 Carbon Rod Atomizer in your area, fill out the coupon on this page and mail it to us. If you'd simply like more information write Varian Techtron, Walnut Creek, California 94598.

Sensitivity comparison for a sample containing lead at a concentration of 0.2 ppm.

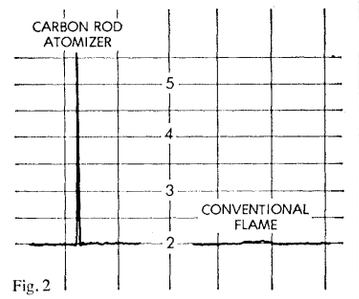

Fig. 2

Sirs:

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18 June 1971, Volume 172, Number 3989 **SCIENCE**

Opportunities in Plant Science

A major determinant of the quality of future civilization will be the wisdom and effectiveness with which man deals with renewable resources and with the natural environment. Central to good management of these matters is first-class competence in the plant sciences. Recently there has been much talk about ecology and the environment, but there has been no corresponding acceleration in the undergirding fundamental science.

At one time botany and zoology were roughly coequal in biology at universities. The emergence of large federal support for medically oriented research changed that relationship. Some aspects of botany, such as growth, were supported moderately by the National Institutes of Health, as was photobiology, including photosynthesis. Other aspects, such as ecology, were not encouraged. Thus, botany came to be overshadowed in some universities and lost identity and stature.

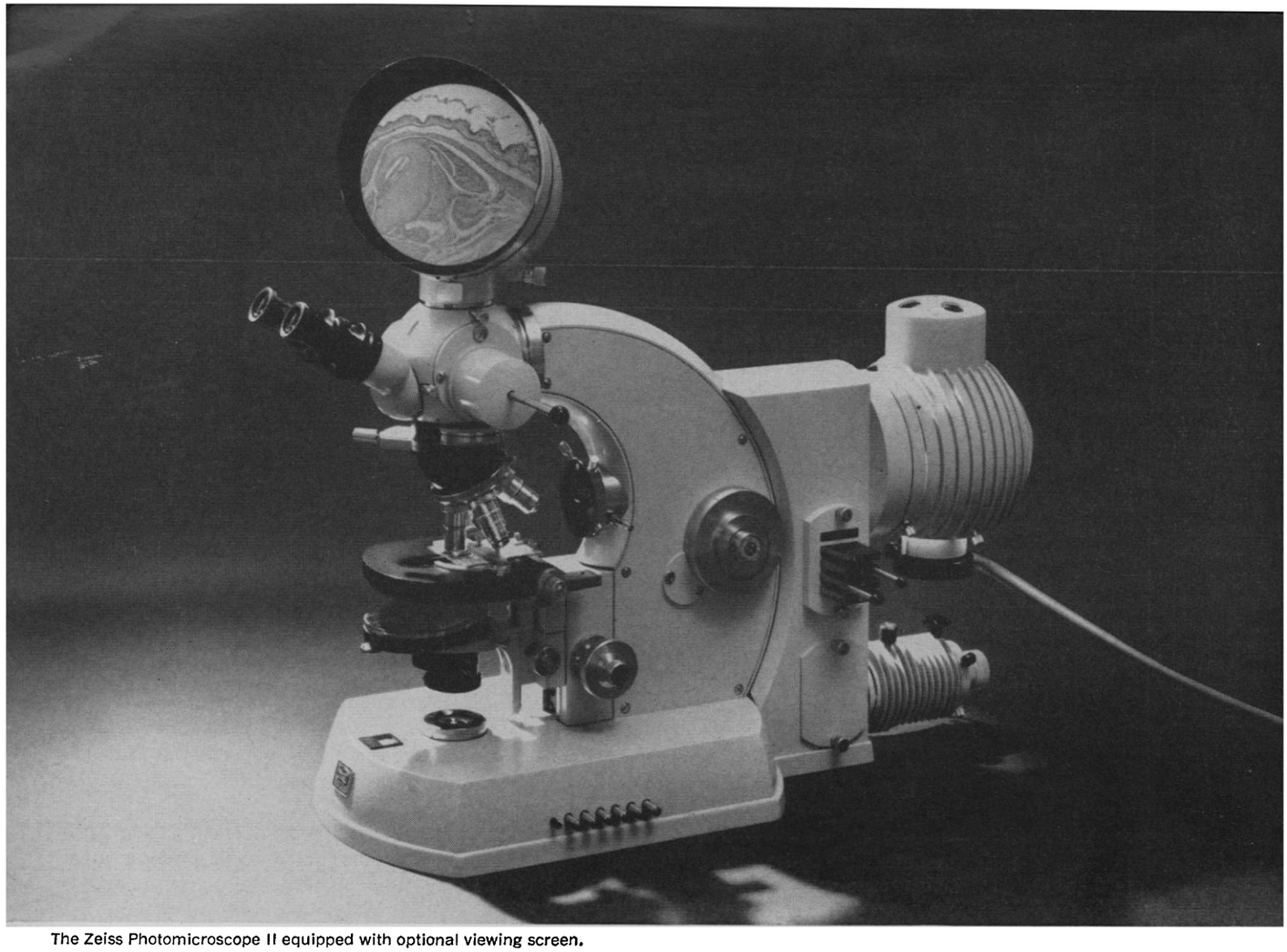
The financial strains of the past few years have been felt rather keenly by plant biologists. The NIH and the Atomic Energy Commission have found it necessary to diminish their support. The National Science Foundation has begun to increase its funding for botany, but the level is still quite low.

Botanists are almost unanimous in their disappointment that the Agricultural Research Service (ARS) has not chosen to institute a grant system comparable to that of NIH. Although academic botanists concede that agricultural research has been cost effective, they feel that ARS has not given sufficient support to work of a truly fundamental nature.

Given an improved intellectual climate and a moderate increase in funds, the plant sciences would flourish. There are substantial matters, both applied and fundamental, to address. The practical challenges facing plant biology include applications in temperate and tropical agriculture and in management of fields and forests. We have developed extraordinarily productive farm crops, but monoculture and the use of limited strains of plants makes the food supply vulnerable to plant enemies such as the southern corn leaf blight. Most of our agricultural research has been devoted to plants of the temperate zone, and the knowledge acquired is not readily adaptable to tropical conditions. Success to date of the "green revolution" indicates what might be accomplished.

A superb group of tools and techniques developed for use in animal biochemistry can be employed effectively in the study of plants. As one example, the use of amino acid analyzers has been crucial in the selection of maize mutants possessing a high lysine content and correspondingly high nutritive value. Recently, it has become clear that plants are involved in complex chemical warfare with pests and with each other (*Science*, 26 February 1971). Greater knowledge of the biochemistry of plants will add an important new dimension to comprehension of ecological relationships. The use of atomic absorption equipment can enlighten us on requirements and utilization of limiting trace elements. One of the developments that seems particularly useful is the creation of mobile laboratories, which enable investigators to study the behavior of plants under a wide range of natural conditions. Thus, the performance of a twig or leaf can be measured under controlled conditions while still attached to a plant.

Research opportunities in many aspects of botany await the energetic and imaginative investigator. Modest increases in support for fundamental research in the plant sciences would bring beneficial returns of disproportionately large magnitude.—PHILIP H. ABELSON



The Zeiss Photomicroscope II equipped with optional viewing screen.

The Zeiss Photomicroscope in NASA's lunar histology lab was set up like this.

A Zeiss Photomicroscope, equipped with Planapochromat and Neofluar objectives and a projection screen (one of the many optional attachments), was used at the Lunar Receiving Laboratory for the first histological studies on the mice and Japanese quail that had been injected with moon dust. This time-critical operation had to be completed before the end of the quarantine period. Never before had the classic techniques been applied to such an exotic end.

The optical quality and the automatic photographic capability of the Photomicroscope insured the reliability and time-saving the circumstances dictated. And the operator's colleagues could observe everything simultaneously on the large, bright viewing screen.

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The Dynamics of Aerocolloidal Systems. G. M. Hidy and J. R. Brock. Pergamon, New York, 1971. xvi, 380 pp., illus. $27. International Reviews in Aerosol Physics and Chemistry, vol. 1.

Economics of Water Resources Planning. L. Douglas James and Robert R. Lee. McGraw-Hill, New York, 1970. xx, 616 pp., illus. $16.50.

Education, Health and Behaviour. Psychological and Medical Study of Childhood Development. Michael Rutter, Jack Tizard, and Kingsley Whitmore, Eds. Wiley, New York, 1971. xiv, 474 pp. $9.75.

Electric Machinery. The Processes, Devices, and Systems of Electromechanical Energy Conversion. A. E. Fitzgerald, Charles Kingsley, Jr., and Alexander Kusko. McGraw-Hill, New York, ed. 3, 1971. xvi, 622 pp., illus. $9.95.

Electronic Circuits. Physical Principles, Analysis, and Design. Paul M. Chirlian. McGraw-Hill, New York, 1971. xxiv, 864 pp., illus. $15.50.

Elmer Gates and the Art of Mind-Using. Donald Edson Gates. Exposition, New York, 1971. xii, 540 pp., illus. $10.

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Entropy and Art. An Essay on Disorder and Order. Rudolf Arnheim. University of California Press, Berkeley, 1971. viii, 64 pp. + plates. $4.50.

Epidermolys's Bullosa. A Clinical, Genetic and Epidemiological Study. Tobias Gedde-Dahl, Jr. Johns Hopkins Press, Baltimore, Md., 1971. 180 pp., illus. $20.

Every War Must End. Fred Charles Iklé. Columbia University Press, New York, 1971. xii, 160 pp. Cloth, $8; paper, $2.95.

Excavations at Tepe Yahya, Iran, 1967–1969. Progress Report No. 1. C. C. Lamberg-Karlovsky. American School of Prehistoric Research, Harvard University, Cambridge, Mass., 1971. x, 134 pp., illus. Paper, $4.50.

Feasting with Mine Enemy. Rank and Exchange among Northwest Coast Societies. Abraham Rosman and Paula G. Rubel. Columbia University Press, New York, 1971. xiv, 222 pp. $10.

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Fundamenta Medicinae. Friedrich Hoffman. Translated from the Latin by Lester S. King. Macdonald, London, and Else-

vier, New York, 1971. xxvi, 142 pp. $10.25.

Fundamentals of Aeronomy. R. C. Whitten and I. G. Poppoff. Wiley, New York, 1971. xvi, 446 pp., illus. $14.95.

Fundamentals of Mathematics. A Discovery Approach. George H. McMeen and James W. Goodfellow. Van Nostrand Reinhold, New York, ed. 2, 1971. xii, 262 pp., illus. $6.95.

Fungal Spores. Their Liberation and Dispersal. C. T. Ingold. Clarendon (Oxford University Press), New York, 1971. viii, 302 pp. + plates. $13.

General Dynamical Processes. A Mathematical Introduction. Thomas G. Windeknecht. Academic Press, New York, 1971. xiv, 182 pp. $9.50. Mathematics in Science and Engineering, vol. 78.

Gordon Allport. The Man and His Ideas. Richard I. Evans. Dutton, New York, 1970. xxviii, 158 pp. Cloth, $5.95; paper, $1.95. Dialogues with Notable Contributors to Personality Theory, vol. 6.

Handbook of Neurochemistry. Vol. 6, Alterations of Chemical Equilibrium in the Nervous System. Abel Lajtha, Ed. Plenum, New York, 1971. xxii, 584 pp. $35.

Handbook of Psychotherapy and Behavior Change. An Empirical Analysis. Allen E. Bergin and Sol L. Garfield, Eds. Wiley, New York, 1971. xviii, 958 pp. $18.95.

The Heterocyclic Derivatives of Phosphorus, Arsenic, Antimony and Bismuth. Frederick George Mann. Wiley-Interscience, New York, ed. 2, 1971. xxiv, 716 pp., illus. $42.50. The Chemistry of Heterocyclic Compounds, vol. 1.

Highway Materials. Robert D. Krebs and Richard D. Walker. McGraw-Hill, New York, 1971. xvi, 428 pp., illus. $13.95.

Highways and Our Environment. John Robinson. McGraw-Hill, New York, 1971. xii, 340 pp., illus. $24.50.

Human Factors Applications in Teleoperator Design and Operation. Edwin G. Johnsen and William R. Corliss. Wiley-Interscience, New York, 1971. xii, 252 pp., illus. $12.95.

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