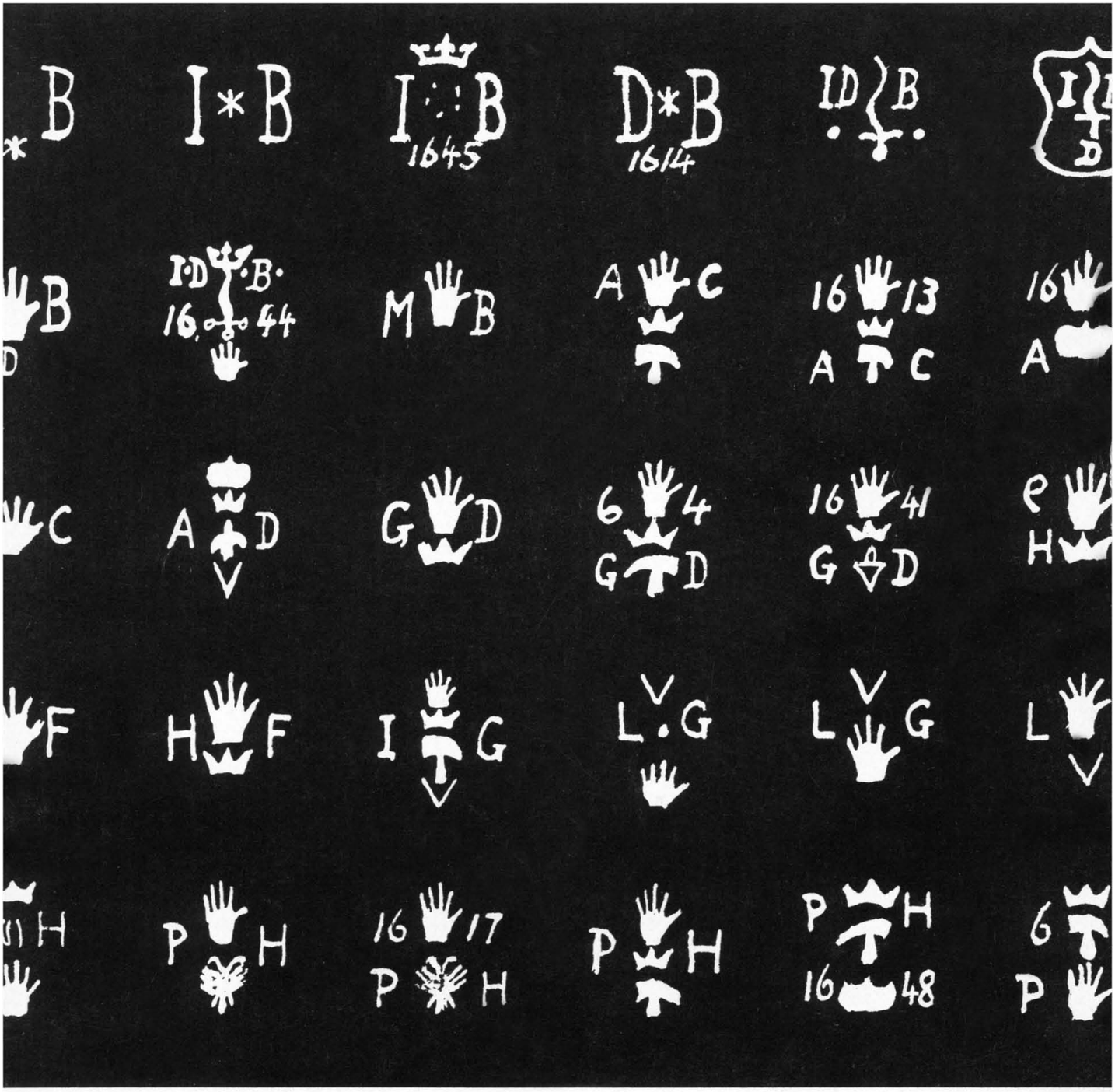
SCIENCE

8 October 1965
Vol. 150, No. 3693

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

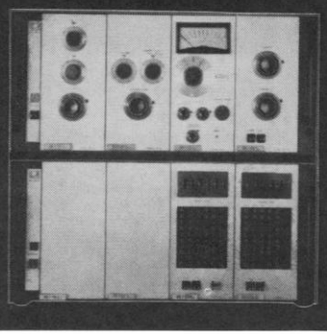


ANTWERP MASTERSIGNS

Instrument Issue

RIDL
DESIGNER SERIES

First family of modular nuclear instruments.



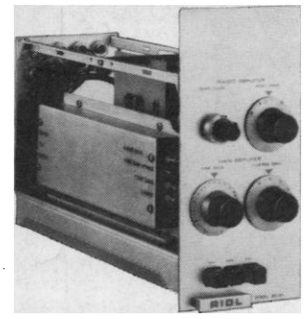
Today you can fulfill your experimental needs with the most complete, useful, and versatile system of modular nuclear instruments currently available — RIDL's Designer Series.* And tomorrow, when those needs change or new ones arise, you will find they are still being met as the series is expanded.

The benefits of totally integrated modular design are therefore always yours in the Designer Series. One of these benefits is the precise matching of your particular requirements. You are also assured of compatibility among modules, both existing and planned.

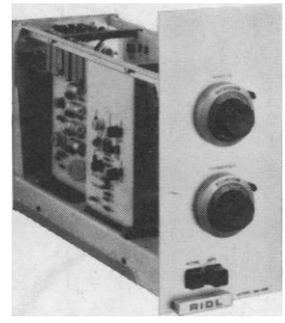
The adaptability and growth potential of the Designer Series helps you overcome the threat of system obsolescence. You can protect your initial investment and budget new purchases knowing that your changing needs will always be met.

The modules illustrated at right are representative of the classes within the Designer Series family. Rounding out the series are detectors, preamplifiers, stabilizers, coincidence equipment, spectrometer sweep units, printers, and programmers. We also offer a wide range of cases and cabinets, as well as kits for your own construction of one-of-a-kind, special-purpose modules.

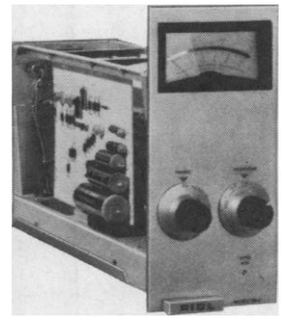
To investigate the unique adaptability of the Designer Series, consult your RIDL sales engineer or write us.



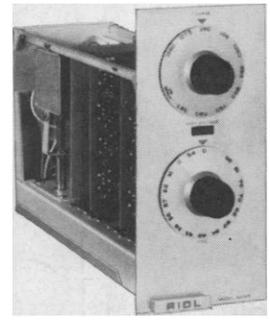
AMPLIFIERS. Single or dual. Also amplifier-discriminators, mixer amplifiers, and double delay line amplifiers.



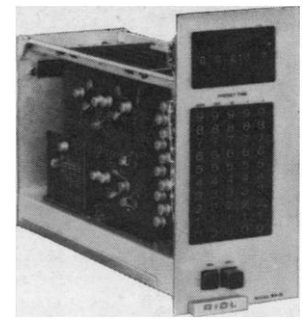
SINGLE-CHANNEL ANALYZERS. With integral and differential outputs, excellent baseline and window stability, wide dynamic range, high count rate, and very short pulse-pair resolution.



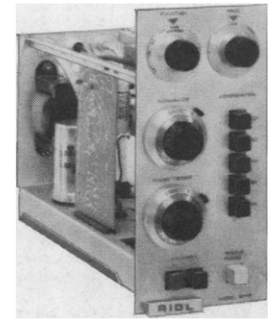
COUNT RATE METERS. Linear or linear/log. Eight linear ranges cover 0 to 10^6 cpm. Log ranges cover 10 to 10^6.



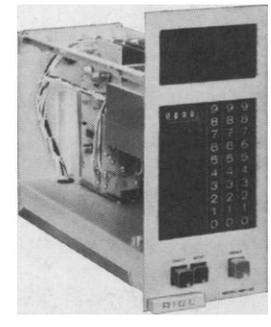
HIGH-VOLTAGE POWER SUPPLIES. Cover range of 0 to 6000 volts. Output adjustable continuously or in increments.



TIMERS. Five-decade, printing or non-printing, with ranges from 0.1 to 10,000 minutes or seconds.



PULSE GENERATORS. Offer variable pulse amplitude and polarity, selectable rise and decay times, fixed or variable pulse repetition rates, and exponential or rectangular pulse shapes.



SCALERS. With or without preset count in count capacities from 10^1 to 10^{12}. Accept pulse inputs to 10 mc/sec continuous with pulse-pair resolution less than 10 nanoseconds.

*Trademark of RIDL

NUC:R-4-274

RIDL
RADIATION INSTRUMENT DEVELOPMENT LABORATORY
A DIVISION OF NUCLEAR-CHICAGO CORPORATION
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In Europe: Donker Curtiusstraat 7
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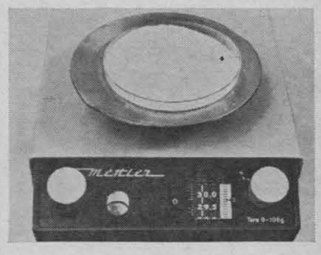
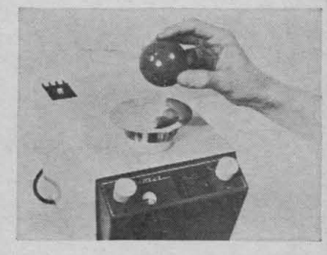
Scientists and engineers interested in challenging career opportunities are invited to contact our personnel director.

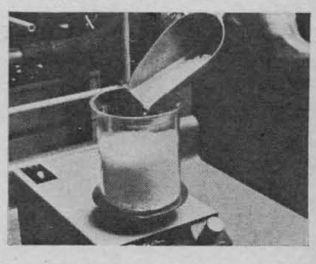
How many weighing problems can you solve with the new Mettler Top-Loaders?



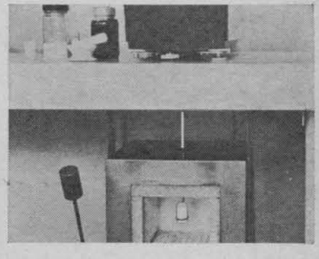
WEIGH UNKNOWNS
You simply place the sample on the pan and read the final results directly.



CHECKWEIGH
You can quickly weigh a whole series of objects and read results directly as over/under values.



WEIGH-IN
You can use the filling-line indicator and fill right up to the desired quantity without repeated stops for checking.



WEIGH BELOW
You can use the top-loader's built-in hook for convenient measurement of force or mass, or for weighing samples in ovens or submerged in liquids.

BATCH-WEIGH
You can rapidly tare to zero for each component.

Find out for yourself just how many problems you can solve with the versatile, new Mettler top-loaders. Write for demonstration or new 16-page catalog to Mettler Instrument Corporation, 20 Nassau Street, Princeton, New Jersey.

Mettler®

8 October 1965
Vol. 150, No. 3693

SCIENCE

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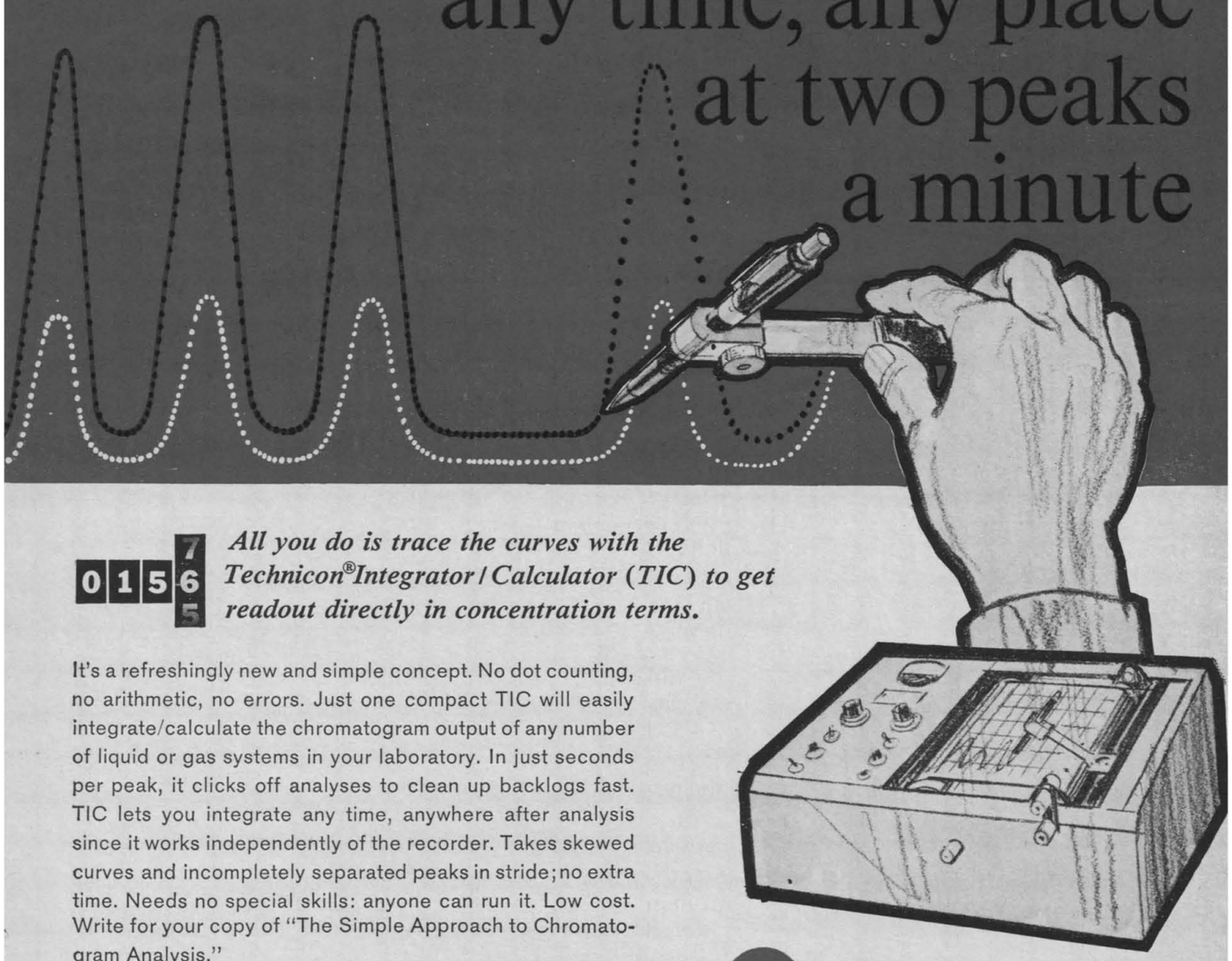
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

COVER

Seventeenth-century mastersigns of the makers of scales, weights, and boxes of the city of Antwerp, one of the centers for the manufacture and export of scales and weights. It was compulsory, starting in medieval times, for each master to choose a sign and imprint it on every item leaving his workshop. This identification was meant to prevent carelessness or cheating. See review of *Scales and Weights: A Historical Outline*, page 203. [Bruno Kisch, Brooklyn, N.Y.]

Integrate & calculate any chromatogram- liquid or gas- any time, any place at two peaks a minute



All you do is trace the curves with the Technicon® Integrator / Calculator (TIC) to get readout directly in concentration terms.

It's a refreshingly new and simple concept. No dot counting, no arithmetic, no errors. Just one compact TIC will easily integrate/calculate the chromatogram output of any number of liquid or gas systems in your laboratory. In just seconds per peak, it clicks off analyses to clean up backlogs fast. TIC lets you integrate any time, anywhere after analysis since it works independently of the recorder. Takes skewed curves and incompletely separated peaks in stride; no extra time. Needs no special skills: anyone can run it. Low cost. Write for your copy of "The Simple Approach to Chromatogram Analysis."

Appropriate Adjectives: fast, economical, versatile, flexible.

Appropriate Conclusion: TIC belongs in your laboratory.

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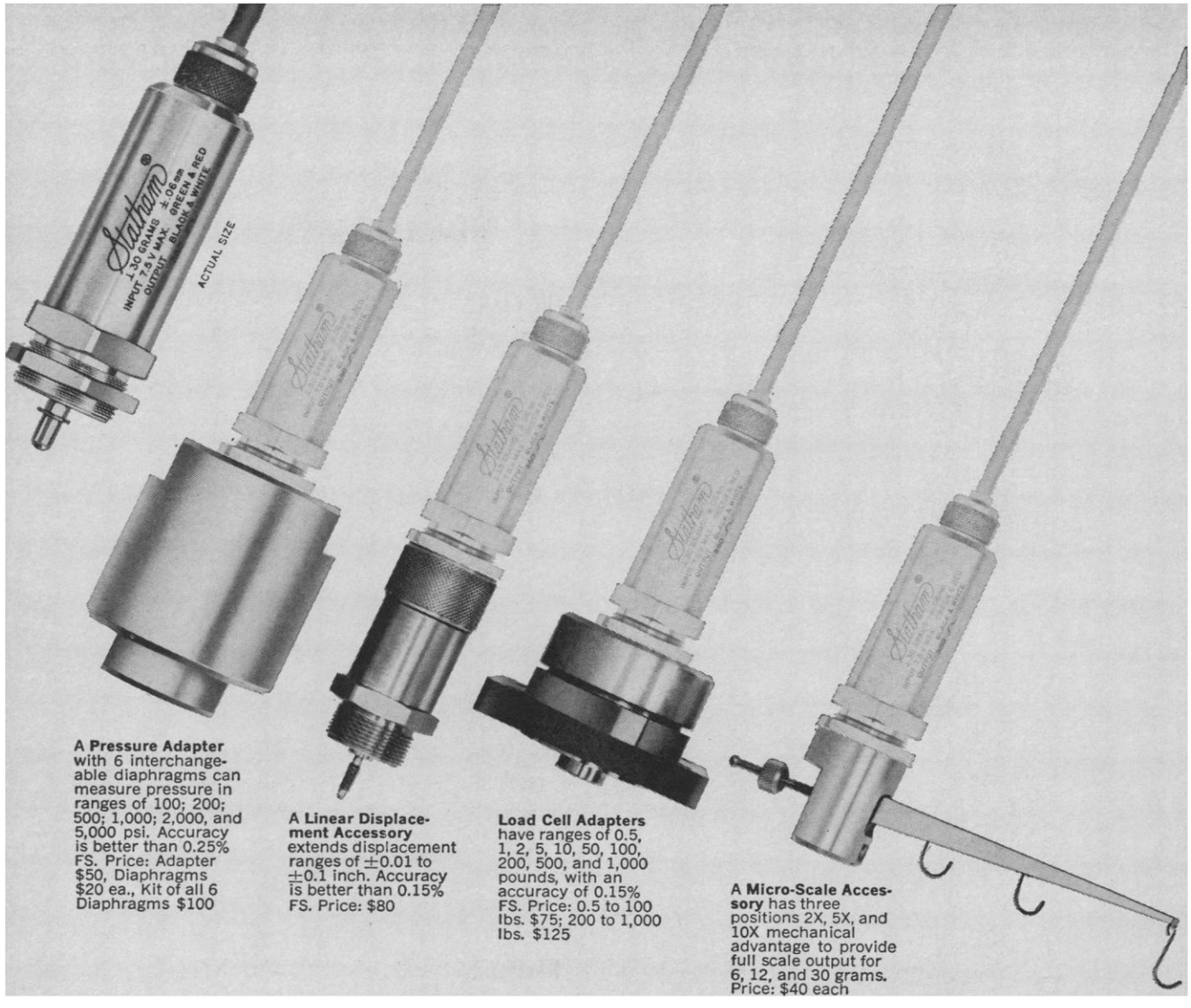

STATHAM'S UNIVERSAL TRANSDUCING CELL, COMBINED WITH THE APPROPRIATE ACCESSORY, CAN MEASURE ALMOST ANYTHING!

The Basic Cell is a Statham Zero-Length unbonded strain gage device which will measure loads up to 2 ounces, which has an output of 16 millivolts per volt, and an accuracy of 0.15% FS. If you burn it out with excessive input voltage, it will cost you $15 for our one-day repair service. The Cell cannot be damaged by mechanical overload. Price: $150.

Companion readouts are available for either battery or 115 volt AC operation. They feature a balancing and calibrating network and a precise long-scale meter with taut-band movement. Accuracy is ½% of full scale. UR4 battery operated analog readout $150. UR5 115 AC operated analog readout $385.

New accessories will be added from time to time. Owners will be kept advised. **Statham Instruments, Inc., 12401 West Olympic Boulevard, Los Angeles, California 90064**

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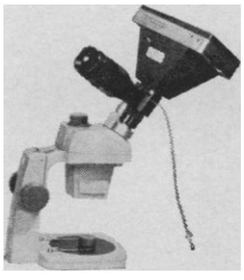
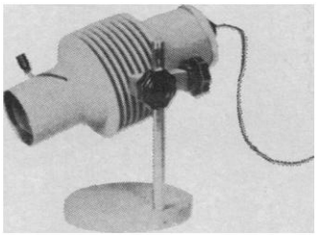


- **ZIRCONIUM ARC ILLUMINATOR 100 WATT**

  special achromatic, cemented condenser provides unusual intensity, high resolution and even illumination. A.C. power supply furnishes D.C. current for lamp operation.

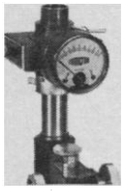


- **HIGH PRESSURE MERCURY ARC ILLUMINATOR 100 WATT**

  a mercury source of great concentration and intensity, rich in U V emission. QUARTZ optics are available.

- **TISSUE CULTURE SLIDES WITH FLAT DEPRESSION**

  for phase contrast microscopy. Available with slide bottom thickness of approximately 1mm and 2.5mm; also, with channel for drainage.



- **EXPOSURE METER FOR PHOTOMICROGRAPHY**

  attaches to microscope tubes. Features built-in meter for instant readings. May be left on the microscope during exposure.

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- Constant current (Regulation ±0.01%, line and load combined)
- Voltage regulation ±0.01% (line and load combined)*
- Extended voltage range, 2:1
- RMS ripple less than 300 microvolts
- Transient response 25 microseconds or less
- Temperature coefficient 0.015%/°C
- Drift typically less than 0.025% for 8 hours
- Output impedance as low as 25μ ohms + 0.3 μh
- No turn-on, turn-off overshoot
- Remote sensing
- Programmability
- Series or parallel operation

*Regulation for 6-volt models ±0.02%

For complete specification and application information on the QB Series, and all other Sorensen products, send for the new 140-page Controlled Power Catalog and Handbook. Contact your local Sorensen representative, or write Sorensen, Richards Avenue, South Norwalk, Conn. Or, use reader service number 200.

ELECTRICAL SPECIFICATIONS

MODEL NUMBER	OUTPUT VOLTAGE RANGE (VDC)	MAXIMUM OUTPUT CURRENT (AMPS.)	PRICE	MODEL NUMBER	OUTPUT VOLTAGE RANGE (VDC)	MAXIMUM OUTPUT CURRENT (AMPS.)	PRICE
QB6-2	5-9	2	$ 98	QB28-2	18-36	2	$160*
QB12-1	9-18	1	98	QB50-1	40-60	1	160*
QB18-.75	13-26	.75	98	QB6-15	5-9	15	215*
QB28-.5	18-36	.5	98	QB12-8	9-18	8	215*
QB6-4	5-9	4	108	QB18-6	13-26	6	215*
QB12-2	9-18	2	108	QB28-4	18-36	4	215*
QB18-1.5	13-26	1.5	108	QB50-2	40-60	2	215*
QB28-1	18-36	1	108	QB6-30	5-9	30	285*
QB50-.5	40-60	.5	108	QB12-15	9-18	15	285*
QB6-8	5-9	8	160*	QB18-12	13-26	12	285*
QB12-4	9-18	4	160*	QB28-8	18-36	8	285*
QB18-3	13-26	3	160*	QB50-4	40-60	4	285*

*Optional volt and ammeters $30

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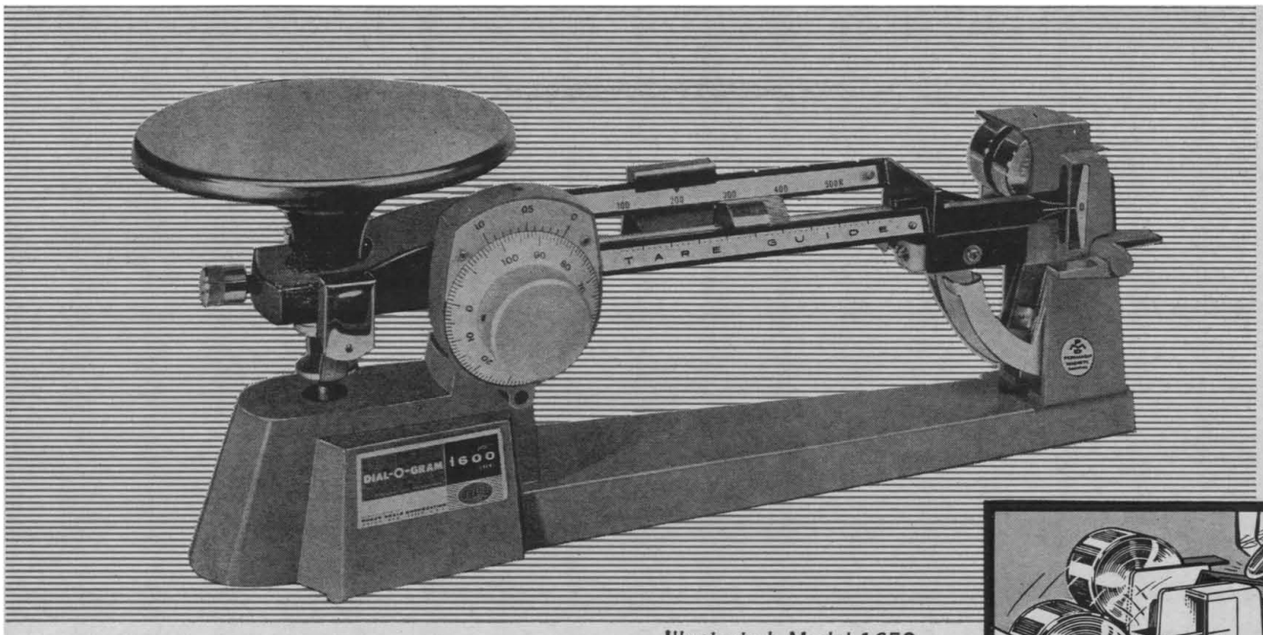

Illustrated: Model 1650

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NEVER BEFORE . . . . A BALANCE WITH SO MANY FINE TIME-SAVING FEATURES AT YOUR FINGERTIPS FOR YOUR *Fastest Weigh Yet!*

Now Ohaus engineering brings you an entire new world of operational ease and speed with the all new Dial-O-Gram 1600 . . . the first and only low-form dial balance ever offered.

Readings to 100 gram are direct to the nearest 0.1 gram on the smooth-acting dial. Above 100 gram readings are accomplished through the combined use of a poise and a revolutionary new method of weight loading . . . "Touch-N-Weigh."

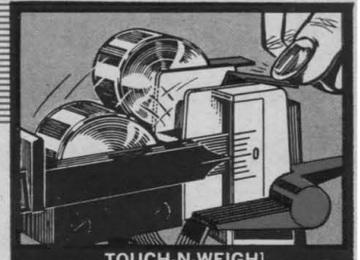
Concealed magnetic damping assures fast, friction-free operation.

The undivided tare beam has a patented tare poise for fine adjustment.

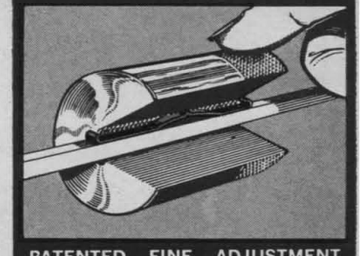
To insure strength and rigidity the beam is constructed of high-strength, die cast aluminum with ends cross braced.

Like all fine balances, the Dial-O-Gram employs precision sharpened knives and agate bearings.

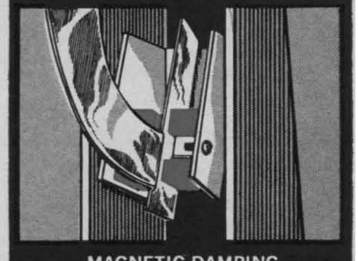
The rugged die cast base is handsomely finished in corrosion-resistant epoxy.



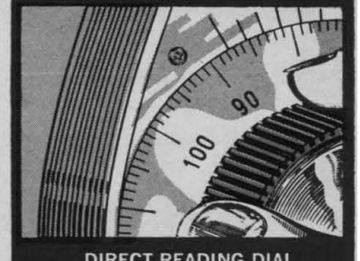
TOUCH-N-WEIGH[1]
RAPID WEIGHT LOADING



PATENTED FINE ADJUSTMENT
TARE POISE



MAGNETIC DAMPING



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New Coleman Medallion pH Meter serves both research and field requirements

The Coleman Medallion pH Meter is the only high-precision instrument of its type which operates either on a rechargeable battery or on ac power lines.

Operating over the full 0-14 pH range, it provides accuracies of ±0.001 pH at the standardization point and ±0.005 pH over any 3 pH span. This is equal to that of research and expanded-scale instruments that operate solely on batteries *or* on ac power.

Its unique and exclusive feature allows the Medallion to be used as a line-operated laboratory pH meter or to be readily transferred to battery operation for plant or field use. Its ready flexibility from line to battery allows the Medallion to be operated free of stray electrical fields, power line transients, ground loops, and other effects common to laboratory ac power lines.

Including its battery, the Medallion weighs only 8.2 lbs. This compactness and inherent portability have been achieved through the use of solid-state circuitry with a single, rechargeable nickel cadmium battery. The battery may be recharged more than 500 times, with each charge affording approximately 20 hours of operation. Under average conditions, the Medallion's battery will last ten years or more; this eliminates the expense and nuisance of frequent battery replacement. Medallion is the only pH meter designed to use the efficient nickel cadmium battery.

The Medallion may be operated in a vertical, horizontal, or tilted position. It is extremely simple to operate—after standardization, only the null-balance control is needed for single or repetitive determinations.

For more information about this research/field, battery/line instrument, write for literature or ask your laboratory supply dealer for a demonstration.

Ask for Bulletin B-298

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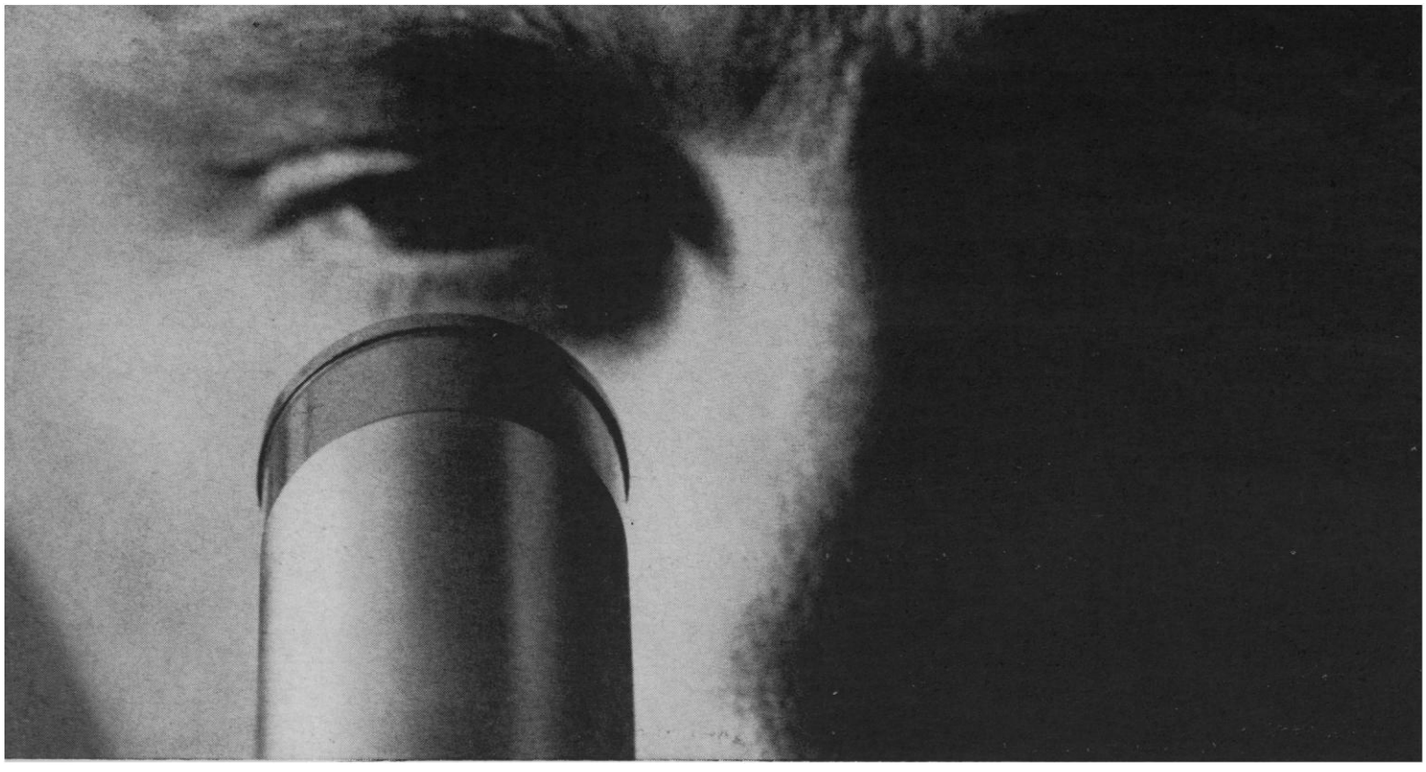

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Gold Seal Slides come to you pre-cleaned, ready to use, in the *new* lint-free box. This box has an inner cellophane wrap as well as a sealed outer wrapper. The box also contains plastic inserts which readily convert the empty box into a Slide File convenient for transporting, filing and storing prepared slides. The special Stand-Rite tabs keep the slides upright in the box during dispensing, permitting fingertip removal without smearing.

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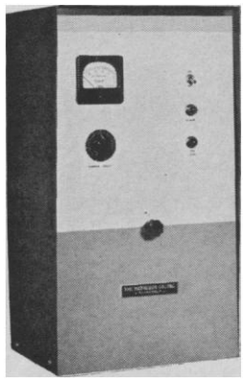
New Equipment from Matheson

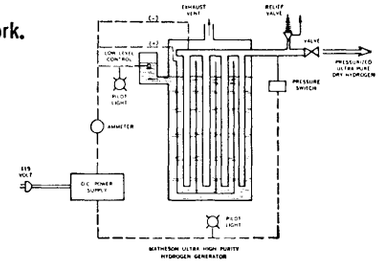


Ultra-High Purity Hydrogen Generator

Produces dry hydrogen under pressure for less than 2¢ per 100 liters. Impurities less than 1:100,000,000. Eliminates contamination possibility. unit is especially applicable for gas chromatography and semi-conductor work.

Generator operates on new principle and is self regulating. Uses only water & electrical energy. Assures continuous hydrogen at pressures to 60 p.s.i.g. Rated capacity: 150 milliliters per minute. (0.31 scfh.) Hydrogen is produced as required to rated capacity. Easy to install & operate. Needs no maintenance.

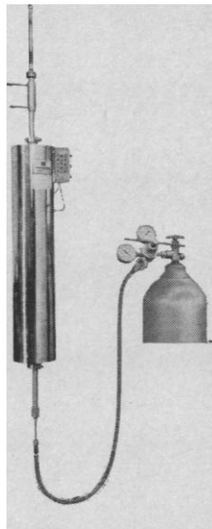
Generator consists of electrolytic cell, rectifier, regulating valves & switches. Electrolytic cell anode is nickel; cathode is bundle of palladium-alloy tubes. Electrolyte is strong alkali. During electrolysis, oxygen collects at anode and is vented to atmosphere. Ionic hydrogen is deposited at cathode. Ions drawn by electrolytic solution pressure penetrate tubes and recombine to form molecular hydrogen under pressure. Mail coupon for data.



Mass Flowmeter

Highly accurate and stable direct reading unit for wide range of flow rates for practically all gases. Needs no ambient temperature correction from 40°F. to 200°F. Needs no gas pressure correction from 0.1 to 250 p.s.i.a.; 2% accuracy in these ranges.

Measures gas flow down to 0.01 standard cc/min. even for hydrogen or helium. Measurement repeatability within 1%. Can be used with recorders. Output signal approximately 0-2 mv. d-c. Once installed, needs no recalibration. Circuity is 100% solid state for maximum reliability. Flow transducer withstands extreme vacuum, pressure and flow rates Comes in 4 basic flow ranges. Mail coupon for data.



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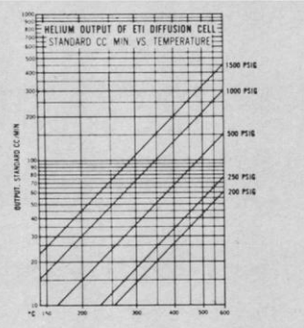

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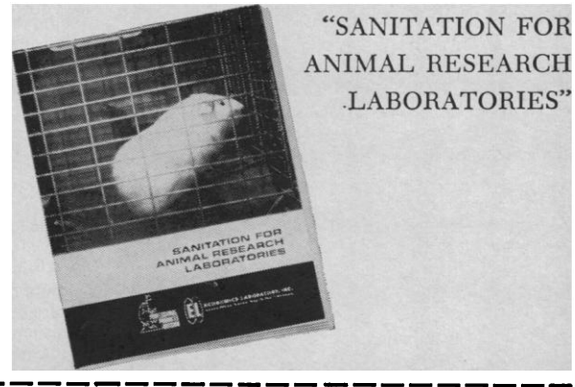

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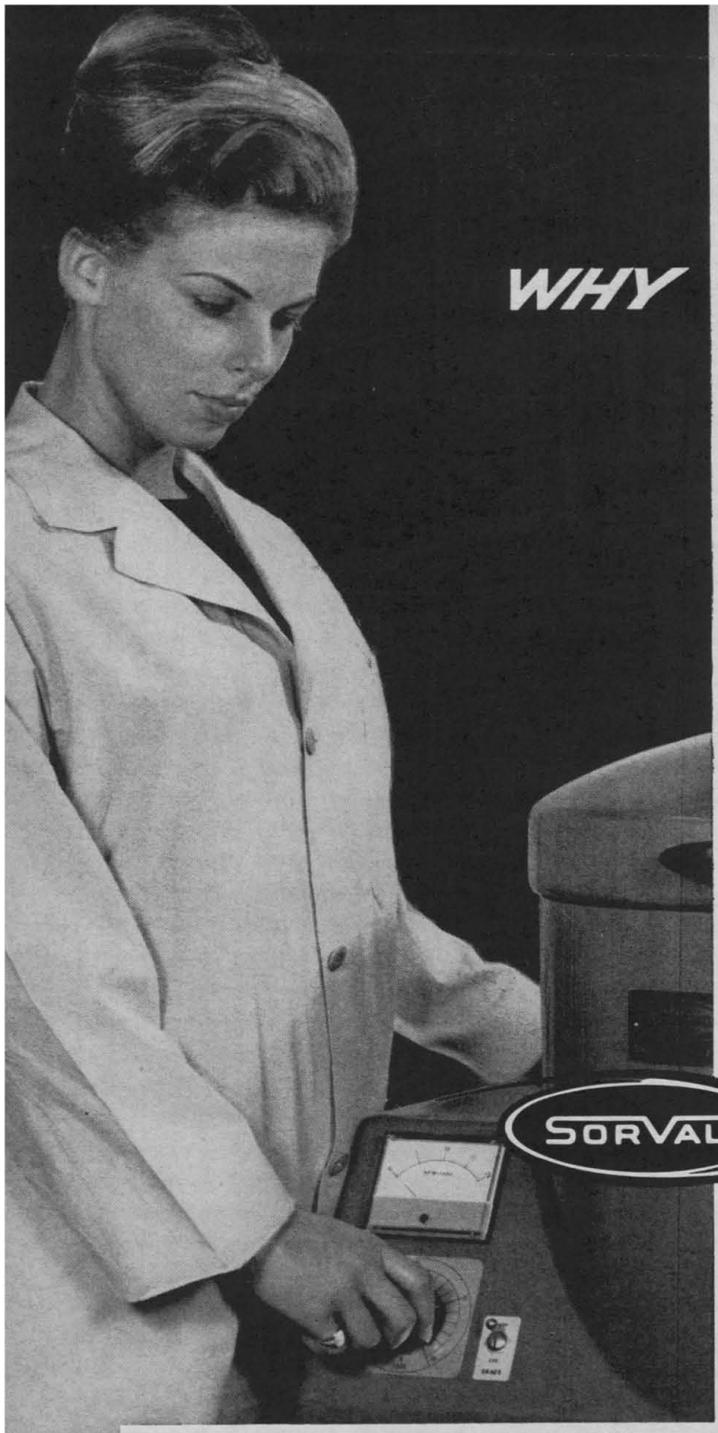

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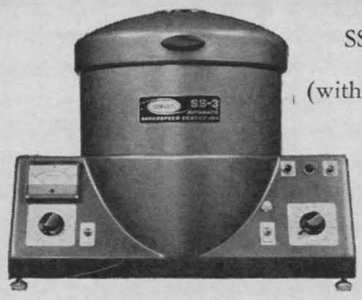

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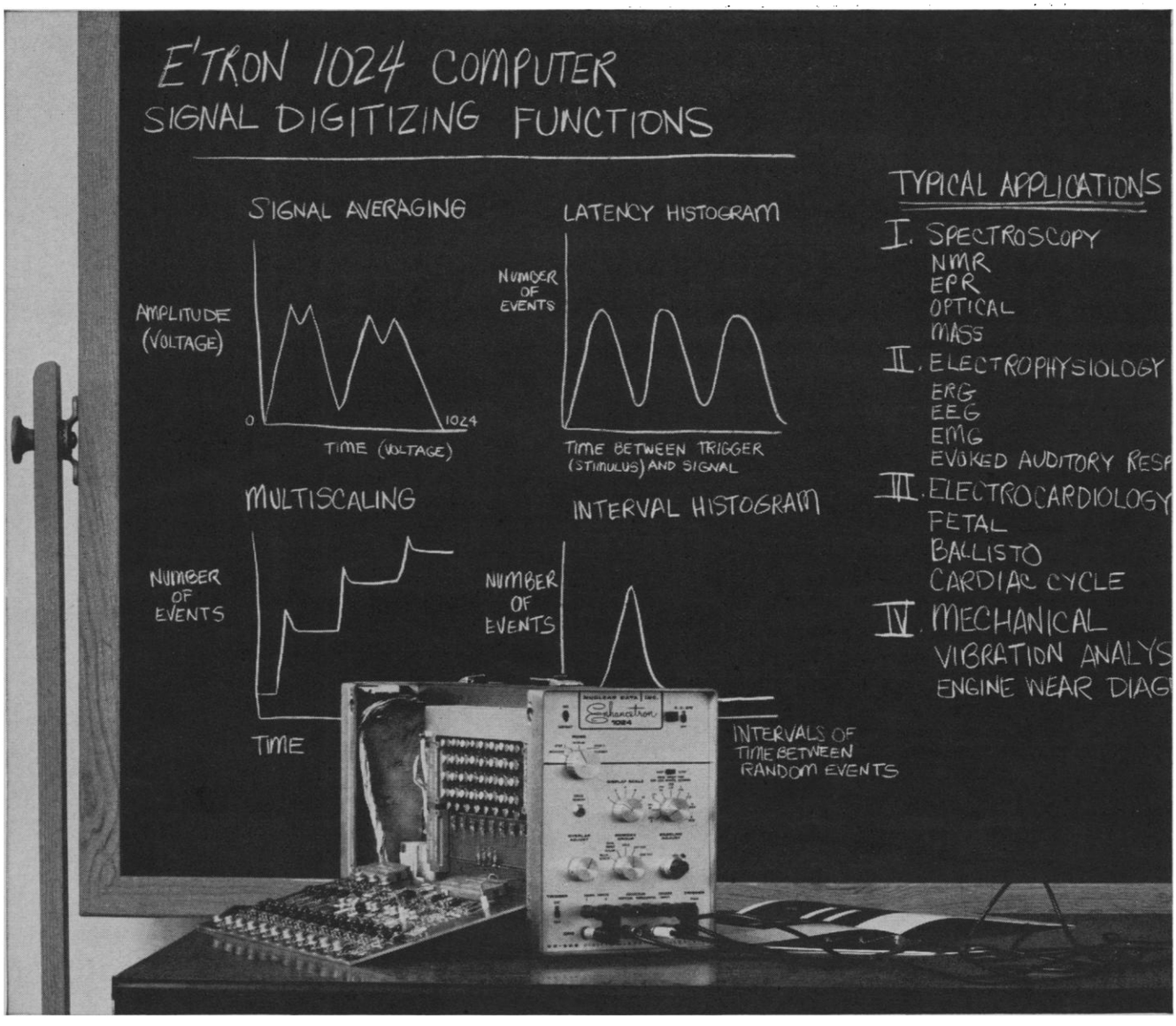

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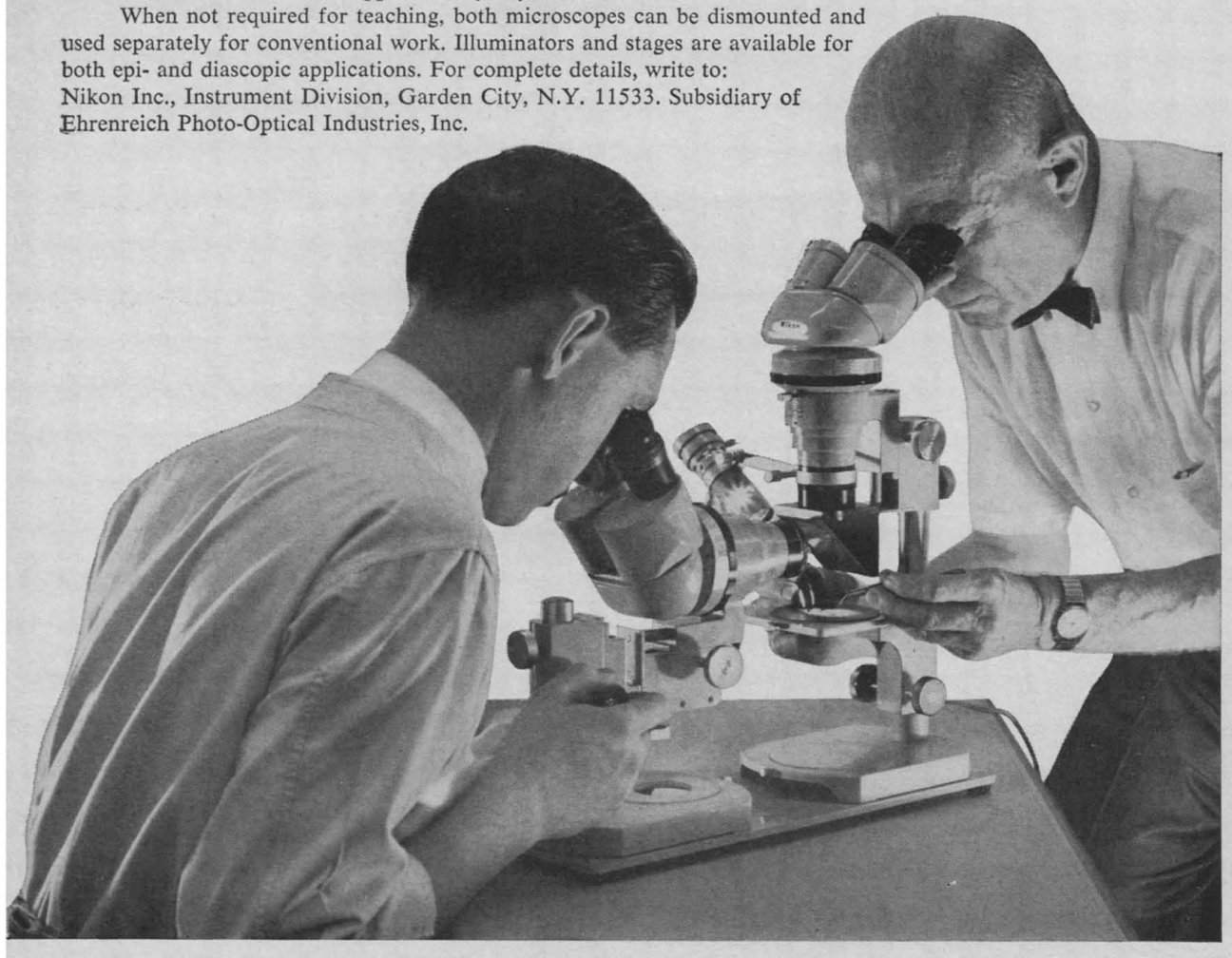

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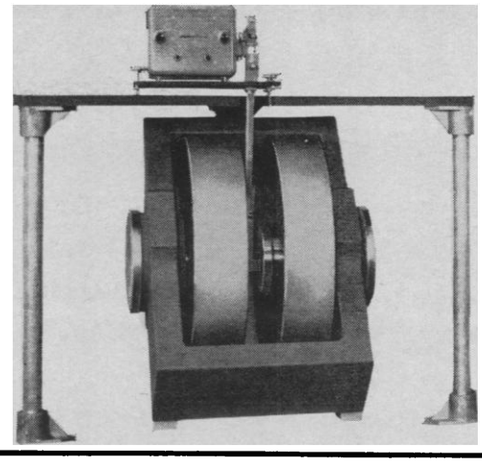

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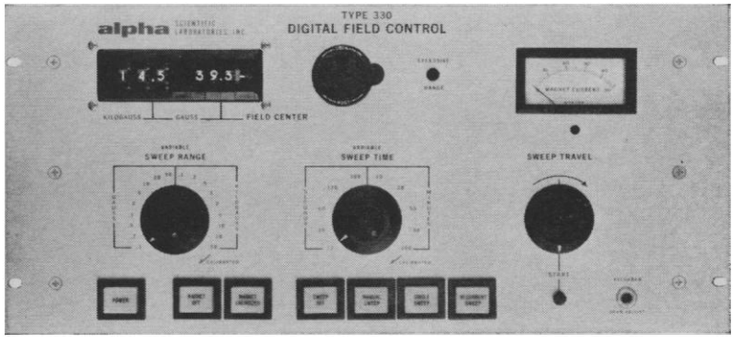

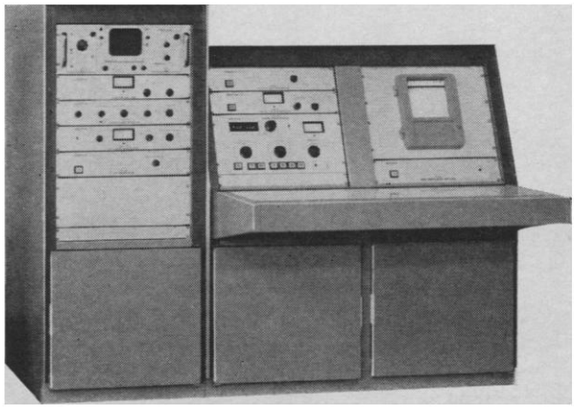

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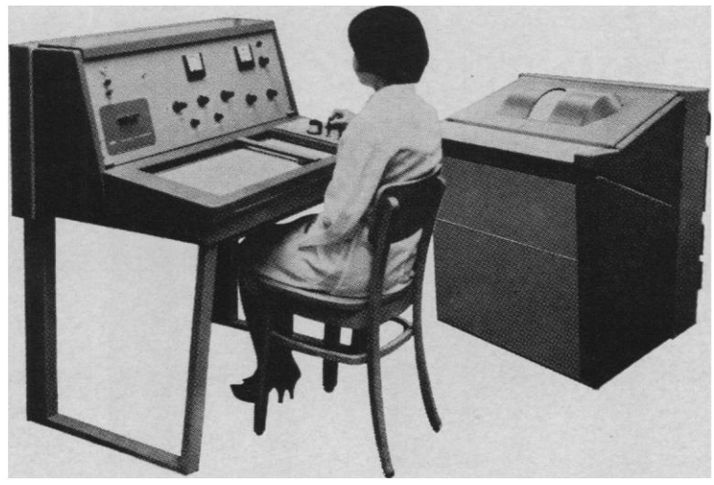

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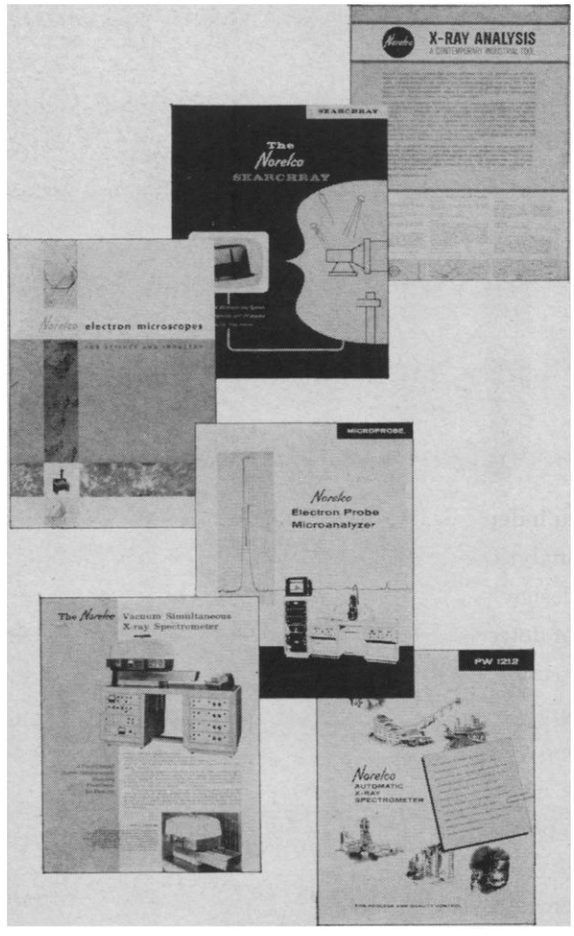

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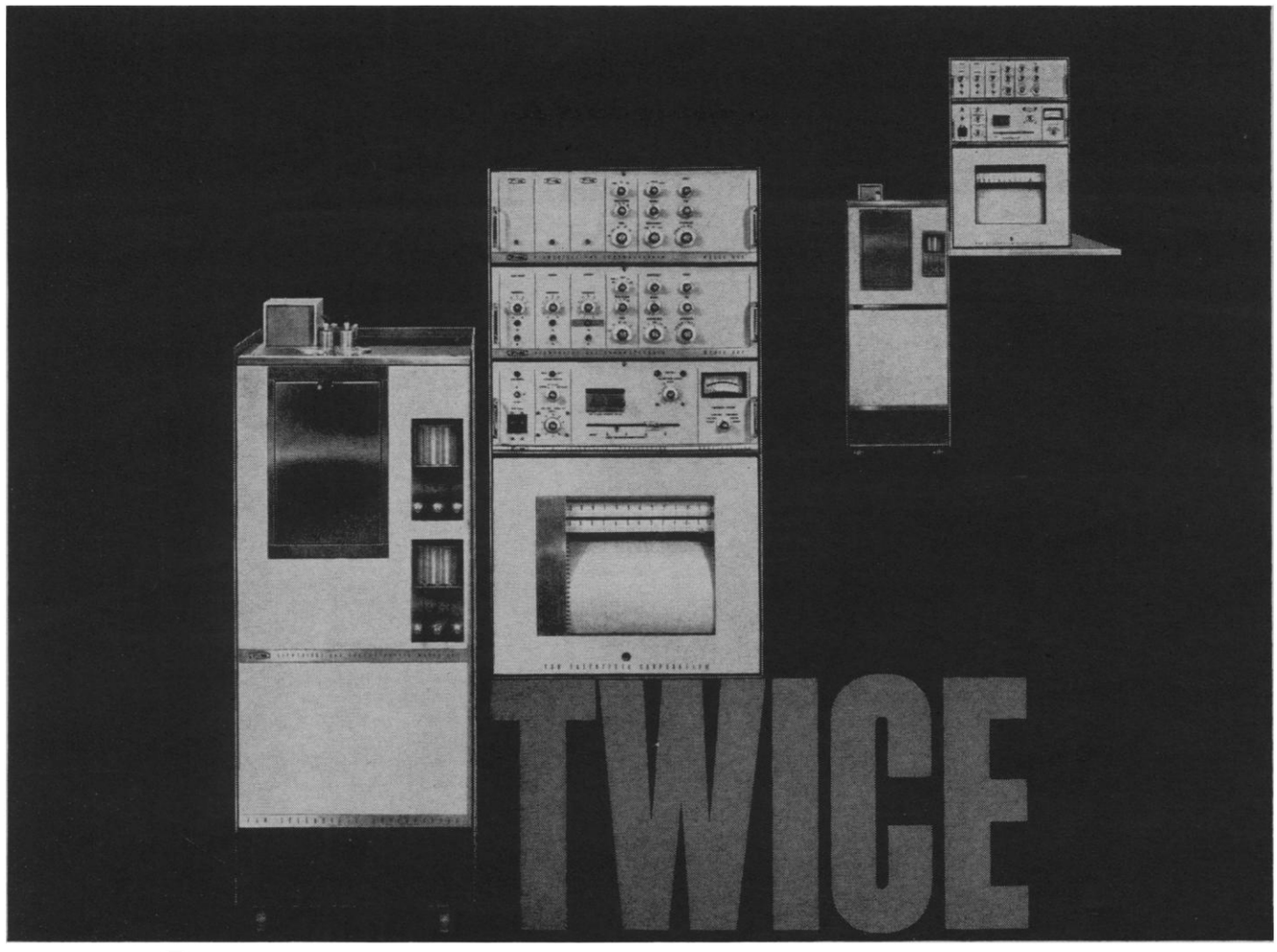

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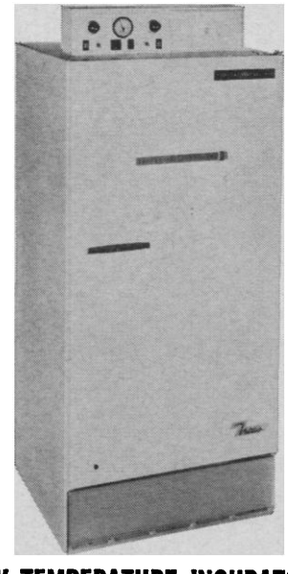

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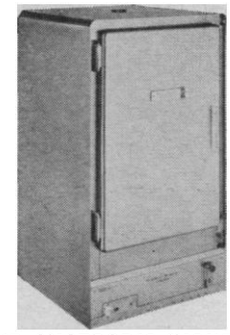

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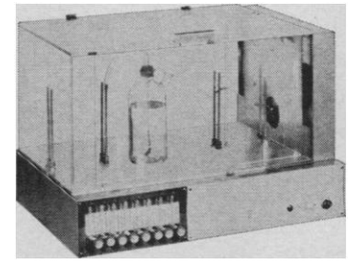

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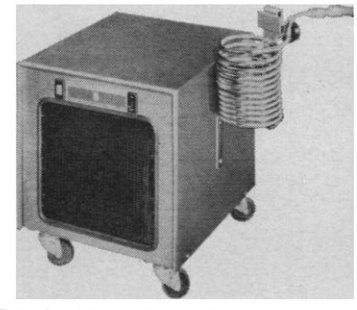

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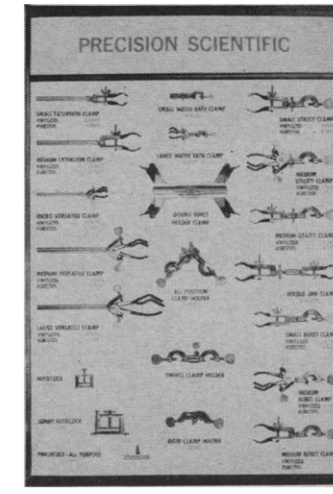

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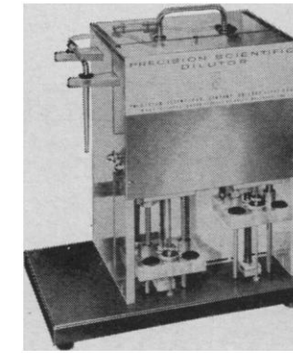

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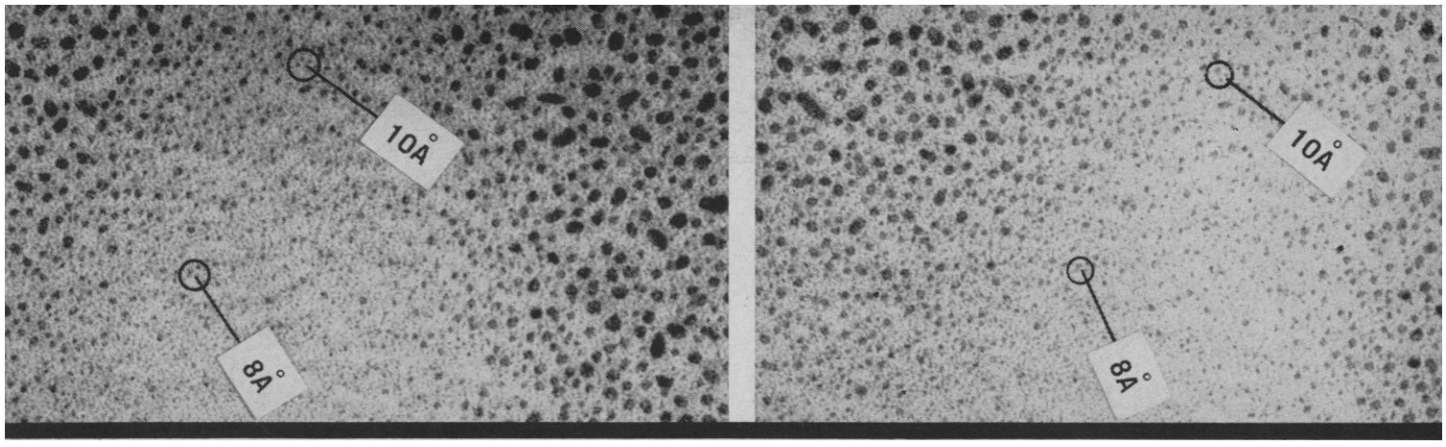

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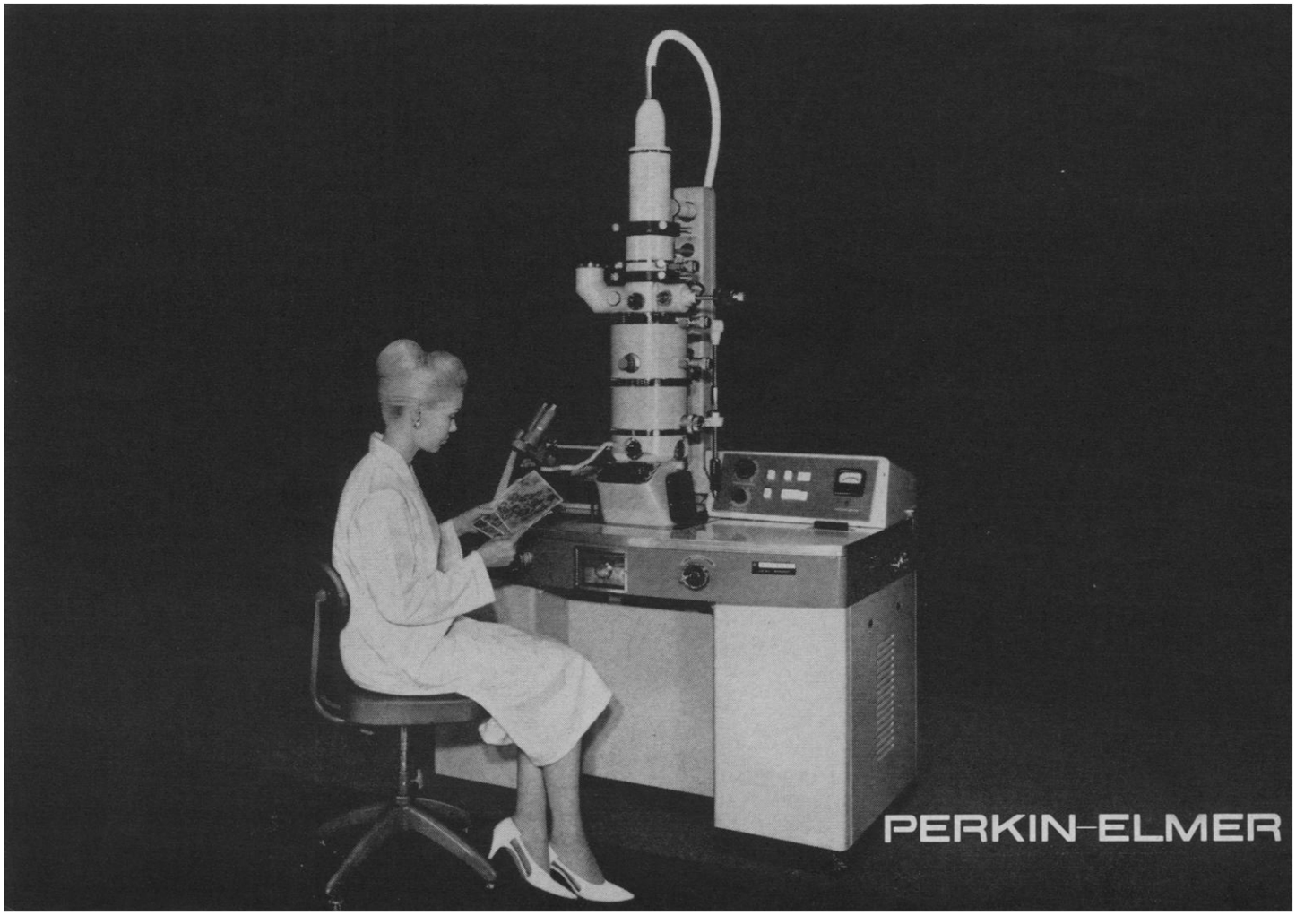

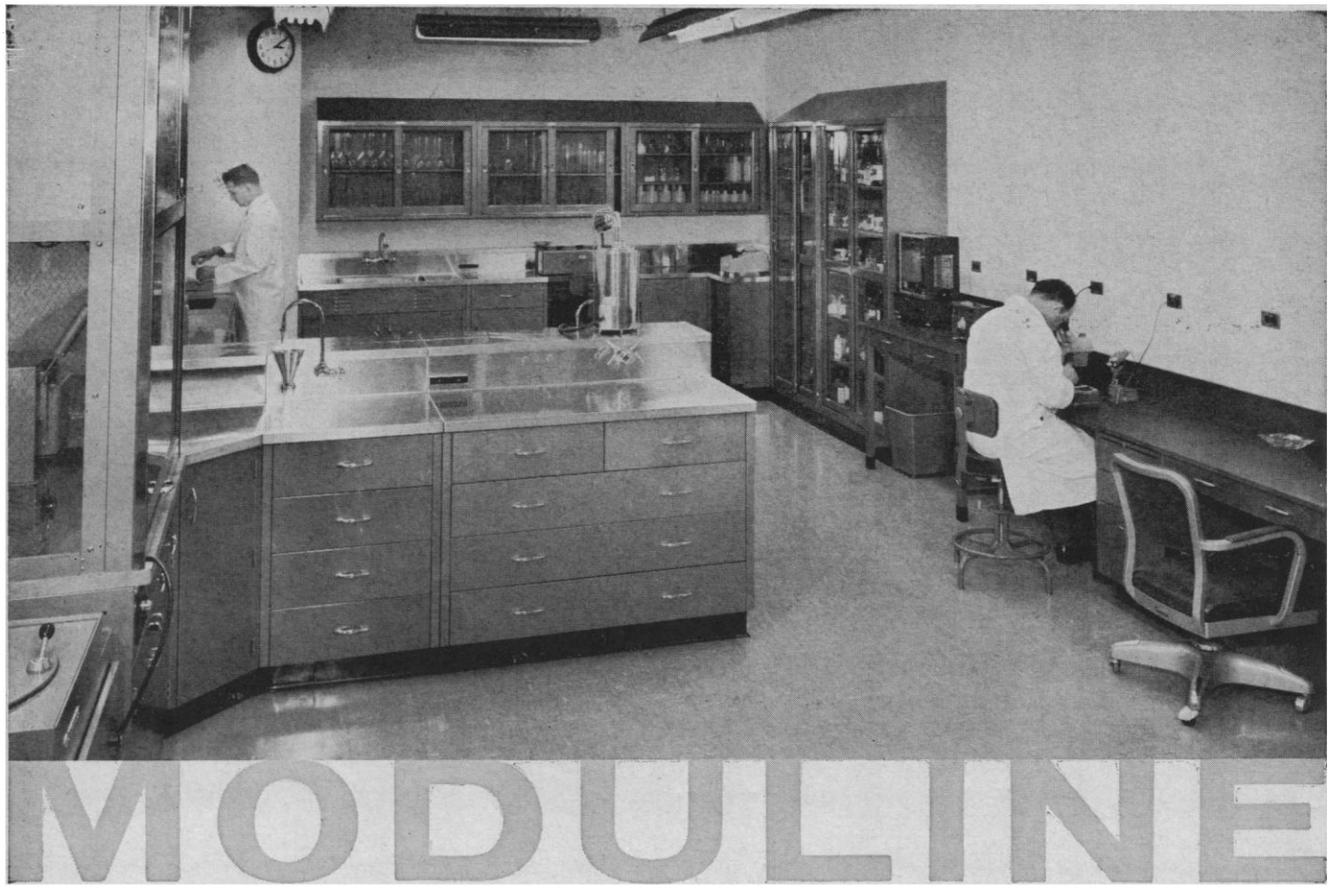

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Coved inside front corner posts for added strength, hat section stiffeners along shelves for heavy loads, welded inverted pan stiffeners on floor and wall cases for rigidity, full height internal channel stiffeners in doors, ½″ shelf adjustment on applied pilasters in lieu of perforated louvers in the corner post, nylon drawer rollers with ball bearings rather than just nylon rollers — these are some of the quality features that make Moduline laboratory furniture structurally superior and new looking year after year under constant heavy usage.

The list can go on and on — modular design provides for future modification and arrangement and simplifies installation. Walk-in fume hoods, illuminated titration tables, distillation racks, lazy susans — formerly custom built pieces — are now part of the standard line.

Look to Moduline for advanced ideas in laboratory furniture — better built to give it a future.

For details see your Aloe Scientific representative or write Aloe Scientific, 1831 Olive Street, St. Louis 3, Mo.

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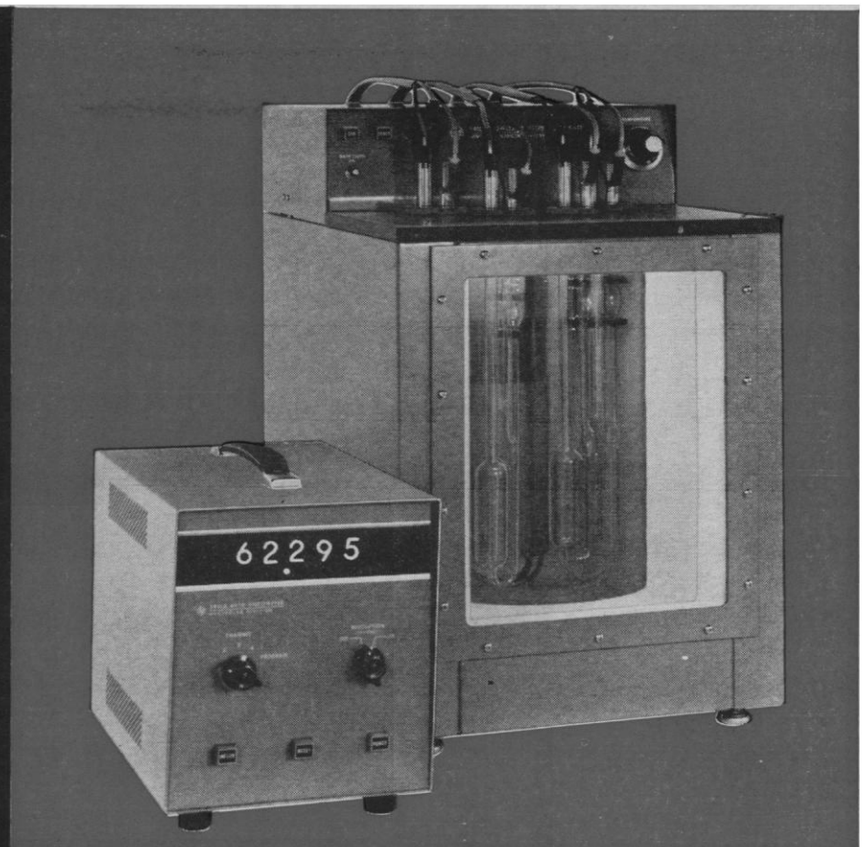
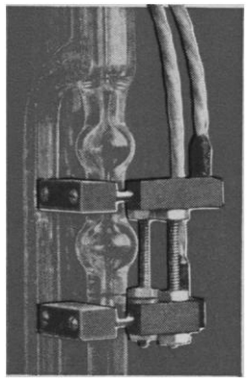


MECHROLAB MODEL 5901A AUTO-VISCOMETER. Electronic counter automatically measures efflux time through use of photocell detectors mounted at upper and lower reference points on glass viscometer. Model 5910A Constant Temperature Bath provides precise temperature control, eliminating errors due to temperature fluctuations.



Just push a button, and Mechrolab's new Auto-Viscometer automatically measures efflux time in glass capillary viscometers. Not only are viscosity measurements more efficient, they're at least 10 times more accurate than stopwatch techniques. Here's why:

1. **Automatic influxing** eliminates possible errors due to differences in technique.

2. **Efflux time** is automatically measured with an electronic counter which has a resolution of ± 0.001 second up to 100 seconds, ± 0.01 second to 1,000 seconds.

3. **Constant Temperature Bath** provides temperature control and stability of better than ± 0.005° C from ambient to 75° C, ± 0.01° C between 75 and 150° C.

4. **Efflux times** are digitally displayed on the counter readout and **remain** there until intentionally erased by the operator. There's also provision for a remote programmer and digital printer.

Applications? Intrinsic viscosities; molecular weights; molecular shapes of natural and synthetic polymers. To learn more about automated viscometer measurements, contact your Hewlett-Packard office or write to us at 1062 Linda Vista, Mountain View, 31, Calif.

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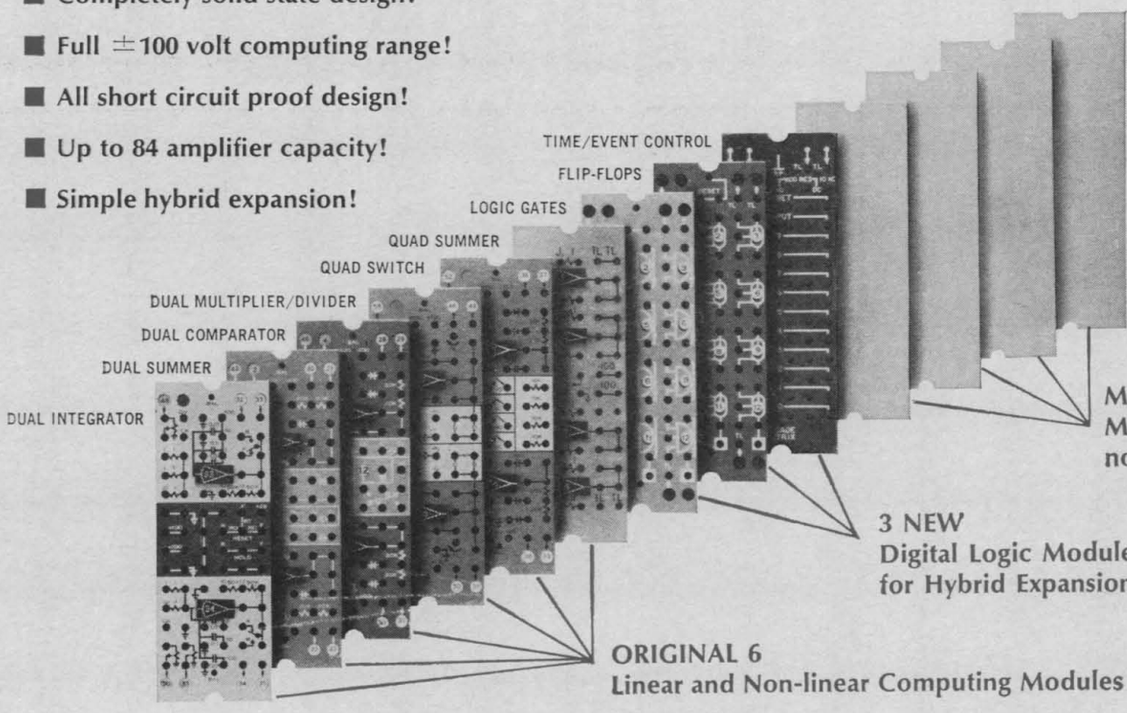
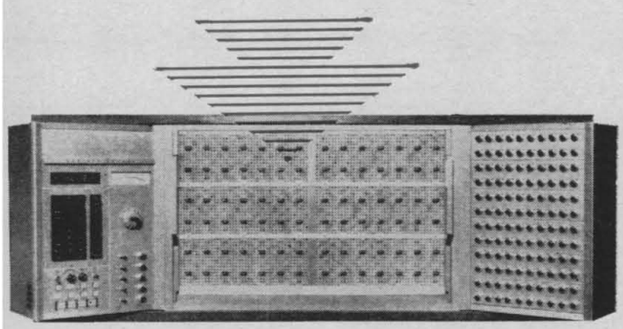
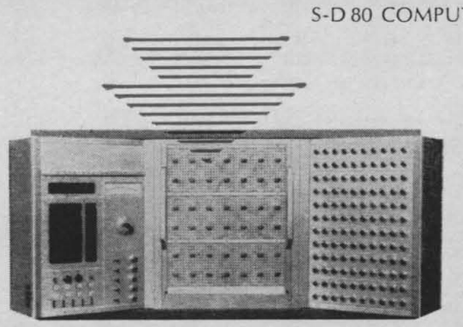




S-D 80 COMPUTER



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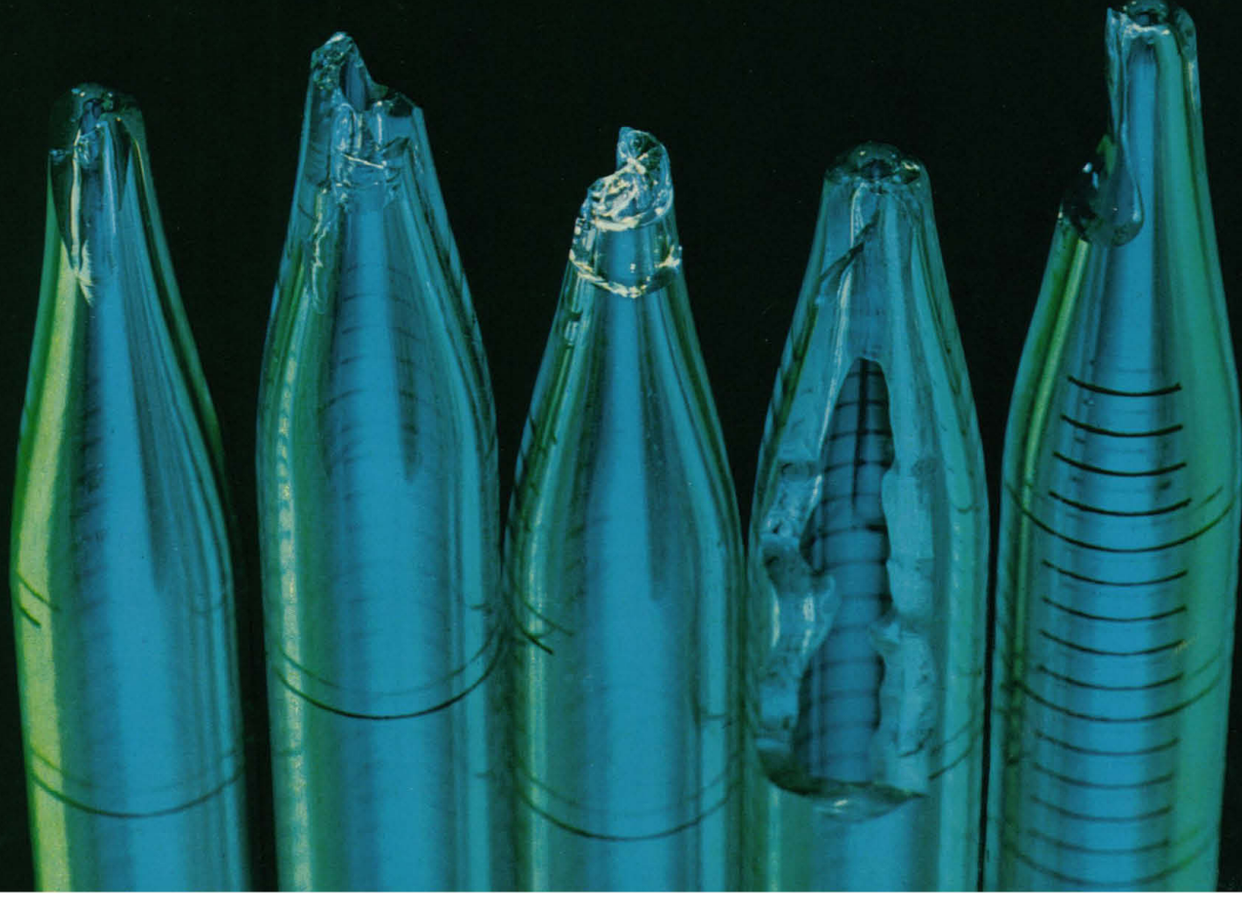

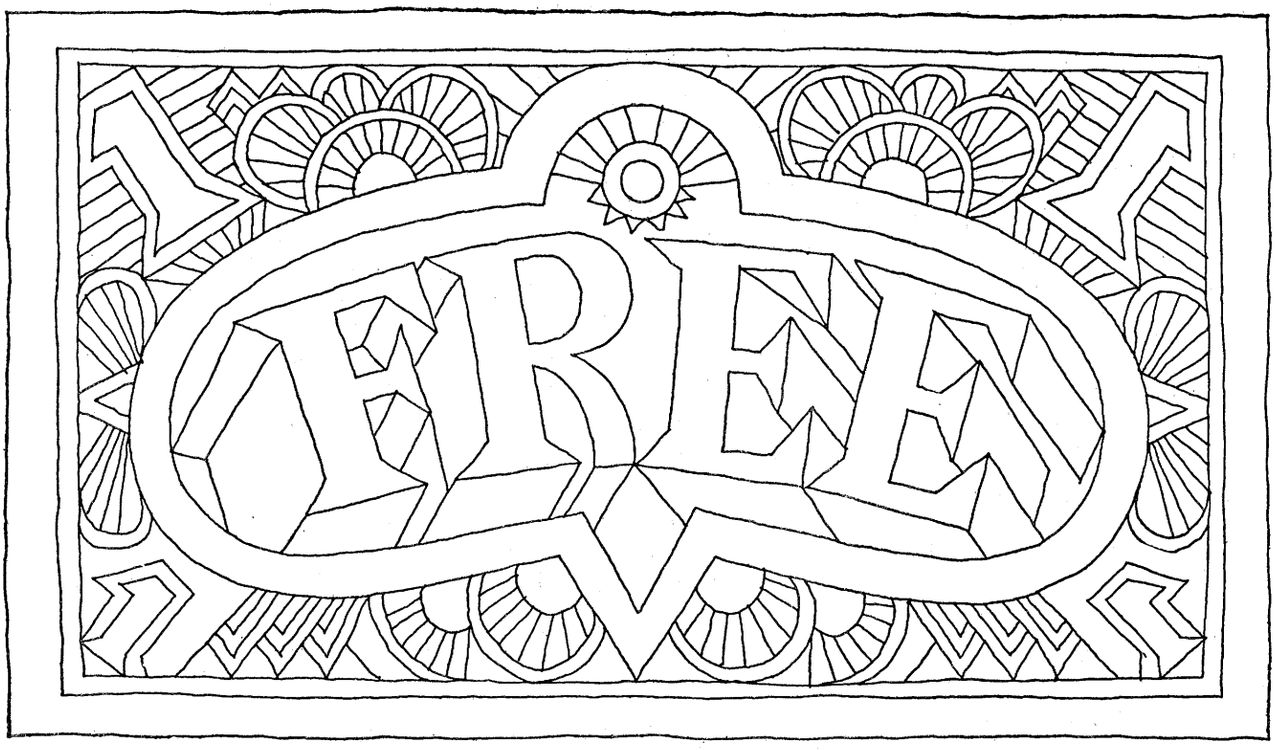

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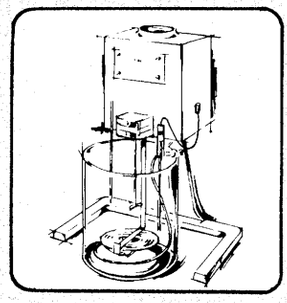

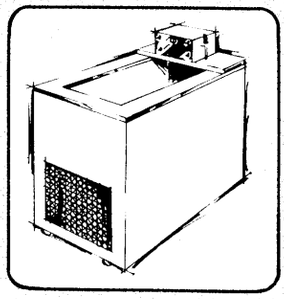

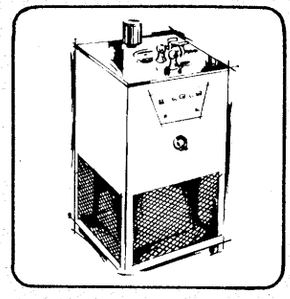

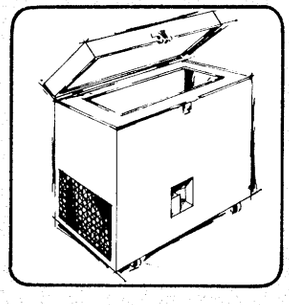

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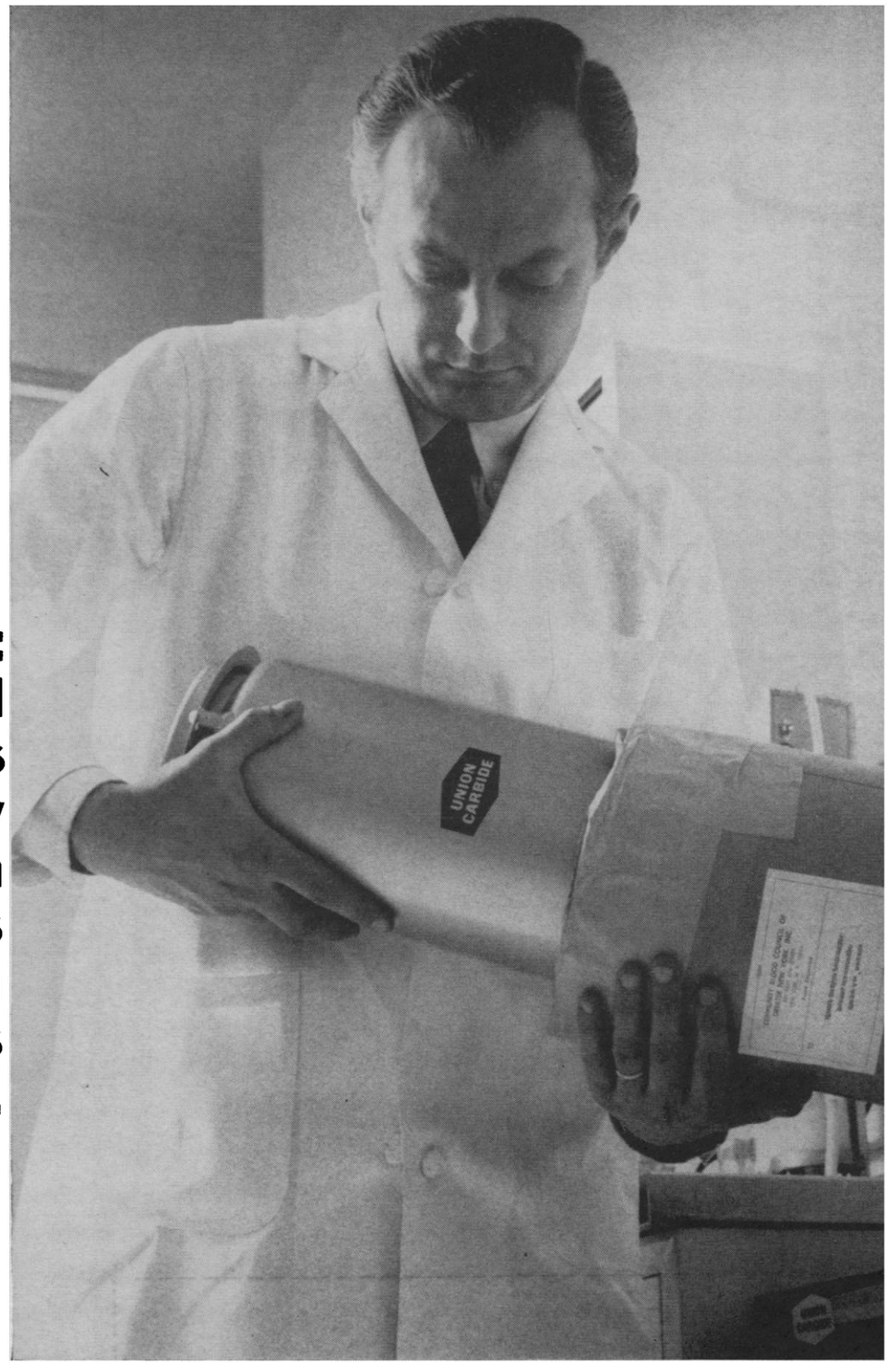

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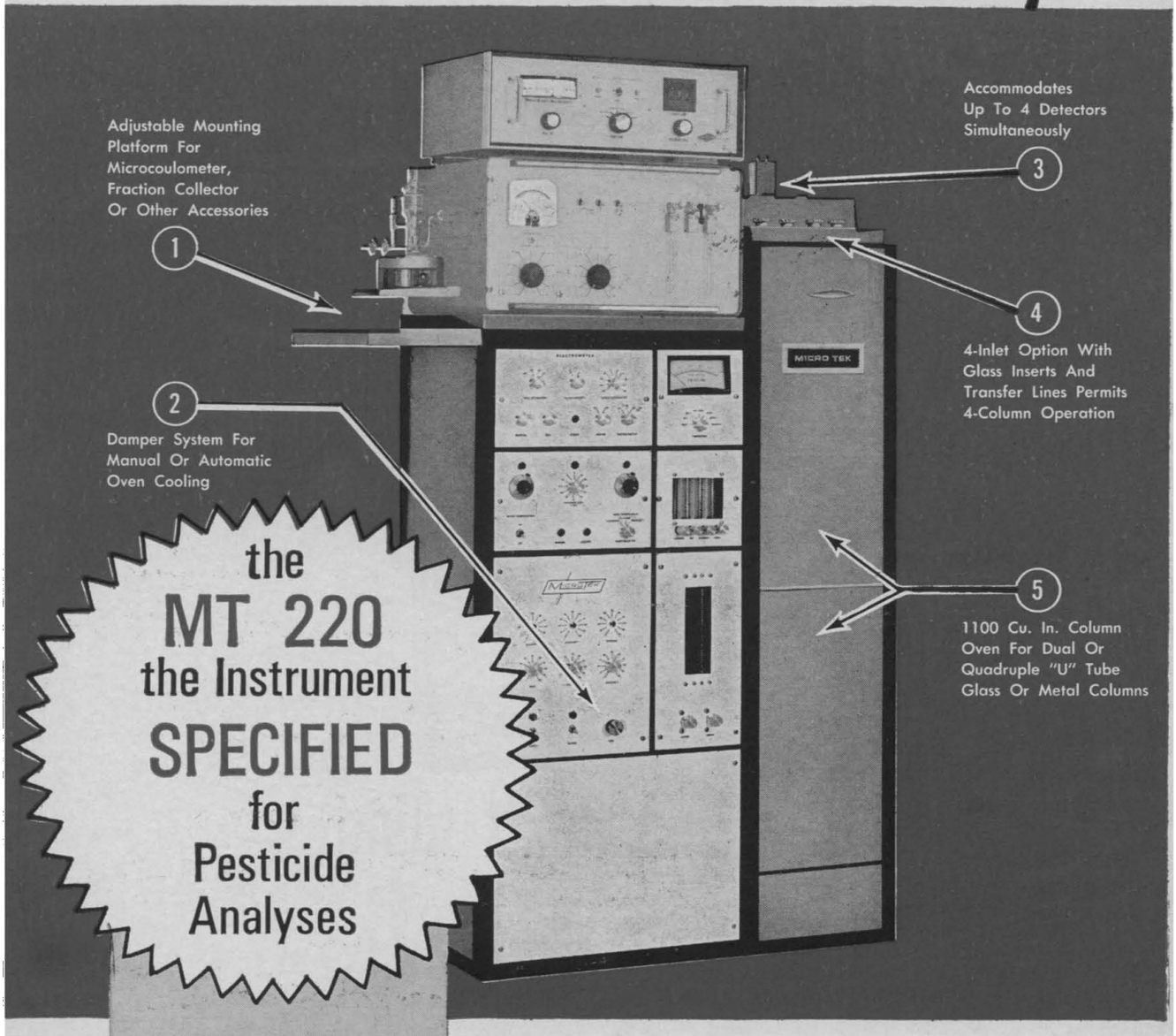

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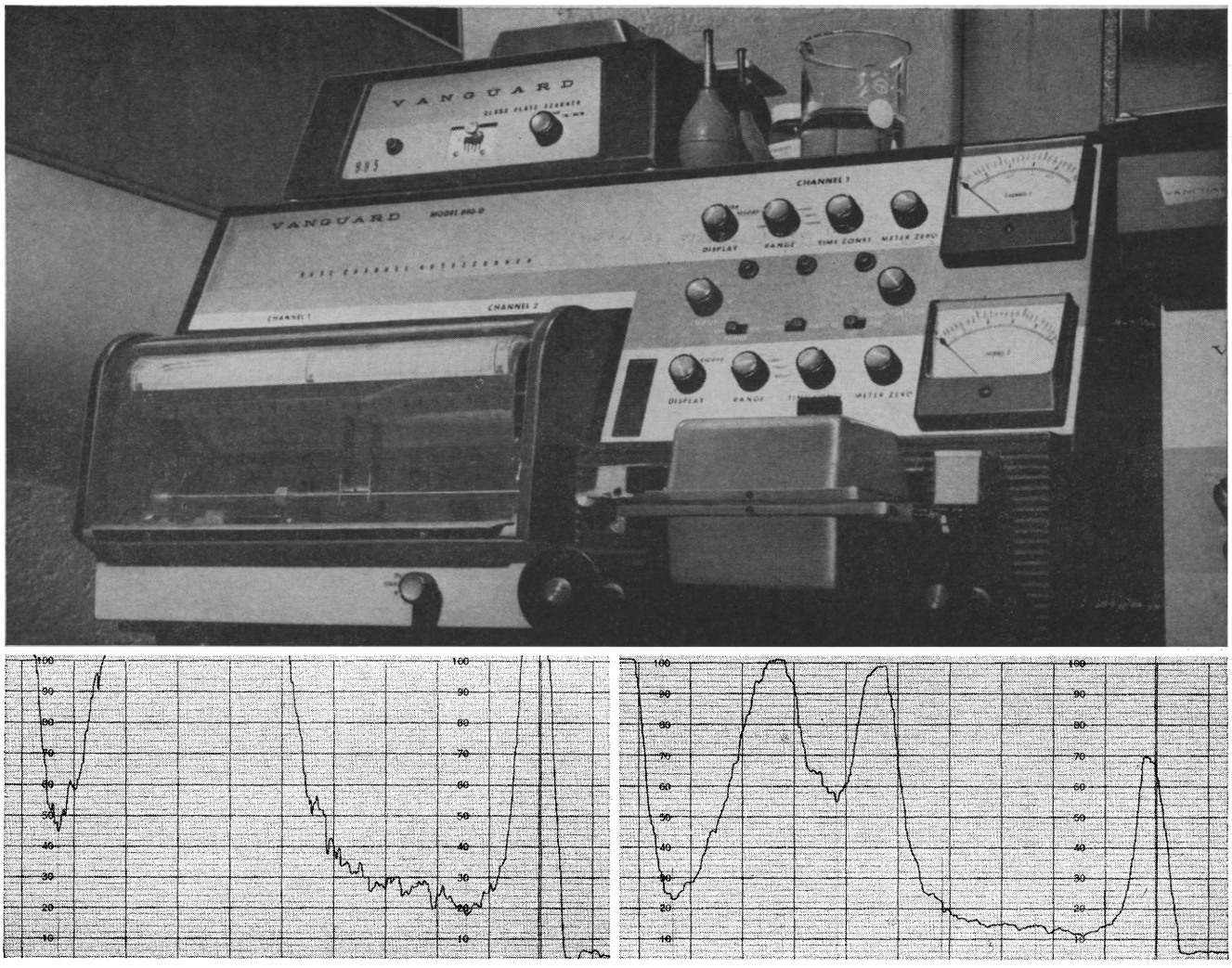

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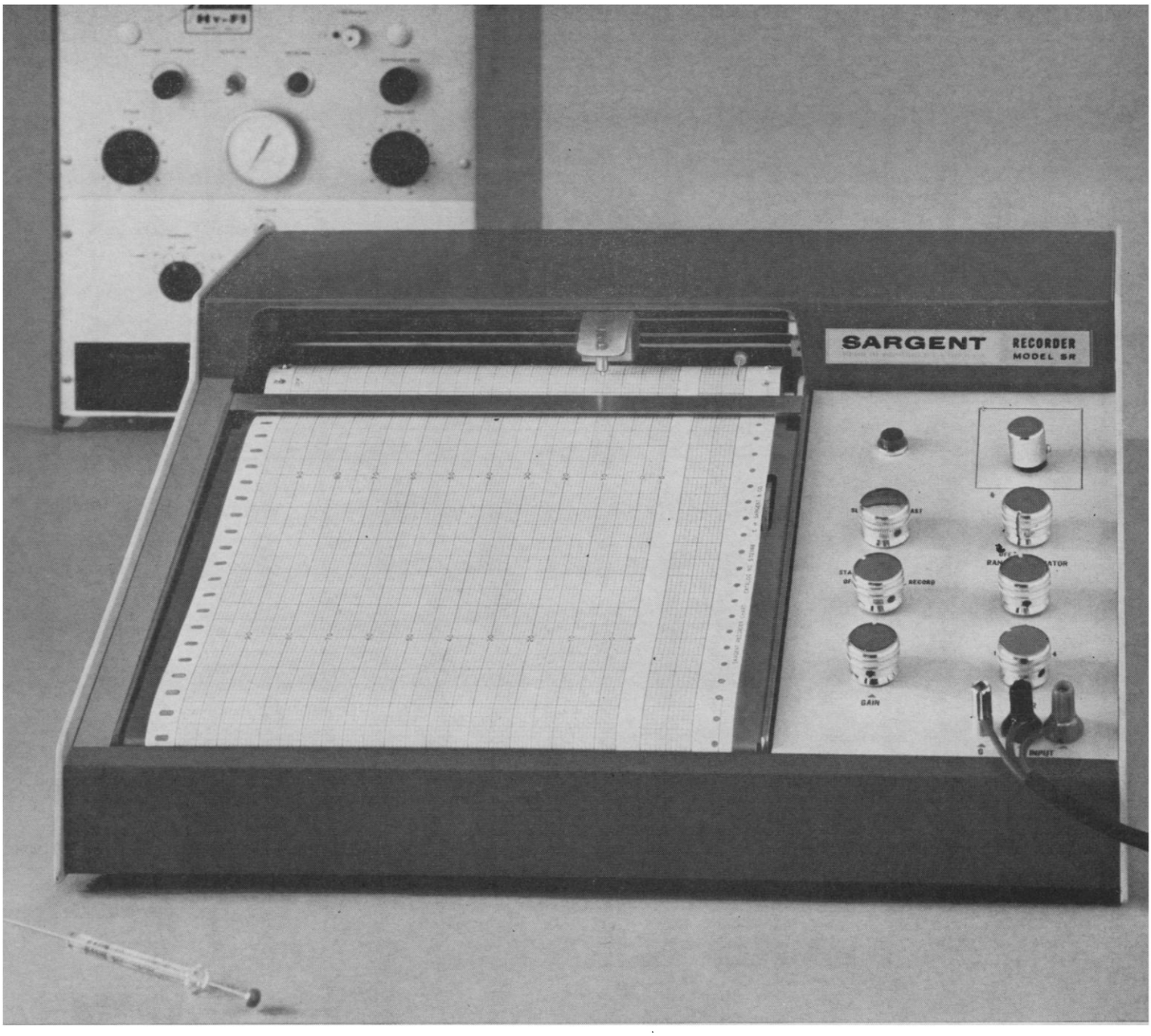

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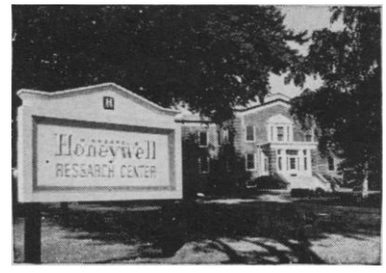

An Investigation of the Sense of Smell Through Examination of Individual Olfactory Cells

The olfactory cell can detect odors of a very few molecules per sensing cell. New studies of olfactory tissue and of individual cells hopefully will lead to an understanding of the transducer mechanism used by this highly specific chemical sensor.

New advances in the field of instrumentation and control will come from the development of new, accurate sensors. It is interesting to note that after hundreds of years of invention and development, nature's sensors still outperform machines by a wide degree in several senses such as smelling, tasting and color perception.

This has led scientists into the field of bionics on the assumption that if they could understand how animal biosensors work they might simulate the mechanism.

One badly needed sensor that has defied invention is an adequate odor detector. For over 100 years scientists have been trying to determine the mechanism behind the incredibly sensitive sense of smell in animals.

Several theories have been proposed but none have prevailed. One theory suggests that the hairs on the olfactory cell sense the vibrations of the molecules of the odoriferous gas. Another suggests that there is a chemical reaction between the hairs and the gas. A third theory suggests that the seven or eight basic odors each have a distinctive molecular structure, with each structure fitting an appropriate receptor site on the hairs of the olfactory cell.

The olfactory bipolar sensing cell and its supporting sustentacular cells have been described in various ways. However, the mechanism whereby a gas molecule triggers a signal which passes through the membrane and is then converted to electrical energy is still completely unknown.

Honeywell scientists in probing for the answer to this have chosen to visually and cytochemically examine the individual cell itself while carrying on biochemical analyses of the cellular contents at the same time.

For their observations, they have chosen the cells of the rabbit.

Individual cells are separated by two methods. In the first, a gentle mechanical action is used and the suspended cells settle out on specially treated slides or are placed in a Rose Chamber for isolation in tissue culture. In the second method, a one millimeter square of olfactory tissue is explanted directly from the animal to the Rose Chamber, where some of the cells migrate and separate. Thus the cells are never touched and are presumed to be undamaged. Such cells can be exposed to various odors and compared visually with control cells.

In their studies, Honeywell scientists have maintained these single cells for weeks at a time.

Prior to electron microscopy, the individual cells are imbedded in an epoxy resin block for sectioning. Using an ultramicrotome, sections of 500 angstrom thickness are prepared for study with the electron microscope. Sections of 1 micron thickness are also prepared for correlated light microscopy.

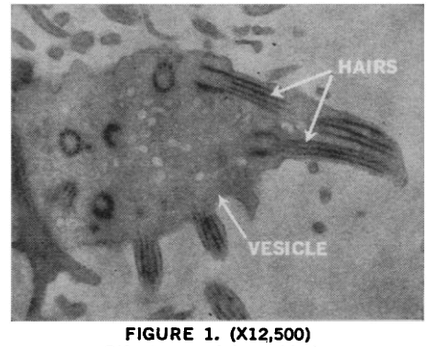

FIGURE 1. (X12,500)
Olfactory vesicle and hairs

From their observations Honeywell scientists theorize that the olfactory hair senses the odor in some unknown fashion and the hair or the olfactory vesicle (*see Figure 1*) is the probable site of a transducer process that initiates the impulse carried directly to the olfactory bulb of the brain via the olfactory rod, cell body and nerve fiber.

The bipolar cell presents a picture of a highly specialized cell characterized by a small amount of cytoplasm in contrast to the supporting cell.

The electron micrographs are revealing concentrated areas of particular intracellular structures such as mitochondria and endoplasmic reticula in certain locations in the cell body. The arrangement pattern and structural relationship of the sensing cells to the supporting cells are also being revealed.

It would seem that to understand the unique mechanism involved the most promising parts for further study would be the hairs themselves and the olfactory vesicle.

The scientists, therefore, are first concentrating their work on the olfactory hairs to determine the exact nature of the outer membrane of the hair and the exact structure of the hair, seeking highly biologically active areas.

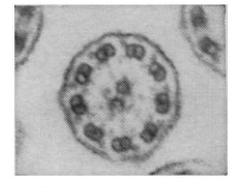

FIG. 2 (X90,000)
Cross section olfactory hair

The scientists have observed that in the rabbit there is an average of 6 to 12 olfactory hairs per cell. The olfactory hairs show a structure similar to that of cilia found on other types of cells throughout the animal kingdom displaying the conventional 9-plus-2 pattern of fibers at their proximal ends. (*see Figure 2*)

They also display an intricate pattern of fibrous connections between the central and outer fibers and the outer membrane.

Obviously much further investigation is needed but hopefully a more complete understanding will lead to new concepts for electronic sensing applicable to detecting and identifying odors in many problem areas including air pollution control, engine performance analysis and military detection procedures.

If you are engaged in biological research of olfaction and wish to know more of Honeywell's activities in this area, you are invited to write Dr. Herbert Heist, Honeywell Research Center, Hopkins, Minnesota. If you are interested in a career at Honeywell and hold an advanced degree write to Dr. John Dempsey, Director of Research at this same address.

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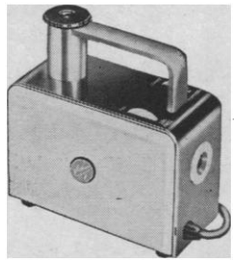

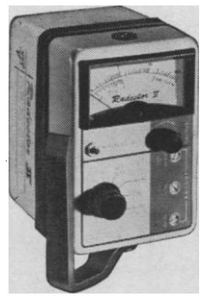

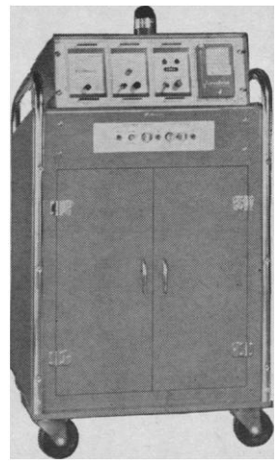

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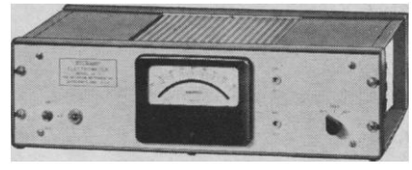

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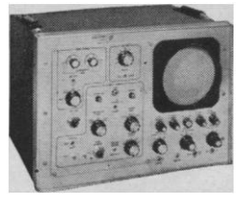

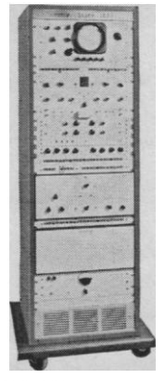

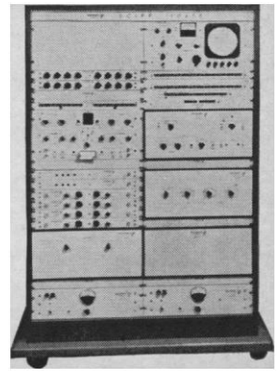

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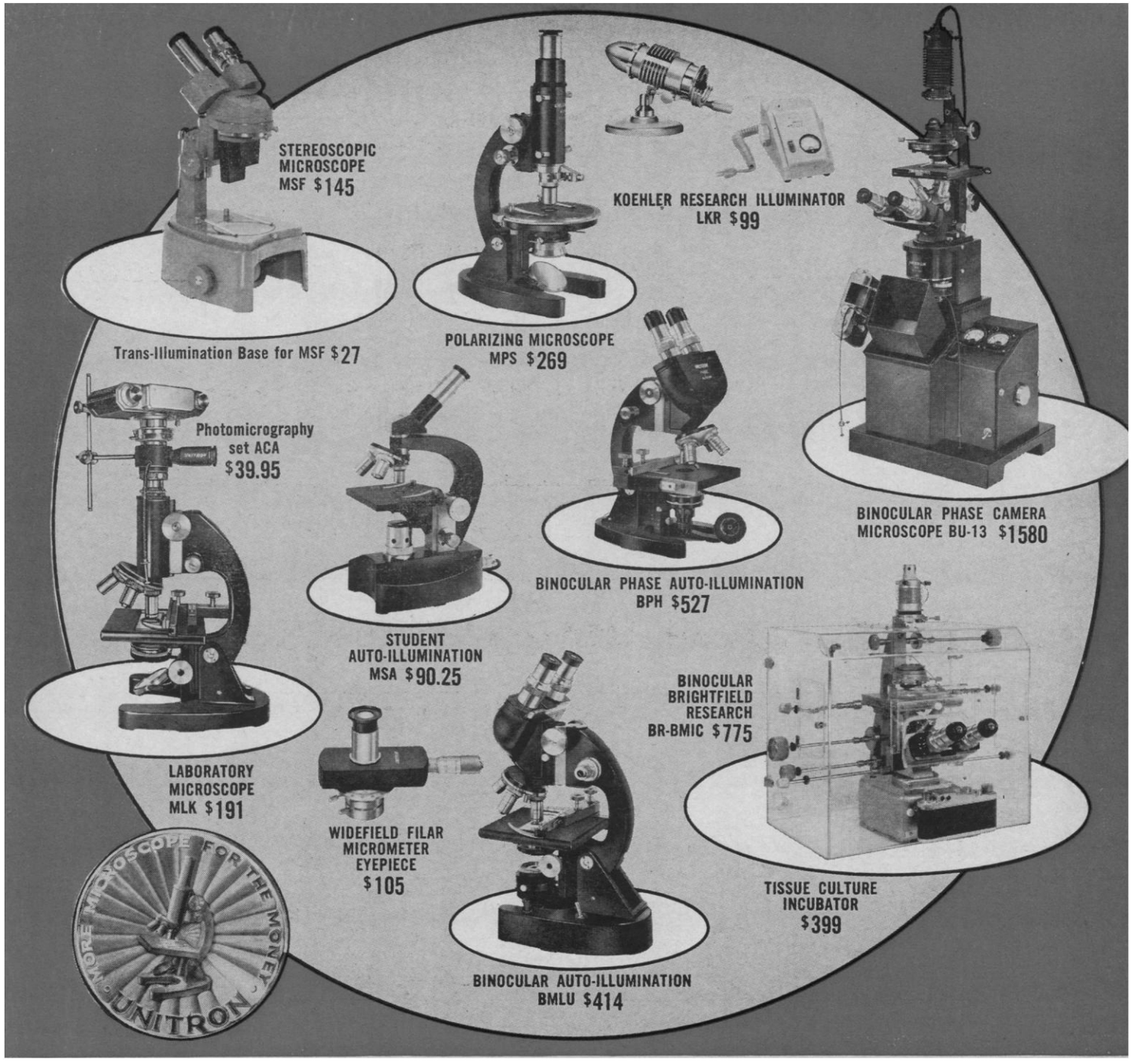

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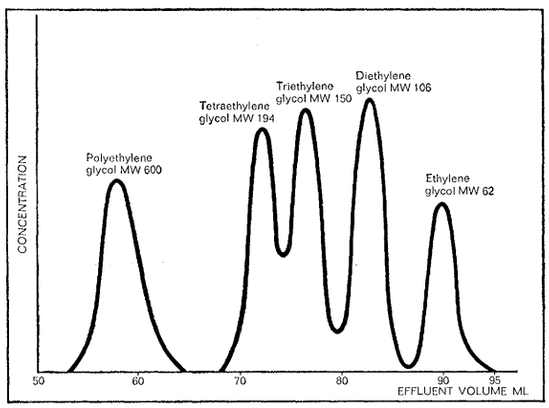

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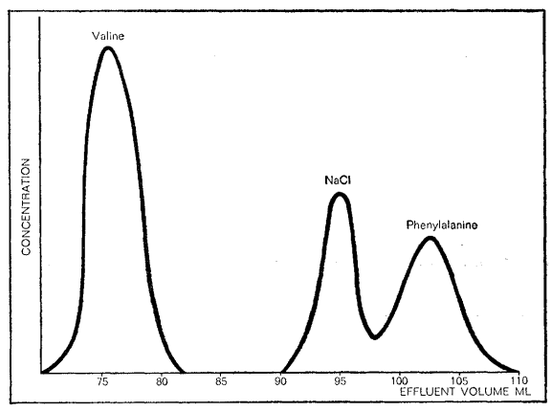

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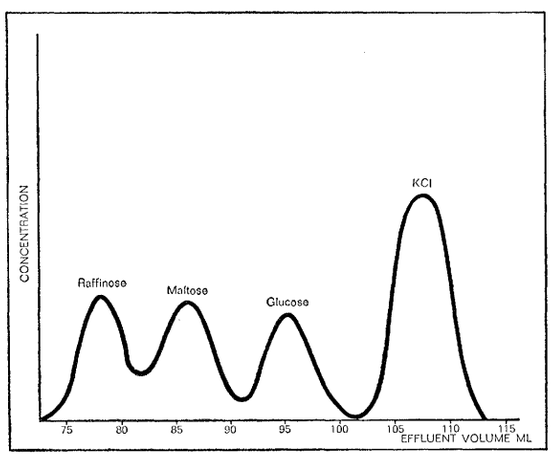

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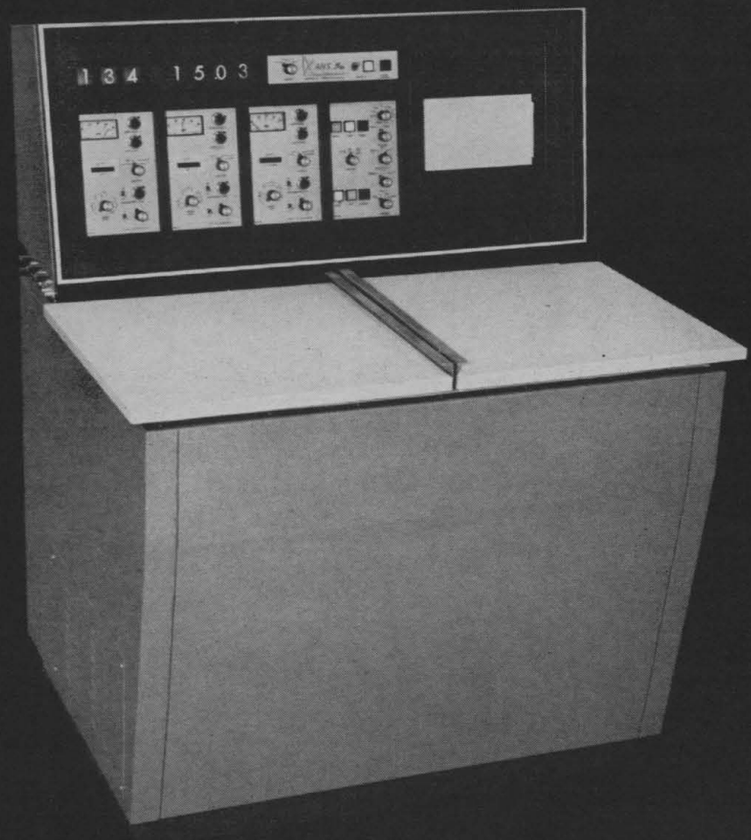

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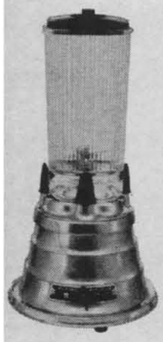

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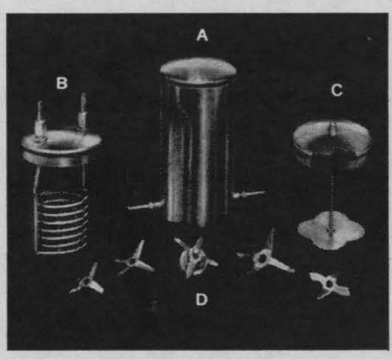

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have no scientific vitality in mathematics today but still have some in physics, and it is much more effective for students to learn them where they are used. What one might ask for is greater coordination between mathematicians teaching "service" courses and other scientists. Here it must be admitted that some mathematicians have rather arrogantly decided that mathematics has no further need for its traditional ties to science; but there are enough remaining with contrary views to carry on the work. However, I suspect it will be necessary that interested nonmathematicians have a much greater sophistication about the present mathematical world.

I have less professional competence to comment on Weinberg's views on high-energy physics, but by emphasizing that the impetus for new expenditures in high-energy physics comes from the universities he has provided a rebuttal to his own argument. American universities are by far the most vital part of American cultural and intellectual life. This may be undesirable in certain fields; it seems to be so in literature. One would wish that the quality of nonuniversity life were much higher. However, especially if one looks at the political alternatives in American intellectual life outside the universities, one may suspect that if a large portion of the relevant university community believes that a program is worthwhile, money is better spent on it than on most of the alternatives. . . .

ROBERT HERMANN
Argonne National Laboratory,
Argonne, Illinois

Weinberg's paper will help dissipate the smoke screen that obscures the two-way movement of ideas between research, teaching, and social change. . . . But he does not describe the implementing procedures with the degree of specificity necessary to help us move beyond head-nodding agreement with his theme, the dissonance of "the mission-discipline duality." Mathematics contributes to physics, physics to engineering, and engineering to society because someone is active at the interface and doing something to facilitate the transition. Weinberg notes that too few university professors are making this effort, and I believe he is correct and for the reason that he gives ("In the university the specialist and analyst is king").

The literature is peppered with exhortations about these and similar problems, but as teachers we are too often left without guides to the appropriate next steps. . . . With his concept of the scientist as a teacher, Weinberg has his finger on the key, but he is trying to unlock only two academic barriers—curricular purity and disesteem of applied science. I believe a better place to look for the desired change will be in the area of educational technology and especially the development of computer-assisted instructional systems. In making this suggestion I am simply trying to direct the momentum of Weinberg's logic into educational action to illustrate an instructional setting where it might be difficult for the scientist-teacher to bypass his "codifying" and "integrating" functions.

Instructional automation has the potential, at least, of bringing the teaching and researching roles of the university professor closer together. As long as the teacher feels that his primary obligation is to present information to students, he is free to follow this path of least resistance. . . . On the other hand, if the basic information and the descriptive materials were programmed into the computer as a master teaching machine and made available to the student in his automated study carrel, the classroom teacher would be freed to demonstrate the integration of one body of knowledge with another and to discuss the social implications of scientific data, research programs, and areas of investigation (including high-energy physics)—value judgments that the computer cannot handle. . . . Sooner or later the scientist-teacher must accept the explicit requirement to contrast his own presentation with the kind that can be made equally well, or better, via the computer. . . .

STANFORD C. ERICKSON
Center for Research on
Learning and Teaching,
University of Michigan, Ann Arbor

Since the appearance of my article I have received several letters from scientists and teachers engaged in curriculum reform objecting to what they interpret as a blanket indictment on my part of all curriculum reform. I am disturbed by this interpretation of my views, since I qualified my indictment thus: ". . . insofar as the new curricula have been captured by university scientists and mathematicians

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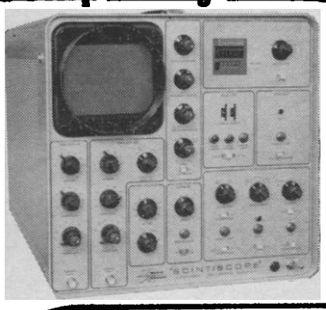

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of narrowly puristic outlook . . . I consider them to be dangerous."

I am not familiar with all the new curricula. There are many that do not seem to suffer from these shortcomings, and several, notably the BSCS biology courses, have since been brought to my attention. Nevertheless, I do believe that the considerations I mentioned in my article must be taken seriously by those who have erred in the past and by those who, unless exhorted by conservatives like me, may err in the future. Educating children is a heavy and difficult responsibility—one which those who create new curricula often are unable to assess until it is too late. All of us, scientists and teachers alike, must do our best to help strike a proper balance. I hope that the debate provoked by my article will serve to clarify some of the philosophic issues underlying curriculum reform and thus contribute to maintaining the necessary balance.

ALVIN M. WEINBERG
Oak Ridge National Laboratory,
Oak Ridge, Tennessee 37831

Birth Control Institute

Dael Wolfle's editorial "Save the world" (20 Aug., p. 819) calls for an immediate systems analysis of the problems of preserving the quality of life on Earth. He acknowledges the cause of the problems—the population explosion—and notes that governments and the Catholic Church have recognized its seriousness. He says that it must be assumed that we will succeed in stemming population growth.

The assumption is reasonable; but the question is, By what means and at what level will the world population be stabilized? The techniques used for lowering the birth rate are a product of scientific research, and it is not unreasonable to believe that more research will result in more and better techniques. Despite the recommendations of the National Academy of Sciences that research in the control of reproduction be greatly increased, there is, I believe, a remarkable inertia. We have governmental and private research institutes for the study of a great number of exotic diseases, yet to my knowledge we have not a single large, multidisciplinary institute concerned with research in reproductive biochemistry and physiology and the development of mechanical and pharmacological means of preventing ovulation, fertilization, implantation, or zygote growth. It is ironic that recent interest in the development of anovulatory drugs had to await the realization that the contraceptive market was immensely rewarding financially.

I see no reason why the urgency of the situation should not be recognized by the scientific community and appropriate action taken. The Second World War saw an unparalleled pooling of scientific brain power which resulted in an extraordinary scientific achievement—the atomic bomb. I believe that a comparable scientific effort could yield a spectrum of pharmacological agents enabling human reproduction to be prevented or induced as desired. Were this to occur, the quality of life, both in the family unit and on a global basis, would be enriched. We would witness the exciting phenomenon of continuing technological progress being applied to a stable population.

The National Institutes of Health, the National Science Foundation, or other appropriate agencies should offer financial support, and if necessary propose legislation to Congress to this end. . . .

ALAN F. HOFMANN
Rockefeller Institute, New York 10021

Fuel for Indian Reactors

McElheny's report from India ("Electric power remains emphasis of India's nuclear energy program," 16 July, p. 284) is thorough and detailed, but there is one omission that might give a false impression. McElheny mentions that the uranium for the reactors at Rana Pratap Sagar and Kalpakkam, "as for the Canada-India reactor, will come from the monazite sands of Kerala and a mine being developed in Bihar." In fact, the original fuel charge for the Canada-India reactor, consisting of 12,000 kilograms of uranium metal, was supplied by Canada and is still in place in the reactor. In addition, Canada is supplying half the fuel elements (uranium dioxide) for the first charge of the 200-megawatt CANDU reactor being built at Rana Pratap Sagar.

R. F. GROSS
Canadian Nuclear Association,
19 Richmond Street West,
Toronto 1, Canada

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The Use of Animals in Research and Teaching

Last week the Subcommittee on Public Health and Welfare of the House of Representatives Committee on Interstate and Foreign Commerce held hearings on several bills concerned with the care, housing, and treatment of animals used in research or teaching. The several bills include a number of proposals for establishing standards for animal care and use, for licensing or certifying individuals or laboratories to use animals for research purposes, for reporting the details of experimental procedure to a Federal Government office, and for maintaining a reference library of detailed information about previous research involving animals, in order to determine before a grant or contract is approved whether similar or identical research has been previously conducted.

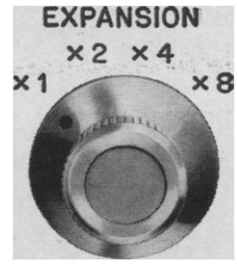
One of the bills (H.R. 5191, introduced by Congressman Edward R. Roybal of Los Angeles) adopts the more constructive approach of authorizing the Surgeon General to use a variety of means to aid in the improvement of laboratory animal stocks, quarters, and maintenance methods, the training of animal caretakers, and the study and prevention of diseases and impairments of laboratory animals.

Whether any legislation on animal care and use will be enacted during this session of Congress is still uncertain, but the current interest makes this an appropriate time to publish the following resolution which endorses a constructive approach toward these problems and which was adopted by the AAAS Board of Directors on 28 March 1965.

The Board of Directors of the American Association for the Advancement of Science reaffirms its conviction, stated in 1948, "that animal experimentation is essential for progress in the biological and medical sciences, . . . in the study of, and the control of, diseases, especially those of childhood, and in the perfecting of those procedures and treatments to which no small part of our community owes its health and life." Proper care and humane treatment of laboratory animals used in teaching and research are essential both in order to maintain the high quality needed for the advancement of science and medicine and as a moral obligation of a civilized society.

The Board believes that the attainment of these high purposes can best be aided by constructive means, such as the encouragement of research on the causes, prevention, and treatment of diseases of laboratory animals, including studies on their production, growth, health, maintenance, comfort, and utilization; the establishment of training programs in laboratory animal medicine; grants for the construction, improvement, expansion, and renovation of laboratory animal facilities with provision for humane housing, care, treatment, and utilization; the provision of technical assistance to organizations using laboratory animals; and the appointment of advisory committees of competent scientists to advise government agencies and other agencies and institutions on the welfare and utilization of laboratory animals.

Members of the Board of Directors of the American Association for the Advancement of Science: Laurence M. Gould, Henry Eyring, John W. Gardner, H. Bentley Glass, David R. Goddard, Paul E. Klopsteg, Mina S. Rees, Walter Orr Roberts, Alfred S. Romer, Athelstan F. Spilhaus, H. Burr Steinbach, John A. Wheeler, and Dael Wolfle.



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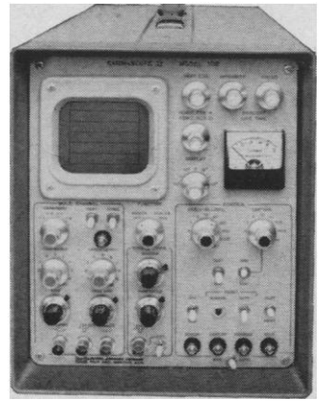

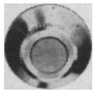

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netism appear to be very different from the liquid-vapor phase transition or the phase transition of a binary liquid mixture, they have very similar descriptions in statistical thermodynamic theory and it is possible to make a "dictionary" which permits the translation from the magnetic to the liquid-vapor use and vice versa. Magnetization thus corresponds to difference between the densities of the liquid and vapor phases; susceptibility corresponds to compressibility and the relation of the magnetic field to magnetization corresponds to the relation of the pressure to volume in a gas. Benedek's talk was thus concerned with the same "exponents" as Rowlinson's. Perhaps the most striking feature of the magnetic experimental data is the fact that the coefficient β which describes the magnetization curve is very close to $\frac{1}{3}$. This result was obtained in a classic experiment by Heller and Benedek by using the nuclear magnetic resonance frequency as a probe of the internal field.

Recent work as well as recent analysis of old experimental work indicates also that the Curie-Weiss law for the susceptibility must be replaced by a minus 4/3 power law. Both of these experimental results are in very good agreement with the predictions of the series summation method for the Heisenberg ferromagnet. Other discussions on magnetism were by Werner Wolf (Yale University) on the critical properties of a magnetic system which closely resembles the Ising model; Dale Teaney (IBM) on the specific heat of ferro- and antiferromagnets, and Peter Heller (Brandeis University) on the line widths of the nuclear magnetic resonances in ferro- and antiferromagnets.

A question which came up from time to time was whether the logarithmic singularity in the specific heat at constant volume for the λ-point of helium is a universal feature of all phase transitions. The interest of this question was enhanced by the experiments of A. V. Voronel (University of Kharkov) on the specific heat at constant volume of oxygen and neon, and of M. E. Moldover and W. A. Little (Stanford University) on helium, near their critical points. Both experiments indicated that the specific heat of oxygen, neon, and helium can be fitted very well by a logarithmic curve. W. Fairbank reviewed data on the helium λ-point, and Moldover presented results on the

critical point of helium. The question of how far the specific heats of magnetic transitions can be represented by the logarithmic form was discussed by T. Yamamoto (Kyoto University). The discussions indicated that, although the specific heat of several gases and many magnetic systems can be represented by the same logarithmic function which represents the specific heat near the λ-point of liquid helium over several decades of T-T_c, in none of these transitions was the logarithmic singularity confirmed as unequivocally as for the helium λ-point. It was pointed out by Fisher that the experiments of Voronel *et al.* and Moldover and Little could be represented by a small positive power of $|T\text{-}T_c|$. This would be more in agreement with the results of the series summation methods and with the conclusions drawn from the inequalities derived by Rushbrooke and Griffiths. Following discussions by M. H. Edwards (Stanford University) on the coexistence curve of liquid helium, and by H. Kierstead (Argonne National Laboratory) on a logarithmic anomaly, the pressure coefficient, in another property of helium close to the λ-line, M. J. Buckingham presented his theory on the nature of cooperative transition. This theory proceeds in quite a different direction from others.

The quantity of light scattered in a given direction at a given wavelength by the fluctuations of an opalescent medium is related by a very simple Fourier transformation to the pair correlation function of the fluctuations. The intensity of inelastically scattered light, which depends on both the frequency and the wave vector, is related by a somewhat more general Fourier transform formula to the temporal sequence of the density fluctuations. In the absence of Elliott Montroll (Institute for Defense Analyses), who was to have discussed the theoretical provenance of this relationship as well as of its limitations, Debye (Cornell University) commented on this topic. He warned that the very convenient Fourier transform formulas are based on the Born approximation theory of scattering. In a region of large fluctuation, one must be concerned with nonlinear effects not given by the Born approximation. With this *caveat* in mind, Michael Fisher (King's College, London) reviewed the statistical mechanical theory of the pair correlation function. Fisher pointed out that the essential assumption of the Ornstein-Zernike theory

is that the "direct correlation function" is short-range even at the critical point. This seemingly innocuous assumption immediately leads to the conclusion that the correlation function itself is long-range and behaves like $1/R$ for large distances. The fact that light scattering experiments are in very good agreement with the Ornstein-Zernike theory, except very close to the critical point, indicates that this is quite a good assumption. Several authors, however, have suggested that the direct correlation function is probably not short-range at the critical point, and in fact this assumption is inconsistent with the rigorous pair correlation function derived by Onsager for the two-dimensional Ising model. Fisher's own investigation with the series summation method suggests that the pair correlation function decays like $1/R$ to a power slightly less than 1.

The present experimental status of light and x-ray scattering from critically opalescent systems was discussed in a review by H. Brumberger (Syracuse University). Critical scattering has often been studied, but only a few of the most recent experiments have been done carefully enough to test the Ornstein-Zernike theory. B. Chu (University of Kansas) briefly reviewed his careful experiments on the scattering of light from a number of binary liquid mixtures. These experiments beautifully confirmed earlier results of McIntyre and others that large and significant deviations from the Ornstein-Zernike theory become manifest for temperatures of the order of hundredths of a degree from the critical point.

One of the most interesting questions before the conference was the apparent contradiction between the experimental results of L. Passel (Brookhaven) and B. Jacrot (Saclay) on critical magnetic scattering of neutrons from iron and the theory of Van Hove. Both experimenters observed a finite inelasticity of the scattering even at the critical point, while the theory of Van Hove, just as unequivocally, showed that the scattering must be inelastic at the critical point. Marshall resolved this contradiction by postulating the persistence of spin waves, much altered by dissipative effects, even up to the critical point. After Passel commented on the work by Marshall and by Als-Neilsen and Deitrich of RISO, Denmark, on elastic neutron scattering from β-brass, the interesting question of the inelastic scattering of light from criti-

cally opalescent systems was raised. The observation of this effect has only recently become possible because of the existence of lasers. Two groups of investigators have recently succeeded in observing this effect. The effect was first observed by Alpert and Yeh (Columbia University) in a critically opalescent mixture of cyclohexane and aniline, and shortly after by Ford and Benedek (M.I.T.). There is much uncertainty in the experimental results on equilibrium critical phenomena and there is even more in the observation of nonequilibrium critical phenomena. J. Sengers (National Bureau of Standards) reviewed experimental work on transport properties of liquids, gases, and liquid mixtures near critical points. Perhaps the most surprising conclusion was the fact that viscosity exhibits no observable anomaly near the critical point of gases, whereas thermal conductivity exhibits a very large and possibly infinite value near the critical point. The reasons for this were the subject of an interesting but inconclusive discussion following Sengers' talk. After a short presentation on nuclear magnetic resonance experiments near the critical point of ethane by M. Bloom (Harvard University and the University of British Columbia) the question of ultrasonic propagation in the neighborhood of critical points was raised. C. E. Chase (M.I.T.) discussed the ultrasonic investigation of helium near its critical points, and C. Garland (M.I.T.) spoke on the ultrasonic investigation of ammonium chloride near its order-disorder transition.

The rather concentrated work of the conference was interrupted by an evening of socializing and relaxation at a banquet. Philip H. Abelson (editor of *Science* and director of the Carnegie Institution Geophysical Laboratory) spoke on the role of group interaction in scientific research.

The emphasis of the conference was mainly on experiment, reflecting the present situation in the field. The significance of much experimental data is being sorted out. The older theories give the broad outlines of the phenomena but are incapable of explaining the delicate behavior in the immediate neighborhood of the critical point.

The conference proceedings will appear in the National Bureau of Standards Miscellaneous Publications series and will be available through the Government Printing Office. Inquiries about the proceedings should be directed to the undersigned.

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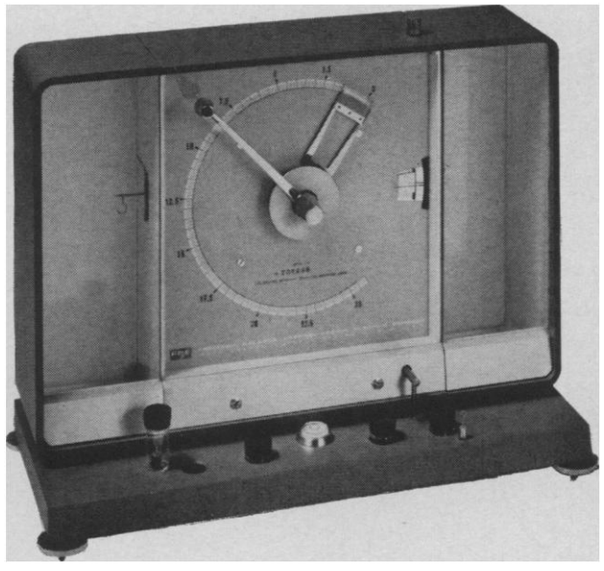

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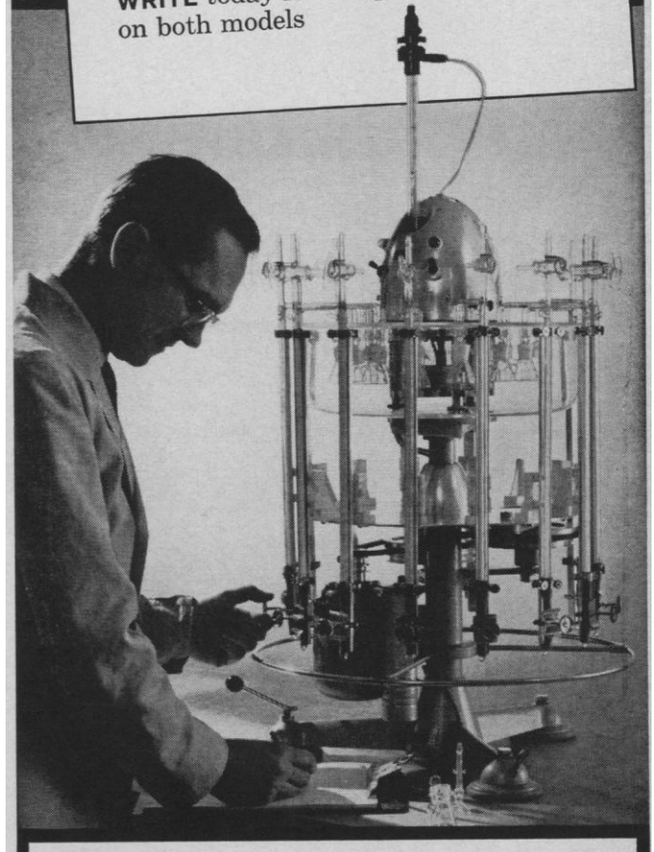

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The conference was cosponsored by the National Bureau of Standards, the National Science Foundation, and the Office of Naval Research.

M. S. GREEN
National Bureau of Standards, Washington, D.C.

Forthcoming Events

October

15–17. **Growth**, intermountain regional conf., Alta, Utah. (E. W. Hanly, Dept. of Molecular and Genetic Biology, Univ. of Utah, Salt Lake City)

16–17. **Infectious Diseases** Soc. of America, Washington, D.C. (E. H. Kass, IDS, Boston City Hospital, Boston, Mass.)

17–21. **Antimicrobial Agents and Chemotherapy**, 5th interscience conf./4th intern. congr. of chemotherapy, Washington, D.C. (R. W. Sarber, American Soc. for Microbiology, 115 Huron View Blvd., Ann Arbor, Mich.)

17–21. **Metallurgical** Soc. of American Inst. of Mining, Metallurgical, and Petroleum Engineers, Detroit, Mich. (American Inst. of Mechanical Engineers, 345 E. 47 St., New York 10017)

18. **Industrial Pharmacy** sect., American Pharmaceutical Assoc., 4th annual midwest regional meeting, Chicago, Ill. (C. Schroeter, Abbott Laboratories, North Chicago, Ill.)

18–19. American Inst. of **Aeronautics and Astronautics**/Canadian Aeronautics and Space Inst., Toronto, Ont., Canada. (D. L. Raymond, 1290 Sixth Ave., New York 10019)

18–19. **Systems Science**, conf., Case Inst. of Technology, Cleveland, Ohio. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 10021)

18–20. **Dynamic Stability of Structures**, intern. conf., Evanston, Ill. (G. Herrmann, Technological Inst., Northwestern Univ., Evanston 60201)

18–20. **Electromagnetic Radiation in Agriculture,** intern. conf., Roanoke, Va. (D. P. Brown, Niagara Mohawk Power Corp., 300 Erie Blvd. W., Syracuse, N.Y. 13212)

18–20. American Soc. of **Lubrication Engineers**, San Francisco, Calif. (D. B. Sanberg, 5 North Wabash Ave., Chicago, Ill.)

18–20. Canadian Inst. of **Mining and Metallurgy**, annual western meeting, Winnipeg, Canada. (CIMM, 906 Drummond Bldg., 1117 St. Catherine St. W., Montreal 2, P.Q., Canada)

18–20. **Nuclear Science**, 12th symp., San Francisco, Calif. (Inst. of Electrical and Electronics Engineers, Box A, Lenox Hill Station, New York 10021)

18–20. Applied **Spectroscopy**, 12th symp., Ottawa, Ont., Canada. (R. V. Baker, Aluminum Co. of Canada, Arvida, P.Q., Canada)

18–21. Advances in **Gas Chromatography**, 3rd intern. symp., Houston, Tex. (A. Zlatkis, Dept. of Chemistry, Univ. of Houston, Houston)

18–21. **Management Information** and Data Transfer Systems, American Univ., Washington, D.C. (R. I. Cole, Center for Technology and Administration, American Univ., 2000 G St., NW, Washington, D.C.)

18–22. American Soc. of **Civil Engineers**, Kansas City, Mo. (W. H. Wisely, ASCE, 345 E. 47 St., New York 10017)

18–22. Society for **Nondestructive Testing**, 25th natl. conv., Detroit, Mich. (N. H. Cale, Anaconda American Brass Co., Research and Technical Center, P.O. Box 747, Waterbury, Conn.)

18–22. American **Public Health** Assoc., 93rd annual, Chicago, Ill. (APHA, 1790 Broadway, New York, N.Y.)

18–22. **Radioisotope Instruments** in Industry and Geophysics, Warsaw, Poland. (J. H. Kane, Div. of Special Projects, U.S. Atomic Energy Commission, Washington, D.C.)

18–22. American Soc. for **Metals**, natl. congr., Detroit, Mich. (A. R. Putnam, ASM, Metals Park, Ohio)

18–22. Application of **Radioisotopes in Gastroenterology**, symp., Lausanne, Switzerland. (A. Vannotti, Clinique Médicale Universitaire, Hôpital Cantonal, Lausanne)

18–22. American College of **Surgeons**, annual clinical congr., Atlantic City, N.J. (American College of Surgeons, 55 East Erie St., Chicago, Ill. 60611)

19–21. Association of **Analytical Chemists**, 13th conf., Detroit, Mich. (G. Schenk, Dept. of Chemistry, Wayne State Univ., Detroit 48202)

19–21. **Cloud Physics and Severe Storms**, conf., American Meteorological Soc., Reno, Nev. (K. C. Spengler, 45 Beacon St., Boston 8, Mass.)

19–21. Radio Astronomical and Satellite **Studies of the Atmosphere**, 2nd symp., Boston, Mass. (G. A. Cushman, Wentworth Inst., 550 Huntington Ave., Boston)

19–22. Economics of **Automatic Data Processing**, symp., Rome, Italy. (Intern. Computation Center, Viale della Civilia del Lavoro, 23, P.O.B. 10053, Rome)

20–21. **Airborne Infection**, 2nd intern. symp., Johns Hopkins School of Medicine, Baltimore, Md. (E. K. Wolfe, Fort Detrick, Frederick, Md. 21701)

20–21. International Soc. of **Audiology**, 2nd congr., Kyoto, Japan. (M. Goto, Dept. of Otolaryngology, Kyoto Univ., Shogoin, Sakyo-ku, Kyoto)

20–22. **Circuit and System Theory**, Allerton Conf., Univ. of Illinois, Monticello. (M. E. Van Valkenburg, Dept. of Electrical Engineering, Univ. of Illinois, Urbana 61803)

20–22. **Design of Experiments**, 11th conf., Hoboken, N.J. (F. G. Dressel, Army Research Office-Durham, Box CM, Duke Station, Durham, N.C. 27706)

20–22. **Parenteral Drug** Assoc., annual conv., New York, N.Y. (PDA, Western Saving Fund Bldg., Broad and Chestnut St., Philadelphia, Pa. 19107)

21. **New Mexico** Acad. of Science, Albuquerque. (K. S. Bergstresser, 739 42nd St., Los Alamos, N.M.)

21. **Ocean Engineering**, symp., 1st autumn meeting, Natl. Acad. of Engineering, New York, N.Y. (H. K. Work, NAE, 2101 Constitution Ave., NW, Washington, D.C. 20418)

21–22. **Copolymer** conf., Ludwigshafen, Germany. (Deutsche Bunsen-Gesellschaft

für Physikalische Chemie, Varrentrappstr. 40-42, 6 Frankfurt am Main, Germany)

21–22. **Electrochemical Current Sources**, symp., Frankfurt am Main, Germany. (Gesellschaft Deutscher Chemiker, Postfach 9075, 6 Frankfurt am Main)

21–23. **Microminiaturization in Automatic Control**, symp., Munich, Germany. (G. Müller, Siemens & Halske AG, Wernerwerk für Messtechnik, Postfach 834, Karlsruhe, Germany)

21–23. Society of **Photographic Scientists** and Engineers, symp., Washington, D.C. (W. S. Dempsey, Houston Fearless Corp., 1413 K St., NW, Washington 20005)

22–23. **Data Processing** in Public Libraries, conf., Drexel Inst. of Technology, Philadelphia, Pa. (M. D. Warrington, Graduate School of Library Science, Drexel Inst. of Technology, Philadelphia 19104)

23. American Assoc. of **Physics Teachers**, Appalachian section, Marietta College, Ohio. (W. H. Davis, Dept. of Physics, Marietta College, Marietta, Ohio)

23–24. **Science and Technology** in Israel and the Middle East, 8th annual conf., American Technion Soc., New York, N.Y. (L. Drapkin, Technical Dept., American Soc. for Technion–Israel Inst. of Technology, 1000 Fifth Ave., New York 10028)

23–28. American Acad. of **Pediatrics**, annual, Chicago, Ill. (R. G. Frazier, AAP, 1801 Hinman Ave., Evanston, Ill. 60204)

24–27. Society of American **Foresters**, annual, Detroit, Mich. (Society of American Foresters, 1010 16th St., NW, Washington 20036)

24–29. **Stable Isotopes**, 4th symp., Leipzig, East Germany. (Inst. für Stabile Isotope, Deutsche Akademie der Wissenschaften, Permoserstr. 15, 705 Leipzig)

24–30. American College of **Gastroenterology**, Bal Harbour, Fla. (D. Weiss, 33 W. 60 St., New York 10023)

25–27. **Chemical Engineering**, 15th conf., Quebec, Que., Canada. (Chemical Inst. of Canada, 48 Rideau St., Ottawa 2, Ont.)

25–27. Functional Organization of the **Compound Eye**, symp., Karolinska Inst., Stockholm, Sweden. (W. E. Savely, Air Force Office of Scientific Research, Washington, D.C. 20333)

25–27. **Electrical Insulation**, Natl. Acad. of Sciences–Natl. Research Council conf., Buck Hill Falls, Pa. (D. W. Thornhill, NAS, 2101 Constitution Ave., NW, Washington, D.C.)

25–27. **Electronics**, natl. conf., Chicago, Ill. (R. G. Brown, Dept. of Electrical Engineering, Iowa State Univ., Ames 50010)

25–27. **Nuclear and Engineering Ceramics**, conf., Harwell, England. (G. H. Stewart, British Ceramic Soc., Shelton House, Shelton, Stoke-on-Trent, England)

25–27. Society of **Rheology**, Case Inst. of Technology, Cleveland, Ohio. (J. C. Miller, Union Carbide Plastics Co., Bound Brook, N.J.)

25–29. **Hypotensive Polypeptides**, intern. symp., Florence, Italy. (E. G. Erdös, Dept. of Pharmacology, Univ. of Oklahoma Medical Center, Oklahoma City 73104)

26. American Soc. of **Safety Engineers**, annual, Chicago, Ill. (A. C. Blackman, ASSE, 5 N. Wabash, Chicago, Ill.)

26–28. **Fluid Amplification**, symp., Washington, D.C. (J. M. Kirschner, Fluid Systems Branch, Harry Diamond Laboratories, Washington 20438)

26–28. **Shock and Vibration**, 25th symp., New Orleans, La. (Shock and Vibration Information Center, Code 4021, U.S. Naval Research Laboratory, Washington, D.C. 20390)

26–28. **Spacecraft Sterilization Technology**, natl. conf., NASA, California Inst. of Technology, Pasadena. (L. B. Hall, Code SB, NASA, Washington, D.C. 20546)

26–29. National Soc. for **Clean Air**, 32nd annual conf., Eastbourne, England. (R. Sharp, The Society, Field House, Breams Bldg., London, E.C.4)

26–30. **Immunohistochemistry**, symp., Nijmegen, Netherlands. (H. von Mayersbach, Faculteit der Geneeskunde, Laboratorium voor Cytologie en Histologie, Universiteit Van Nijmegen, Nijmegen)

27-29. **Aerospace and Navigational Electronics**, 12th East Coast conf., Baltimore, Md. (B. W. Moss, Mail #383, Martin Co., Box 988, Baltimore 21203)

27–29. American **Ceramic** Soc., Electronics Div., fall meeting, Los Angeles, Calif. (R. S. Shelden, 4055 N. High St., Columbus 4, Ohio)

27–29. **Electronic Data Processing Systems** for State and Local Governments, 2nd natl. conf., New York Univ., New York, N.Y. (H. G. Berkman, Graduate School of Public Administration, 4 Washington Sq. N., New York 10003)

27–30. **Neurological Surgeons**, 15th annual congr., Chicago, Ill. (J. R. Russell, 1815 N. Capitol Ave., Indianapolis, Ind. 46202)

28. **Water Pollution**, intermountain workshop, Denver, Colo. (Manufacturing Chemists Assoc., 1825 Connecticut Ave., NW, Washington, D.C.)

28–29. **Educational Records** Bureau, 13th annual conf., New York. (A. E. Traxler, Educational Records Bureau, 21 Audubon Ave., New York 10032)

28–29. **Energy Conversion and Storage**, 3rd annual conf., Oklahoma State Univ., Stillwater. (C. M. Summers, School of Electrical Engineering, Oklahoma State Univ., Stillwater 74075)

28–29. **Microwave Acoustics**, symp., Hanscom Field, Bedford, Mass. (T. G. Burnhagen, Air Force Cambridge Research Laboratories, Cambridge, Mass.)

28–30. American Soc. for **Aesthetics**, Washington, D.C. (J. R. Johnson, Cleveland Museum of Art, Cleveland, Ohio 44106)

28–4. **Psychology** as a Theoretical and Applied Discipline, seminar, Gujarat Univ., Ahmedabad, India. (P. H. Prabhu, School of Psychology, Education, and Philosophy, Gujarat Univ., Ahmedabad 9)

29–30. Society for the **Scientific Study of Religion**, annual, New York, N.Y. (SSSR, 1200 17th St., NW, Washington, D.C. 20036)

30–31. **Bronchoesophagology**, 11th intern. congr., Hakone, Japan. (C. M. Norris, 3401 N. Broad St., Philadelphia, Pa. 19140)

30–2. American **Speech and Hearing** Assoc., Chicago, Ill. (K. O. Johnson, 1001 Connecticut Ave., NW, Washington, D.C. 20006)

31–4. American Soc. of **Agronomy**, 57th

annual, Columbus, Ohio. (ASA, 677 South Segoe Rd., Madison, Wis. 53711)

31–5. Society of **Motion Picture and Television Engineers**, 98th technical conf., Montreal, P.Q., Canada. (SMPTE, 9 E. 41 St., New York 10017)

31–5. American Soc. for **Testing and Materials**, 5th Pacific area natl., Seattle, Wash. (H. H. Hamilton, ASTM, 1916 Race St., Philadelphia, Pa. 19103)

November

1–3. Development of the **Lung**, Ciba Foundation symp., London, England. (Ciba, 41 Portland Pl., London, W.1)

1–3. American **Physical** Soc., southeastern section, Charlottesville, Va. (H. Carr, Auburn Univ., Auburn, Ala.)

1–3. **Industrial Static Power Conversion**, conf., Philadelphia, Pa. (L. W. Morton, General Electric Co., Bldg. #2, Schenectady 5, N.Y.)

1–3. Information Processing in **Sight Sensory Systems**, California Inst. of Technology, Pasadena. (E. D. Johnson, 208 Booth Computing Center, California Inst. of Technology, Pasadena 91109)

1–3. **Systems**, intern. meeting, Chicago, Ill. (R. L. Irwin, Systems and Procedures Assoc., 7890 Brookside Dr., Cleveland, Ohio 44138)

1–4. American Soc. of **Agronomy**, Columbus, Ohio. (M. Stelly, ASA, 677 S. Segoe Rd., Madison, Wis. 53711)

1–4. **Radioactive Pharmaceuticals**, symp., Gatlinburg, Tenn. (Chairman's Office, Medical Div., Oak Ridge Inst. of Nuclear Studies, Oak Ridge, Tenn. 37831)

1–5. American **Dietetic** Assoc., 48th annual, Cleveland, Ohio. (ADA, 620 North Michigan Ave., Chicago, Ill. 60611)

The following meetings will be held under the **U.S.–Japan Cooperative Science Program** for November. Information is available from N. P. Neureiter, Office of International Activities, National Science Foundation, Washington, D.C.

1–5. **Congenital Malformations and Can-Cells**, conf., Kyoto, Japan.

4–5. **Range of Deviation among Cancer Cells**, conf., Kyoto, Japan.

15–18. **Bulk Sampling**, seminar, Tokyo, Japan.

1–7. **Military Medicine and Pharmacy**, 18th intern. congr., Bangkok, Thailand. (J. Voncken, Intern. Committee of Military Medicine and Pharmacy, 79, rue Saint-Laurent, Liege, Belgium)

2–4. New England **Research and Engineering** Meeting (NEREM), Boston, Mass. (IEEE Boston Office, 313 Washington, Newton, Mass.)

2–4. **Space Electronics**, intern. symp., Inst. of Electrical and Electronics Engineers, Miami Beach, Fla. (A. J. Wood, Office of Information, Public Information Div., Patrick Air Force Base, Fla.)

2–5. Use of the **Baboon as an Experimental Animal**, 2nd intern. symp., San Antonio, Tex. (L. R. Smith, Southwest Foundation for Research and Education, P.O. Box 2296, San Antonio 78206)

2–6. American Soc. of **Oral Surgeons**, annual, Denver, Colo. (G. A. Malecki, ASOS, 919 North Michigan Ave., Chicago, Ill.)

3–4. **Automation**, conf., Oslo, Norway. (Studieselsmapet Forkninsveien, Oslo 3)

3–4. American College of **Clinical Pharmacology and Chemotherapy**, Chicago, Ill. (D. E. Hutcheon, The College, 7 E. 82 St., New York 10028)

3–5. **Data Processing**, intern. fall conf., Dallas, Tex. (Conference Registrar, P.O. Box 2665, Dallas 75221)

3–5. **Diffraction**, 23rd Pittsburgh conf., Pittsburgh, Pa. (B. R. Banerjee, Crucible Steel Co., 234 Atwood, Pittsburgh 15213)

3–5. Society of **Engineering Science**, 3rd technical, Univ. of California, Davis. (A. C. Eringen, School of Aeronautics, Astronautics and Engineering Sciences, Purdue Univ., Lafayette, Ind. 47907)

3–5. American Soc. of **Tropical Medicine and Hygiene**, New Orleans, La. (G. M. Jeffrey, P.O. Box 295, Kensington, Md. 20795)

3–6. **Acoustical** Soc. of America, St. Louis, Mo. (W. Waterfall, American Inst. of Physics, 335 E. 45 St., New York 10017)

3–8. French Soc. of **Orthopedics and Traumatology**, 40th annual, Paris. (D. P. Masse, FSOT, Pavillon Ollier, Hôpital Cochin, 27 rue du Faubourg Saint-Jacques, Paris 14e)

3–12. Intergovernmental **Oceanographic** Commission, 4th session, Paris, France. (Office of Oceanography, UNESCO, Pl. de Fontenoy, Paris 7e)

4–5. **Operations Research** Soc. of America, Houston, Tex. (N. E. Miller III, Mt. Royal and Guilford Aves., Baltimore, Md. 21202)

4–5. **Rheumatology**, Czechoslovak-Polish meeting, Prague, Czechoslovakia. (F. Lenoch, Na Slupi 4, Prague 2)

4–6. American Soc. of **Cytology**, 13th annual scientific, New York, N.Y. (W. R. Lang, 1012 Walnut St., Philadelphia, Pa. 19107)

4–6. Society of **Economic Geologists**, Kansas City, Mo. (J. O. Kalliokoski, Dept. of Geology, Princeton Univ., Princeton, N.J. 98540)

4–6. **Geological** Soc. of America, Kansas City, Mo. (R. C. Becker, GSA, 231 E. 46 St., New York 10017)

4–6. National Assoc. of **Geology Teachers**, Kansas City, Mo. (M. B. Rosalsky, Dept. of Geology, City College of New York, New York 10031)

4–6. Southwestern **Medical** Assoc., 47th annual, El Paso, Tex. (S. Heinemann, 310 N. Stanton, El Paso)

4–6. **Paleontological** Soc., Kansas City, Mo. (R. L. Langenheim, Jr., Dept. of Geology, Univ. of Illinois, Urbana)

5–6. **Cancer of the Gastrointestinal Tract**, 10th annual clinical conf., Univ. of Texas M. D. Anderson Hospital and Tumor Clinic, Houston. (R. L. Clark, M. D. Anderson Hospital and Tumor Inst., Univ. of Texas, Houston 25)

5–6. Society for **Psychosomatic Research**, London, England. (C. J. Lucas, Student Health Centre, 17 Gordon St., London W.C.1)

5–7. American **Translators** Assoc., natl. conv., Washington, D.C. (Suite 2157, 630 Fifth Ave., New York 10020)

6–7. American Soc. for **Colposcopy and Colpomicroscopy**, annual, New York, N.Y. (D. Schildwaechter, 4219 Chester Ave., Philadelphia, Pa.)

6–7. International College of **Dentists**, Las Vegas, Nev. (H. O. Westerdahl, 4829

Minnetonka Blvd., Minneapolis, Minn. 55416)

6–20. International Federation of **Thermalism and Climatism**, Israel. (A. Schirmer, Fédération Intern. du Thermalisme et du Climatisme, Stadtbachstr. 12, Baden, Switzerland)

7. American College of **Dentists**, Las Vegas, Nev. (O. W. Brandhorst, 4236 Lindell Blvd., St. Louis, Mo.)

7–9. American **Science Film** Assoc., annual, Washington, D.C. (ASFA, 1319 F St., NW, Washington 20004)

7–10. **Automation**, British conf., Eastbourne, England. (Inst. of Production Engineers, 10 Chesterfield St., Mayfair, London, W.1)

7–11. American Soc. of **Mechanical Engineers**, winter annual mtg., Chicago, Ill. (ASME, 345 East 47 St., New York 10017)

7–12. **Anatomical Pathology**, 5th Latin American congr., Lima, Peru. (J. J. Andujar, P.O. Box 118, Fort Worth, Tex.)

7–13. **Paediatrics**, 11th intern. congr., Tokyo, Japan. (K. Nakamura, Dept. of Pediatrics, Univ. of Tokyo, P.O. Box 18, Hongo, Tokyo)

7–14. **Vienna Univ. of Technology**, 150th anniversary celebration, Vienna, Austria. (Technische Hochschule, Gusshausstr. 23, Vienna 4)

8–9. **Engineering in the Practice of Medicine**, Philadelphia, Pa. (S. Rosen, Dept. of Medicine, Hahnemann Medical College, 230 N. Broad St., Philadelphia 19102)

8–11. American **Dental** Assoc., Las Vegas, Nev. (H. Hillenbrand, 222 E. Superior St., Chicago, Ill. 60611)

8–11. **Insecticide and Fungicide**, 3rd British conf., Brighton, England. (Secretary, 140 Bensham Lane, Thornton Heath, Surrey, England)

8–11. **Nutrition**, Western Hemisphere congr., Chicago, Ill. (Dept. of Foods and Nutrition, American Medical Assoc., 535 North Dearborn, Chicago 60610)

8–11. **Quality Control**, intern. congr., Tokyo, Japan. (Union of Japanese Scientists and Engineers, c/o Sakata Bldg., 3 Muromachi 4-chome, Nihombashi, Chuo-ku, Tokyo)

8–13. Austrian **Medical** congr., 19th annual, Vienna. (M. Schnardt, Osterreichische Arztekammer, Referat für Arztliche Fortbildung, Weihburggasse 10–12, Vienna I)

9–12. **Seismic Models**, symp., Prague, Czechoslovakia. (V. Karnik and J. Vanek, Inst. of Geophysics, Czechoslovak Acad. of Sciences, Bocni II, Prague 13-Sporilov)

9–13. Asociación Médica de Puerto Rico, Santurce. (J. A. Ramirez, 13–5 Fernandez Juncos Ave., Santurce)

10–11. Power Applications of **Controllable Semiconductor Devices**, conf., London, England. (Secretary, Inst. of Electrical Engineers, Savoy Pl., London, W.C.2)

10–12. American Soc. for **Cell Biology**, 5th, Philadelphia, Pa. (M. J. Moses, Box 2982, Duke Univ. Medical Center, Durham, N.C. 27706)

10–12. **Engineering in Medicine and Biology**, 18th annual conf., Philadelphia, Pa. (H. P. Schwan, Moore School of Electrical Engineering, Univ. of Pennsylvania, Philadelphia 19104)

10–12. **Isotope Techniques in the Hydrologic Cycle**, symp., Univ. of Illinois, Urbana. (G. E. Stout, Meteorology Section, Illinois State Water Survey, Univ. of Illinois, Urbana)

10–13. **Respiratory Therapy**, 2nd New England conf., Boston, Mass. (D. Crocker, Children's Hospital Medical Center, 300 Longwood Ave., Boston 15)

10–20. Development of **Petroleum Resources of Asia and the Far East**, 3rd symp., Tokyo, Japan. (S. Santitham, Rajadamnern Ave., Bangkok, Thailand)

11–12. **Kentucky** Acad. of Science, Univ. of Kentucky, Lexington. (D. M. Lindsay, Georgetown College, Georgetown, Ky.)

11–13. **Gerontological** Soc., 18th annual, Los Angeles, Calif. (W. D. Obrist, Dept. of Psychiatry, Duke Univ. Medical Center, Durham, N.C. 27706)

11–13. Bases for **Nuclear Spin-Parity** Assignments, conf., Gatlinburg, Tenn. (F. K. McGowan, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn. 37831)

12–13. **Clinical Pathology of Infancy**, Assoc. of Clinical Scientists, Washington, D.C. (F. W. Sunderman, 1833 DeLancey Pl., Philadelphia, Pa. 19103)

12–13. Society for **Industrial and Applied Mathematics**, western regional, Seattle, Wash. (B. H. Colvin, Boeing Scientific Research Laboratories, P.O. Box 3981, Seattle)

12–14. Association of **Clinical Scientists**, Washington, D.C. (R. MacFate, 300 N. State St. No. 5322, Chicago, Ill. 60610)

12–15. **Neutrality of Medicine**, 2nd intern. congr., Paris, France. (R. Ellenboger, Ministère des Anciens Combattants et Victimes de Guerre, 37, rue de Bellechasse, Paris 7°)

14–15. National Medical Foundation for **Eye Care**, Chicago, Ill. (L. A. Zupan, Room 6, 1100 17th St., NW, Washington, D.C.)

14–16. Hedrologicum Conlegium, Intern. Soc. for the Study of **Diseases of the Colon and Rectum**, 2nd congr., Tokyo, Japan. (J. F. Montague, 104 E. 40 St., New York 10016)

14–17. Southern **Medical** Assoc., Washington, D.C. (R. F. Butts, 2601 Highland Ave., Birmingham 5, Ala.)

14–18. Mexican **Dental** Assoc., 1st intern. congr., Mexico City. (R. Espinosa de la Sierra, Asociación Dental Mexicana, Sinaloa no. 9, Mexico 7, D.F.)

14–18. **Dental**, Pacific intern. conf., Honolulu, Hawaii. (W. A. Wakai, 291 Alexander Young Bldg., Honolulu 96813)

14–18. Society of **Exploration Geophysicists**, 35th annual intern., Dallas, Tex. (Dallas Geophysical Soc., Dallas)

14–19. American Acad. of **Ophthalmology and Otolaryngology**, Chicago, Ill. (W. L. Benedict, 15 Second St., SW, Rochester, Minn.)

14–21. **Air Pollution**, 1st world congr., Buenos Aires, Argentina. (D. D. Torti, Asociación Argentina Contra la Contaminación del Aire, Sarmiento 680, Buenos Aires)

15–16. **Hypervelocity Techniques**, 4th symp., Tullahoma, Tenn. (J. Lukasiewicz, vonKarman Gas Dynamics Facility, ARO, Inc., Arnold Air Force Station, Tenn. 37706)

15–16. **Science** conf., 4th annual, Belfer Graduate School of Science, Yeshiva Univ., New York, N.Y. (A. Gelbart, Bel-

fer Graduate School of Science, Amsterdam Ave. and 186th St., New York 10033)

15–17. Association of **Military Surgeons** of the U.S., Washington, D.C. (F. E. Wilson, 1500 Massachusetts Ave., NW, Washington, D.C.)

15–18. **Aircraft Design and Technology**, Los Angeles, Calif. (American Inst. of Aeronautics and Astronautics, 1290 Sixth Ave., New York 10019)

15–18. **Information Problems in the Drug Industry**, conf., Philadelphia, Pa. (C. P. Butcher, Graduate School of Library Science, Drexel Inst. of Technology, 32nd and Chestnut Sts., Philadelphia 19104)

15–18. American **Nuclear** Soc./Atomic Industrial Forum, winter meeting, Washington, D.C. (O. J. DuTemple, American Nuclear Soc., 244 E. Ogden Ave., Hinsdale, Ill. 60521)

15–19. **Animal Care Panel**, 16th annual, Philadelphia, Pa. (H. P. Schneider, Hahnemann Medical College, 230 N. Broad St., Philadelphia 19102)

15–19. **Gulf and Caribbean Fisheries** Inst., 18th annual session, Miami, Fla. (Executive Secretary, 1 Rickenbacker Causeway, Miami 33149)

15–19. **Magnetism and Magnetic Materials**, San Francisco, Calif. (W. D. Doyle, Franklin Inst. Laboratories, Philadelphia, Pa.)

15–19. World Federation for **Mental Health**, 18th annual, Bangkok, Thailand. (F. Cloutier, 1, rue Gevray, Geneva, Switzerland)

15–19. Disposal of **Radioactive Wastes** into the Sea and Fresh Waters, symp., Vienna, Austria. (Intern. Atomic Energy Agency, 11 Kärntnerring, Vienna I)

15–20. **Productivity, Technology, and Change**, conf., London, England. (British Productivity Council, Vintry House, Queen St. Pl., London, E.C.4)

16–18. **Physics of Failure in Electronics**, 4th annual symp., Chicago, Ill. (M. Goldberg, IIT Research Inst., 10 W. 35 St., Chicago 60616)

16–18. **Spacecraft Sterilization Technology**, 1st natl. conf., California Inst. of Technology, Pasadena. (Office of Space Science and Applications, NASA, 400 Maryland Ave., SW, Washington, D.C. 20546)

17–19. Eastern **Analytical** Symp., New York, N.Y. (M. E. McGoldrick, Armco Steel Corp., P.O. Box 1697, Baltimore, Md. 21203)

17–19. **Micrography**, intern. congr., Tokyo, Japan. (Mrs. J. Lang, 2501 Hudson Rd., St. Paul, Minn. 55119)

17–20. Canadian **Cardiovascular** Soc., Winnipeg, Man. (J. B. Armstrong, 1130 Bay St., Toronto 5, Ont.)

17–20. **Hyperbaric Oxygenation**, 3rd intern. conf., Duke Univ. Medical Center, Durham, N.C. (I. W. Brown, Jr., Dept. of Surgery, Duke Univ. Medical Center, Durham)

18. Society of Military **Otolaryngologists**, Chicago, Ill. (G. R. Hart, Box 223, U.S. Naval Hospital, Philadelphia, Pa. 19145)

18–19. **Computational Methods in Crystallography**, conf., London, England. (Meetings Officer, Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London, S.W.1)

18–19. **Electronics**, Mid-America conf., Kansas City, Mo. (W. Wiley, Bonzer Inc., 11111 W. 59th Terrace, Shawnee, Kan.)

18–21. American **Anthropological** Assoc., Denver, Colo. (S. T. Boggs, 1530 P St., NW, Washington, D.C. 20005)

18–24. **Tropical Oceanography**, intern. conf., Miami Beach, Fla. (F. F. Koczy, Inst. of Marine Science, Univ. of Miami, Miami 33149)

20–21. American **Folklore** Soc., Denver, Colo. (T. P. Coffin, Box 5, Bennett Hall, Univ. of Pennsylvania, Philadelphia 19104)

21–26. **Orthopedics and Traumatology**, 6th Latin American congr., Lima, Peru. (G. de Velasco Polo, Zacatecas 117, Mexico 7, D.F.)

22–24. **Electromagnetic Sensing of Earth** by Satellites, intern. symp., Coral Gables, Fla. (R. Zirkind, Polytechnic Inst. of Brooklyn, Graduate Center, Farmingdale, L.I., N.Y.)

22–26. **Nuclear Electronics**, conf., Bombay, India. (K. Zybylski, Div. of Scientific and Technical Information, Intern. Atomic Energy Agency, 11 Kärntnerring, Vienna, Austria)

22–26. **Plutonium**, intern. conf., London, England. (Inst. of Metals, 17 Belgrave Sq., London, S.W.1)

22–3. **Volcanology**, intern. symp., Auckland and Wellington, New Zealand. (J. Healy, Dept. of Scientific and Industrial Research, Rotorua, New Zealand)

24–29. American College of **Apothecaries**, Inc., Miami Beach, Fla. (R. E. Abrams, Hamilton Court Hotel, 39th and Chestnut St., Philadelphia, Pa. 19104)

25. Central Assoc. of **Science and Mathematics Teachers**, Chicago, Ill. (A. M. Hach, 1220 Wells St., Ann Arbor, Mich.)

25–27. National Council for **Geographic Education**, New York, N.Y. (T. G. Gault, The Council, Indiana State College, Indiana, Pa.)

25–27. **Reinforced Plastics**, 4th intern. conf., British Plastics Federation, London, England. (The Federation, 47–48 Piccadilly, London, W.1)

26–27. **Interactions of Space Vehicles with an Ionized Atmosphere**, 2nd symp., Univ. of Miami, Coral Gables, Fla. (A. R. Hochstim, Inst. for Defense Analyses, 400 Army-Navy Drive, Arlington, Va.)

26–27. American Inst. of **Ultrasonics in Medicine**, 1st Pan American meeting, Lima, Peru. (C. Bustamante Ruiz, Dept. of Physical Medicine and Rehabilitation, Hospital Obrero, Lima)

28–3. **Radiological** Soc. of North America, Chicago, Ill. (M. D. Frazer, 713 Genesee St., Syracuse, N.Y.)

28–4. **Odontological** Federation of Central America and Panama, San Jose, Costa Rica. (R. Pauly S., Univ. of Costa Rica, San Jose)

28–4. **Odontological** Soc. of Chile, 5th intern. congr., Santiago. (J. Pequeño, San Antonio 510, Santiago)

29–30. Biochemical and Pharmacological Aspects of **Basal Ganglia Disease**, symp., Columbia Univ. College of Physicians and Surgeons, New York, N.Y. (M. D. Yahr, New York Neurological Inst., 710 W. 168 St., New York 10032)

29–2. **Entomological** Soc. of America, New Orleans, La. (R. H. Nelson, ESA, 4603 Calvert Rd., College Park, Md., 20740)

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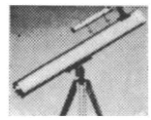

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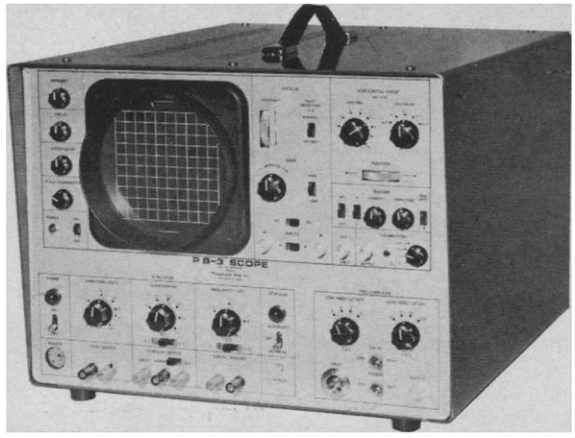

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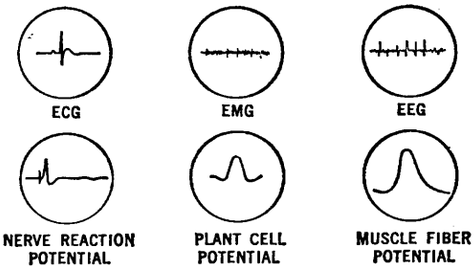

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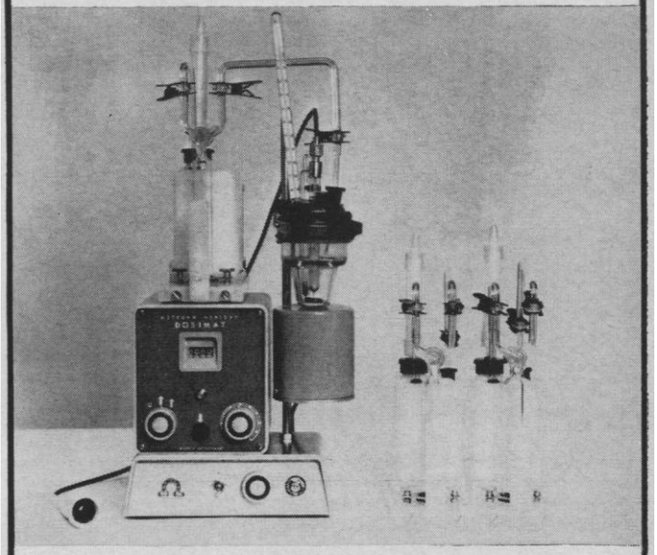

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NEW BOOKS

(Continued from page 204)

Neural Networks in the Retina. Floyd Ratliff. Holden-Day, San Francisco, 1965. 379 pp. Illus. $13.95.

Mammalian Learning and Behavior: A Psychoneurological Theory. David D. Smith. Saunders, Philadelphia, 1965. 184 pp. Illus. $6.50.

Marine Mammals. Richard J. Harrison and Judith E. King. Hillary House, New York, 1965. 192 pp. Illus. $3. Hutchinson University Library Series.

The Molecular Biology of Development. James Bonner. Oxford Univ. Press, New York, 1965. 165 pp. Illus. $3.50.

Molecular Biology of the Gene. J. D. Watson. Benjamin, New York, 1965. 516 pp. Illus. Paper, $5.95; cloth, $10. Biology Teaching Monograph Series, edited by Cyrus Levinthal.

Molecules and Life. Robert F. Steiner and Harold Edelhoch. Van Nostrand, Princeton, N.J., 1965. 207 pp. Illus. Paper, $1.95.

Mountain Sickness. B. Bhattacharjya. Wright, Bristol, England; Williams and Wilkins, Baltimore, 1965. 58 pp. Illus. Paper, $3.50.

The Parathyroid Glands: Ultrastructures, Secretion, and Function. Pieter J. Gaillard, Roy V. Talmage, and Ann M. Budy, Eds. Univ. of Chicago Press, Chicago, 1965. 365 pp. Illus. $15. Twenty-three papers presented at a symposium (Noordwijk aan Zee, Netherlands), August 1964; the symposium was sponsored by the State University of Leiden and Rice University, Houston, Texas.

Photosynthesis. Jerome L. Rosenberg. Holt, Rinehart, and Winston, New York, 1965. 127 pp. Illus. Paper, $1.28; cloth, $2.50. Holt Library of Science, Series II.

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The Plant Kingdom. A laboratory manual. Paul C. Lemon and Norman H. Russell. Mosby, St. Louis, ed. 2, 1965. 225 pp. Illus. Paper, $3.90.

Progress in Protozoology. Ph. Vuysje, Ed. Excerpta Medica Foundation, Amsterdam, Netherlands, 1965. 278 pp. Illus. Paper, $9. Abstracts of 357 papers read at the Second International Conference on Protozoology (London), July-August 1965.

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Recent Progress in Photobiology. Proceedings of an International Congress (Oxford, England), July 1964. E. J. Bowen, Ed. Academic Press, New York, 1965. 408 pp. Illus. $12. Thirty-three papers.

Residue Reviews. Residues of pesticides and other foreign chemicals in foods and feeds. vol. 10. Francis A. Gunther, Ed. Springer-Verlag, New York, 1965. 169 pp. Illus. $5.50. Five papers: "Effects of pesticidal treatments on the chlorophyll

content of plant parts" by J. Bruinsma; "Determination of extractable substances in food packaging materials" by E. A. Garlock and O. E. Paynter; "DDD as a decomposition product of DDT" by D. E. Ott and F. A. Gunther; "Residue analytical limit of detectability" by G. L. Sutherland; and "Herbicides: A compilation of their physical, chemical, and biological properties" by G. W. Bailey and J. L. White.

The Staphylococci: Ecologic Perspectives (*Ann. N.Y. Acad. Sci.* **128**, *No. 1*). Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1965. 458 pp. Illus. Paper, $8. Papers presented at a conference held by the Academy in October 1964.

The Tissues of the Body. W. E. Le-Gros Clark. Oxford Univ. Press, New York, ed. 5, 1965. 430 pp. Illus. $12.75.

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Miscellaneous Publications

(Inquiries concerning these publications should be addressed to the publisher or agency sponsoring the publication, not to Science.*)*

Acanthodrilidae and Eudrilidae (Oligochaeta) from Ghana (*Bull. Brit. Museum Zool.* **12**, *No. 8*). R. W. Sims. British Museum (Natural History), London, 1965. 29 pp. Illus. Paper, 10s.

Activities Report, 1964. International Union Against Cancer, Geneva, Switzerland, 1965. 62 pp. Paper.

Alimentation des populations africaines au Sud du Sahara (Enquetes Bibliographiques **13**). M. P. C. Lefevre. Centre de Documentation Economique et Sociale Africaine, Brussels, 1965. 235 pp. Paper, F.B. 500. Annotated bibliography containing 985 alphabetically arranged (by author) entries.

Anais do XIII Congresso da Sociedade Botânica do Brasil (1962). Instituto de Micologia, Universidade do Recife, Recife, Brazil, 1964. 516 pp. Illus. Paper.

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Atlantide Report, No. 8. Scientific results of the Danish Expedition to the coasts of tropical West Africa, 1945–1946. Jorgen Knudsen and Torben Wolff. Danish Science Press, Copenhagen, 1965. 255 pp. Illus. Paper, $9.

Autoimmunity—Experimental and Clinical Aspects, pt. 2 (*Ann. N.Y. Acad. Sci.* **124**). Harold E. Whipple, Ed. New York Acad. of Sciences, New York, 1965. 478 pp. Illus. Paper. Forty-one papers.

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NEWS AND COMMENT

(Continued from page 199)

slogan is, more or less, "a trout in every river," but the industries and municipalities which pay the bills for treatment plants tend to see water use as an either-or proposition—"pickerels or payrolls is their dogma," one observer remarked last week.

Critics also fear that the competition among states for industry would give commercial advantage to the states with the lowest standards, and that the Secretary of HEW will be hard put to resist political pressures arising from cries of lost jobs or bankruptcy if industries move elsewhere. It has been argued that shifting the burden for the first formulation of standards to the states will give them a chance to define the terms of discussion in a way that will be detrimental to conservation interests. "When we call an enforcement conference now," one HEW official said last week, "we go in on the basis of a technical report which names names, tells the facts, and makes recommendations. If the states define the standards, the basis for discussion will be much weaker—and it's going to be hard to revise it upward." In this view, the reason for HEW's poor record in water pollution is not absence of authority to intervene but absence of inclination—which presumably will be remedied by the new administration.

Fears have also been expressed that the legislation will prove difficult to administer. For the most part neither the designers of the bill nor the officials who will administer it are yet able to answer questions concerning, for example, how a new industry entering a river system will be integrated into the system without lowering the standards. A redistribution of pollution allowances among all users of the stream would be one alternative—but one which might prove costly by encouraging piecemeal expenditures. An absolute prohibition on pollution for the newcomer is another—but one which would plainly discourage industrial expansion. Political dispensations—and the collapse of standards—is a third. Vagueness about such key questions is one reason for apprehension not only among the conservationists but also among industrial lobbyists.

Most such complaints are dismissed by supporters of the standards as intellectual fantasies. "What this bill says to polluters," one leading congressional conservationist said last week, "is that

you have two more years of hanky-panky and after that we'll really be in business." The basis for this view is that, whereas now enforcement begins at the conference table and follows a lengthy route to hearings and court action, the new and elaborate standards-setting procedure itself encompasses those delays. Once the standards are set, the government can presumably move right on to enforcement action against violators. As for the seeming interlocking of federal and state authority, another veteran congressional conservationist advises, "don't be fooled. Federal enforcement officials have had a lot of experience structuring conferences and they'll be able to handle this to suit them." Congressman Blatnik also believes that, despite the emphasis on cooperation with states, "there is no doubt that in the last analysis real authority rests with the federal government." Political pressures on government officials these lobby-hardened politicians take as a matter of course. Details of administration, they believe, will work themselves out. And they feel, above all, that, by extending the basis for federal intervention to situations where there is no pretense that the immediate public health or welfare is threatened, they have constructed a system in which broader values are recognized and in which the upgrading of long-polluted rivers can begin.

Other Features

Besides the provision for a new agency and water standards, the new legislation contains several other measures designed to put water-pollution control on a stronger footing. One of the most important, though little noticed, features of the bill gives the new agency power to bring enforcement action if it finds that substantial economic injury results from the inability to market shellfish or shellfish products because of pollution in interstate or navigable waters. The inclusion of "navigable" waters gives the agency access to the large number of coastal bays and harbors which have no interstate boundaries and which therefore will be omitted from classification under the standards provision. The bill also authorizes a 4-year, $20 million program of grants to states, municipalities, and other agencies for research and development on ways of improving the combined storm and sewage systems which are extremely common throughout the country and which fre-

quently feed huge overflows of untreated waste into the waterways during periods of heavy rainfall. Finally, the new bill begins to make some inroads on the admittedly inadequate levels of federal financial support for state and local pollution abatement activities. The annual appropriation ceiling has been raised from $100 million to $150 million. Some of the inequitable provisions that limited effective use of the $100 million have also been modified for the additional $50 million, which is to be allotted on a straight population basis. (The formula still governing the first $100 million stipulates that half of the funds must go to communities with a population of 125,000 or less—a system which has actually discriminated against the populous urban areas where pollution problems are most serious.) The new bill also doubles present limitations on grants for the construction of waste treatment works from $600,000 to $1.2 million for a single project and from $2.4 million to $4.8 million for a project serving more than one municipality —figures still only a fraction of what cities must spend for effective abatement systems.

Widespread satisfaction with the new legislation is balanced by an equally widespread conviction that much more remains to be done. The pollution problem is not the work of a malevolent few but of an ingrained national habit of treating the waterways as sewers. A recent HEW study of pollution on the Hudson River, for example, reports that 43 percent of the waste dumped into the river is discharged without any treatment whatever. In some of the heavily industrialized areas of New England, the proportion may be even higher. The result is a threat not only to the rising conservationist values of a well-heeled and recreation-minded public but to the water supply itself. "When all is said and done," a congressional aide remarked last week, "our best friend on the water pollution bill was the northeast drought. If anything gives a guy courage to thumb his nose at a lobbyist, it's 400 housewives screaming about watering their lawns." Sentiment is growing, even among some industrial polluters, that a change in philosophy is in order and veterans of this year's congressional battle are already casting about for new ways of embodying it in progressive legislation. One thing they are sure about is that in the field of water pollution there will be plenty to do for an encore.

—ELINOR LANGER

Arches of Science Award to Weaver

The Pacific Science Center Foundation this week named Warren Weaver to receive its first Arches of Science Award on 25 October in Seattle. The award, created earlier in the year to recognize outstanding contributions by people in all professions to better public understanding of science, carries a $25,000 prize and a gold medal.

Although Weaver retired last year as vice president of the Alfred P. Sloan Foundation in New York, he has continued as a special consultant and a trustee of the foundation. He is also chairman of the board of the Salk Institute for Biological Studies in San Diego. A fellow of AAAS since 1928, he was the 1954 president of the AAAS. Next week, in Paris, he will receive the Kalinga prize, awarded annually by UNESCO for distinguished contributions to public understanding of science.

Wheeler Receives Einstein Award

John Wheeler, professor of physics at Princeton, is the recipient of this year's Einstein Award. The award, which provides $5000, a gold medal, and a citation, is presented by the Lewis and Rosa Strauss Memorial Foundation.

Established in 1950, the award is made in recognition of significant additions to human knowledge in the natural sciences.

During World War II Wheeler was a consultant and senior physicist on atomic energy projects, first at Princeton, later at Chicago, Richland, and Los Alamos. He was a vice president of the Battelle Memorial Institute in Columbus, Ohio, where he is now a trustee. He is a member of the advisory committee at Oak Ridge National Laboratory.

Announcements

NASA last week stopped telemetry operations of the **Mariner IV** spacecraft. The craft had operated since November 1964, transmitting scientific and engineering measurements on the environment of interplanetary space. In July it recorded the first close-up pictures of Mars. Project officials at Caltech's Jet Propulsion Laboratory said that the craft will continue in its present orbit around the sun; tracking it will be possible only with a new 210-foot antenna, which will begin

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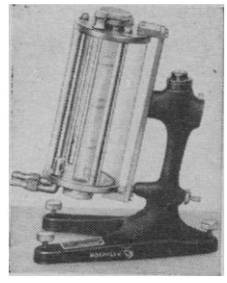

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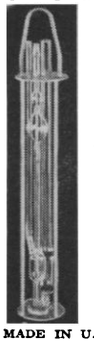

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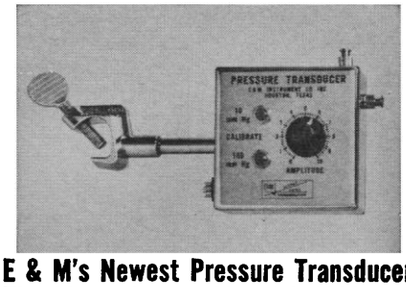

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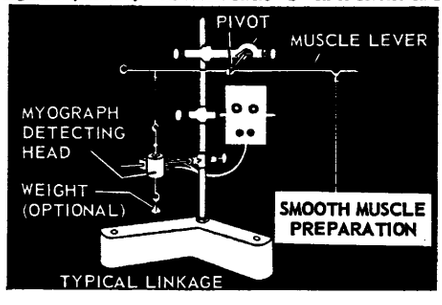

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operation next spring at the Goldstone Space Communications Station in California. The spacecraft will continue transmitting signals; it may resume its radio link with Earth in September 1967, when it will be at its closest approach to this planet, some 29 million miles away. At that time, according to JPL engineers, several months of useful telemetry may be obtained if the transmitter and other critical systems are still operating.

The National Library of Medicine has introduced a new service for the biomedical public, consisting of a monthly listing of selected demand-search **bibliographies**, orginally compiled by the library at the request of individual researchers. The bibliographies are in subject areas which the library feels may be of interest to a broader audience. Listings will include the topic of the searches and the number of citations; individuals may write for copies of the particular bibliographies in which they are interested. Additional information is available from the National Library of Medicine 8600 Rockville Pike, Bethesda, Maryland 20014.

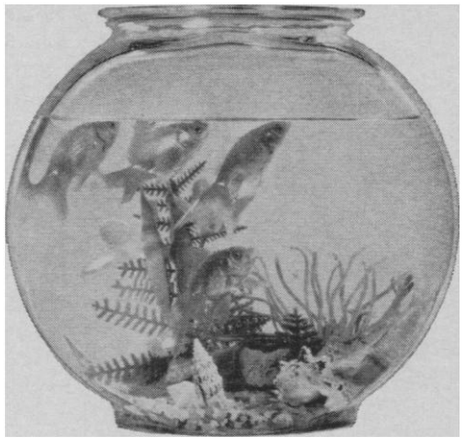
The University of Bridgeport, Connecticut, has established a **graduate division** in its college of arts and science. Graduate courses leading to the master's degree will include biology, chemistry, mathematics, physics, poltical science, and sociology. Initially, courses will be offered on a part-time basis, most meeting once a week. The college plans to seek formal approval of the program from the Connecticut State Board of Education during the 1966–67 academic year, and to confer the first master's degrees not later than June 1968. Applications for the graduate division are being accepted by William Walker, director of the College of Arts and Science Graduate Admissions Office, Bridgeport.

An **Office of Biochemical Nomenclature** has been established by the National Academy of Sciences–National Research Council. The office will seek to coordinate information on activities of national and international organizations in biochemical nomenclature, to stimulate new activities in the field, and to encourage dissemination of information to interested groups. Waldo E. Cohn, of the biology division at Oak Ridge National Laboratory, is director of the office. He also is secretary of the Joint Commission on the Nomenclature of Biological Chemistry of the International Unions of Pure and Applied Chemistry and of Biochemistry.

An **Advisory Committee on Emergency Planning** has been established by the National Academy of Sciences, under an agreement with the Office of Emergency Planning in the Executive Office of the President. It will assist OEP in planning and coordination of federal activities in times of national emergency. The committee will be concerned with such problems as long-range requirements for stockpiling of strategic and critical materials, recovery and construction after a nuclear attack, and the impact of new developments in science and technology on the emergency planning effort. Carl F. Prutton, of Food Machinery and Chemical Corporation, is chairman of the committee; vice chairman is Philip Arnold, of Phillips Petroleum Company. The other members include:

Clay P. Bedford, Henry Kaiser Company, Oakland.

S. H. Bingham, president of his own



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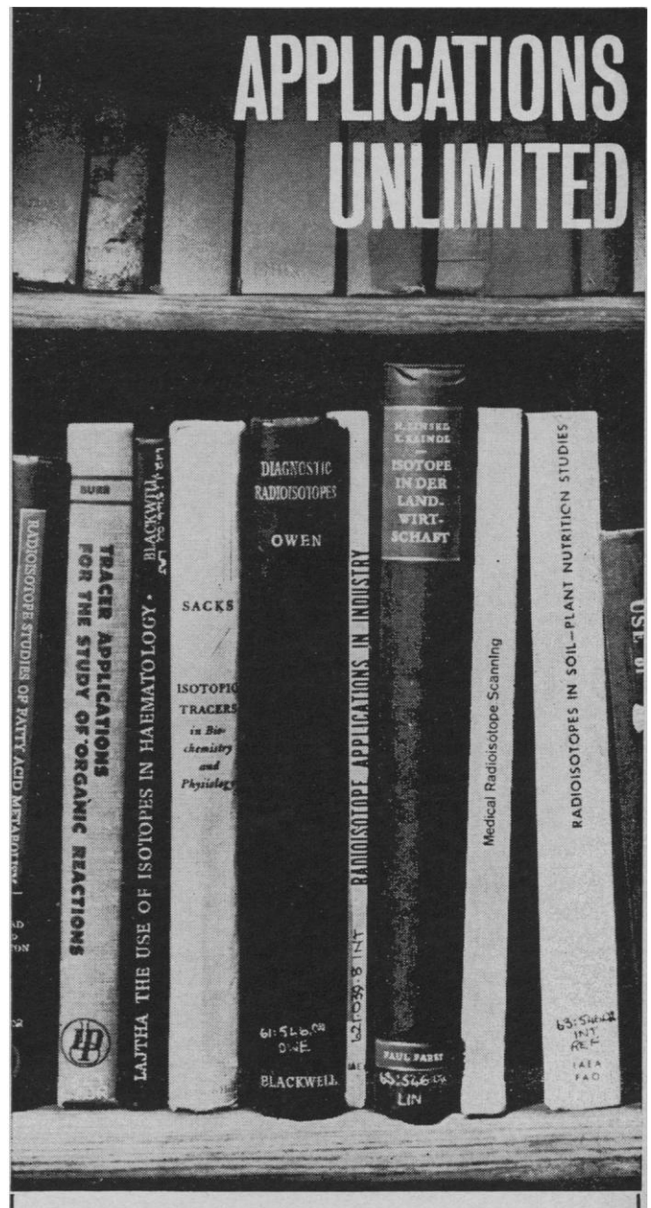

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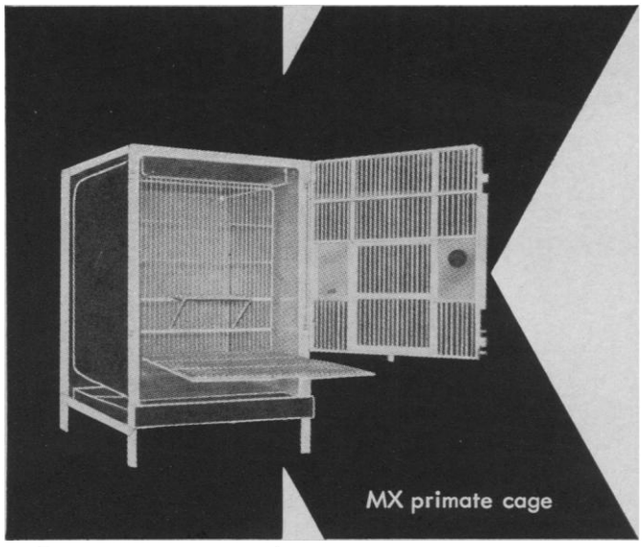
Charles E. Reed, General Electric Company, Bridgeport, Connecticut.

Lauriston S. Taylor, special assistant to the president of the NAS, is executive director of the committee.

An academic committee offering a graduate degree program in the **information sciences** has been formed at the University of Chicago. The committee on information sciences will accept its first masters and doctoral students this fall. Richard H. Miller, associate professor of astronomy and director of the University's Institute for Computer Research, is acting chairman. He points out that the creation of the committee reflects the emergence of "an important new body of knowledge which does not fit into traditional university departments." Its purpose is to provide a multidisciplinary academic base for research and training in the field. Students entering the program will need a background in advanced calculus, linear algebra, numerical methods, and probability statistics.

George Washington University is offering a program in **law, science, and technology** in its graduate school of public law. The program's aim is to help train lawyers to deal more effectively in the areas of reciprocal relationships between law and science. It treats social, economic, legal, and political sciences. The program offers courses leading to the master-of-laws degree in law, science, and technology. A limited number of research assistantships are available for law and social-science graduates. Courses and conferences are also offered on a noncredit basis for members of the bar. Additional information may be obtained from the dean, Graduate School of Public Law, George Washington University, Washington, D.C. 20006.

Brown University has incorporated its departments of biology and botany and the division of medical science into a **Division of Biological and Medical Sciences**. Administration will be chiefly by an executive council, chaired by Paul F. Fenton, of the former



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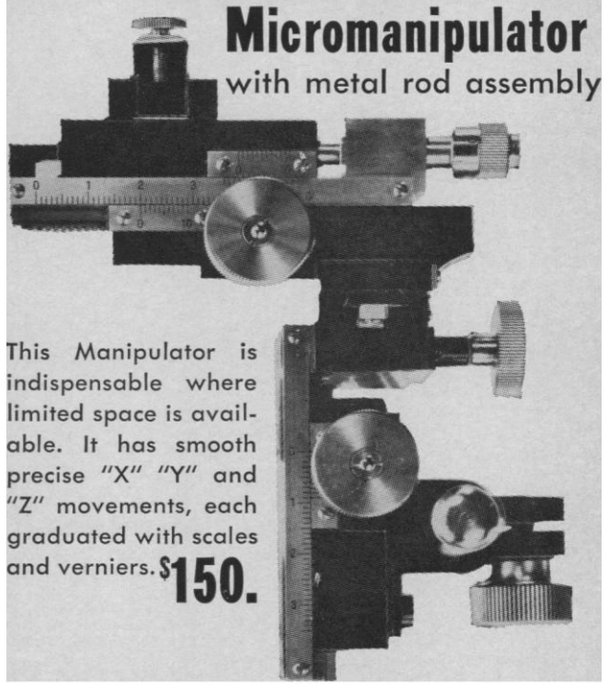

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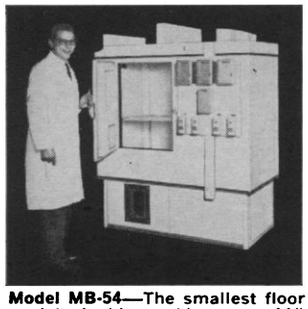

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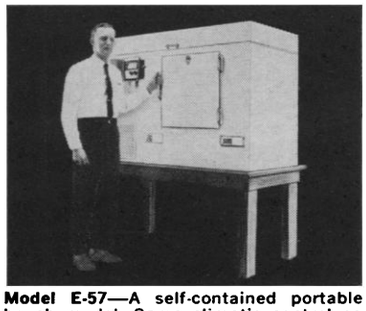

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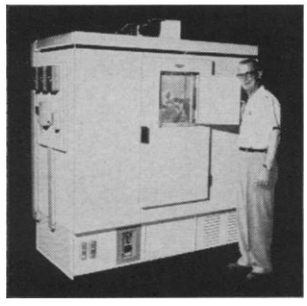

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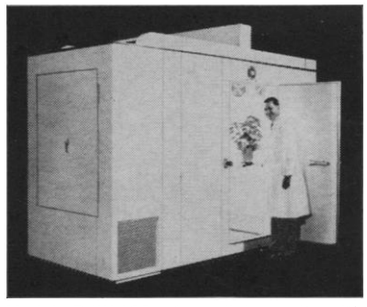

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biology department. Mac V. Edds, Jr., formerly chairman of the division of medical science, will be director of medicine; and Herman B. Chase, formerly chairman of the biology department, will be director of biology.

An **Institute of Philosophy and Politics of Education** was formed recently at Teachers College, Columbia University. The institute will sponsor research and publications on the purposes and politics of American education. Its first project, supported by a $196,000 grant from the Carnegie Corporation of New York, will be an interpretive history of American education, prepared by Lawrence R. Cremin, Barnard professor of education at the college and the institute's executive officer.

Grants, Fellowships, and Awards

The Technical University of Karlsruhe, West Germany, is planning a postgraduate course in **chemical engineering and physical chemistry**, from 2 May 1966 to 15 July 1967. The program, sponsored by UNESCO, is open to persons under 40, preferably from developing countries; candidates should have at least a master's degree and should be active in teaching or research in their home country. Preference will be given persons with previous research experience in foreign countries. German-language training will be given at the Goethe Institute, then course and research work at Karlsruhe and Frankfurt. Participants will receive fellowships to cover economy-class travel; tuition and fees; room, board, and a small allowance at the Goethe Institute; and a monthly stipend of DM 700 (about $175 U.S.) during study at Karlsruhe and Frankfurt. Applications may be obtained from UNESCO, the various countries' embassies in Germany, or the Technical University at Karlsruhe. Deadline for receipt of completed applications: *15 November*. (Internationales Seminar, 75 Karlsruhe, Karlstrasse 42-44, Germany)

The University of Colorado medical school is accepting entries in the Jane Nugent Cochems competition. A prize of $2500 will be presented for the best paper on "**thrombophlebitis and basic vascular problems.**" The vascular problems under consideration should be concerned with the underlying mechanisms or processes of vas-

cular disease, particularly those associated with thrombosis, but not necessarily restricted to it. There are no restrictions as to length or format, joint authorship, or use of pictures, charts, or figures; but papers may not be published until after the winner is announced early next year. Deadline for receipt of entries: *15 November*. Information about eligibility may be obtained from J. J. Conger, School of Medicine, University of Colorado Medical Center, 4200 East Ninth Avenue, Denver 80220.

The Fund for **Overseas Research Grants and Education**, Inc. (FORGE) offers research grants to junior members of science faculties in Latin American universities. The grants are designed to help recently trained science and engineering faculty members to start projects that promise worthwhile results and effective teaching. Funds go directly to the researchers for supplies, equipment, and student assistants. Applicants may write to FORGE, describing their project, its importance, and the basic requirements; there are no deadlines or calendar dates for starting or completing the work. Applications are reviewed throughout the year by a panel of U.S. scientists who are familiar with science in Latin American institutions.

FORGE, established in 1963, is supported by private corporations and individuals. The amounts granted are usually small by U.S. standards, averaging about $2000; they are given on the assumption that small amounts of U.S. currency may be used with great advantage in institutions in developing countries. At the present time FORGE limits its operation to Latin America. Additional information is available from the executive director, FORGE, 60 East 42nd Street, New York 10017, Room 4310.

Publications

A 40-page brochure on "**Coronary Care Units**," issued by the PHS Heart Disease Control Program, describes specialized intensive care units for acute myocardial infarction patients. It is aimed toward hospital administrators and professionals concerned with hospital care of heart-attack patients. It covers full-time electronic monitoring, staffing patterns for medical and nursing personnel, and nurse training for work in the special units. The booklet

also includes suggested design for 4- and 5-bed units. (Public Health Service, Washington 20201; single copies free of charge. For more copies: Superintendent of Documents, U.S. Government Printing Office, Washington 20402; 20 cents each, $15 per hundred)

The Atomic Energy Commission has published a booklet describing its organization and principal functions. The brochure includes descriptions of the **AEC programs** of production, research and development, and training, along with a brief explanation of the procedures for regulating the nongovernment uses of atomic energy to assure safety. It contains maps locating major AEC installations across the nation and the sites of power reactors. The booklet is nontechnical, designed for students, teachers, and the public. (*The USAEC—What It Is, What It Does*; 68 pages, no charge. Division of Technical Information Extension, Atomic Energy Commission, P.O. Box 62, Oak Ridge, Tenn.)

The National Association of Educational Broadcasters (NAEB) has released a study on the **financing of educational television stations**, by Educational Television Stations (ETS), a division of NAEB. The publication contains analyses of ETV station financing and a description of the meeting last December of ETV station representatives. Copies of the report, "The Financing of Educational Television Stations, Present Patterns and Recommendations for the Future," are available for $2 from the ETS Division, NAEB, 1346 Connecticut Avenue, NW, Washington 20036.

The National Science Foundation has issued the results of its most recent annual survey of **federal spending for scientific activities**. *Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1963, 1964, and 1965, volume 13*, emphasizes obligations for research and development, with major stress on obligations for the related but separate activities of basic research, applied research and development. (Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. No. NSF 65-13. 244 pages; $1.25)

The Organization for Economic Cooperation (OECD) has published a summary of its first ministerial meeting on **science**, held in Paris, October 1963. The meeting, attended by ministers of

science and technology of the member nations, "marked the first time that the implications of science and technology for the formulation of public policies were discussed at a high-level intergovernmental forum," according to Thorkil Kristensen, OECD secretary general. It covered national and international science policy and science and economic growth. (*Ministers Talk about Science.* McGraw-Hill Book Company, OECD Unit, 351 West 41st St., New York 10036. 178 pages; $2.50)

A brochure on **radiation pyrometry** is available free of charge from Milletron, Inc. The bulletin presents charts and equations showing types of errors to be anticipated in radiation measurements, and various tables, curves, and definitions pertinent to the field. It also includes the theory of pyrometry operation for total radiation, brightness, and two-color instruments. (*Radiation Pyrometry*, Technical Bulletin 31565, Milletron Inc., 454 Lincoln Highway East, Irwin, Pennsylvania 15642)

A report on the technical and economic **status of magnesium-lithium alloys** has been published by the National Aeronautics and Space Administration's technology utilization division. The 45-page booklet, prepared for NASA by the Battelle Memorial Institute, is based on research and development activity at NASA's R&D centers across the nation. It deals with current uses of the alloys and with their potential for adaptation to commerce and industry. (*Technical and Economic Status of Magnesium-Lithium Alloys.* Superintendent of Documents, U.S. Government Printing Office, Washington 20402. NASA SP-5029. 25 cents)

The Department of Health, Education, and Welfare has published a report on the numbers of **graduate science students in selected U.S. institutions** from 1959 to 1964. The book summarizes data from an annual survey by the Office of Education. (*Five-Year Trend in Graduate Enrollment and Ph.D. Output in Scientific Fields at 100 Leading Institutions, 1959–60 to 1963–1964.* Superintendent of Documents, Government Printing Office, Washington 20402. $1)

The role of **minerals** in the world's economy is assessed in the latest in a series of Interior Department publications. Statistics are presented on more

than 130 foreign countries and areas, plus detailed accounts of their mineral industries. (*Minerals Yearbook; Vol. IV, Area Reports: International.* Superintendent of Documents; U.S. Government Printing Office, Washington, D.C. 20402. $5)

NASA has released its semiannual publication, "Opportunities for Participation in **Space Flight Investigations**." The 107-page book includes detailed descriptions and timetables covering a wide range of NASA flight projects, both manned and unmanned. The projects are described briefly, and details of the space that may be available for locating instrument packages are included. Flight dates cover the period between 1966 and 1972, and the deadlines for proposals vary according to each project. (Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. 60¢)

Scientists in the News

The new president of the American Society for Testing and Materials is **Robert F. Legget**, director of the Division of Building Research, National Research Council of Canada.

The new president of the Society of Women Engineers is **Isabelle French**, of Bell Telephone Laboratories, Allentown, Pennsylvania.

Elizabeth M. Rona, of the special training division at Oak Ridge Institute of Nuclear Studies, has been appointed a professor in the chemistry department and in the marine laboratory at the University of Miami.

The new president of the Forest History Society is **Ralph W. Hidy**, professor of business history at Harvard graduate school.

John T. Schlebecker, formerly at Iowa State University, Ames, has become curator of agriculture and forest products at the Smithsonian Institution.

William H. Danforth, associate professor of medicine at Washington University, has been appointed vice chancellor for medical affairs at the university.

Rupert E. Billingham, professor of zoology at the University of Pennsylvania, has been appointed chairman of

the newly created department of medical genetics at the university.

William Rea Keast has become president of Wayne State University, succeeding **Clarence B. Hilberry**. Keast was formerly vice president for academic affairs at Cornell.

George K. Davis, formerly director of the nuclear science program at the University of Florida, has been appointed director of the university's division of biological sciences.

Robert C. Wood, professor of political science at M.I.T., has been appointed head of the newly formed department of political science at the school.

Donald Crossan, associate professor of plant pathology at the University of Delaware, has been appointed assistant dean of the college of agricultural sciences and assistant director of the Delaware Agricultural Experiment Station.

Donald Harting has been named director of the National Institute of Child Health and Human Development. He had been acting director since last fall, when **Robert A. Aldrich** resigned to return to the University of Washington.

William R. Bennett, head of the data theory department, Bell Telephone Laboratories at Holmdel, New Jersey, has been appointed professor of electrical engineering at Columbia University.

William J. Youden, formerly a senior statistical consultant at the National Bureau of Standards, has been appointed professor of applied science at the George Washington Uuniversity school of engineering and applied science.

The University of Chicago has named **H. Stanley Bennett** director of the new Laboratories for Cell Biology, effective 1 January. He will be succeeded as dean of the division of the biological sciences by **Leon O. Jacobson**, who is now chairman of the department of medicine.

William J. Rutter, formerly professor of biochemistry at the University of Illinois, has been appointed professor of biochemistry and professor of genetics at the University of Washington.

Willard J. Jacobson, professor of natural sciences at Teachers College,

Columbia University, has been appointed chairman of the department of science education at the college.

Homer W. Schamp, professor of physics at the University of Maryland and director of the university's Institute for Molecular Physics, has been appointed dean of faculty for the University of Maryland in Baltimore County. The new campus will open in the fall of 1966 for about 500 freshman students.

George James will become vice president of the Mount Sinai Medical Center and dean of the new Mount Sinai School of Medicine, as of 1 November; he will retire in October as New York City Commissioner of Health. The medical school plans to admit its first students in the fall of 1968.

Miles D. McCarthy, chairman of the division of science and mathematics and of the department of biological sciences at California State College, Fullerton, has been named dean of the college's school of letters, arts, and sciences. He will be on sabbatical leave during the fall semester for a tour of European science laboratories.

Eville Gorham, associate professor of botany at the University of Minnesota, has been appointed professor and head of the department of biology at the University of Alberta, Calgary, Canada.

Massachusetts Institute of Technology has appointed **Emily L. Wick** associate dean of student affairs, succeeding **Jacquelyn A. Mattfeld**, who will become dean of Sarah Lawrence College. Dr. Wick is an associate professor of food chemistry at M.I.T.

S. Douglas Cornell, formerly executive officer of the National Academy of Sciences–National Research Council, has been appointed president of Mackinac College, Michigan. The school is scheduled to open in September 1966.

Roger G. S. Bidwell, formerly associate professor of botany at the University of Toronto, has been appointed professor of biology at Western Reserve University.

John A. Hutcheson, recently retired vice president of the Westinghouse

Electric Corporation, Pittsburgh, has become chairman of the division of engineering and industrial research of the National Research Council.

The University of California, San Diego, has appointed **Robert B. Livingston** chairman of the department of neurosciences. He had been chief of the general research support branch in the NIH Division of Research Facilities and Resources.

Leon Katz, professor of physics and director of the linear electron accelerator laboratory at the University of Saskatchewan, has become head of the university's physics department.

The following have been appointed professors of mathematics at Case Institute of Technology:

John R. Isbell, formerly at the University of Washington.

Milton Lees, formerly associate professor at California Institute of Technology.

A. J. Lohwater, formerly at Rice University.

The Federation of American Societies for Experimental Biology has appointed **Joseph F. A. McManus** executive officer. He had been a professor of pathology in the experimental program of medical education at Indiana University, Bloomington. He was a member of the FASEB Board from 1957 to 1964, and a member of the FASEB Advisory Committee from 1961 to 1964.

Wallace R. Brode, chairman of the AAAS Science Youth Activities Committee and a former AAAS president, has become foreign secretary of the American Chemical Society. He will head the International Activities office, a recently established unit in the Division of Membership Activities of ACS, with offices in Washington. He is retaining his position at AAAS.

John H. Law, formerly of Harvard, has been appointed professor in the biochemistry department of the University of Chicago.

Arthur B. Callahan, formerly biological sciences coordinator in the Office of Naval Research San Francisco branch, has become head of the medicine and dentistry branch of ONR, in Washington.

The University of Pennsylvania medical school has named **Walter B. Shelley** chairman of the dermatology department, succeeding **Donald M. Pillsbury**, who will remain at the school as a professor of dermatology.

Thomas K. Barber has been appointed professor and head of the department of pedodontics at the University of Illinois College of Dentistry, Chicago. He has been associate head of the department. He succeeds **Maury Massler**, who has been appointed assistant dean for postgraduate and teacher education.

The new president of the Medical Library Association is **Alfred N. Brandon**, of Johns Hopkins University Welch Medical Library.

Morton Rothstein, formerly of the Kaiser Research Foundation, has been appointed professor of biology at the State University of New York at Buffalo. **Carmelo A. Privitera**, formerly of St. Louis University, has become associate professor and vice chairman of the biology department.

Janis V. Klavins, formerly professor of pathology at Duke University, has been appointed clinical professor of pathology at the State University of New York Downstate Medical Center, and pathologist-in-chief at the Brooklyn-Cumberland Medical Center.

Recent Deaths

Samuel A. Alexander, 73; clinical professor of medicine at Georgetown University; 22 September.

Samuel K. Allison, 64; director of the Fermi Institute for Nuclear Studies at the University of Chicago; while representing the U.S. Atomic Energy Commission at an international conference on thermonuclear programs, in England; 15 September.

Othmar H. Ammann, 86; designer of many of New York's bridges, most recently of the Verrazano-Narrows Bridge; he was elected this year to the National Academy of Engineering; 22 September.

Alva Raymond Davis, 78; vice chancellor and former dean of the college of letters and science, University of California, Berkeley; 15 July.

John E. Flynn, 68; chief scientist in New York for the Office of Naval Research; 22 September.

Morris B. Jacobs, 59; professor of occupational medicine at Columbia; 12 July.

Dwight E. Minnich, 76; retired chairman of the zoology department at the University of Minnesota; 4 September.