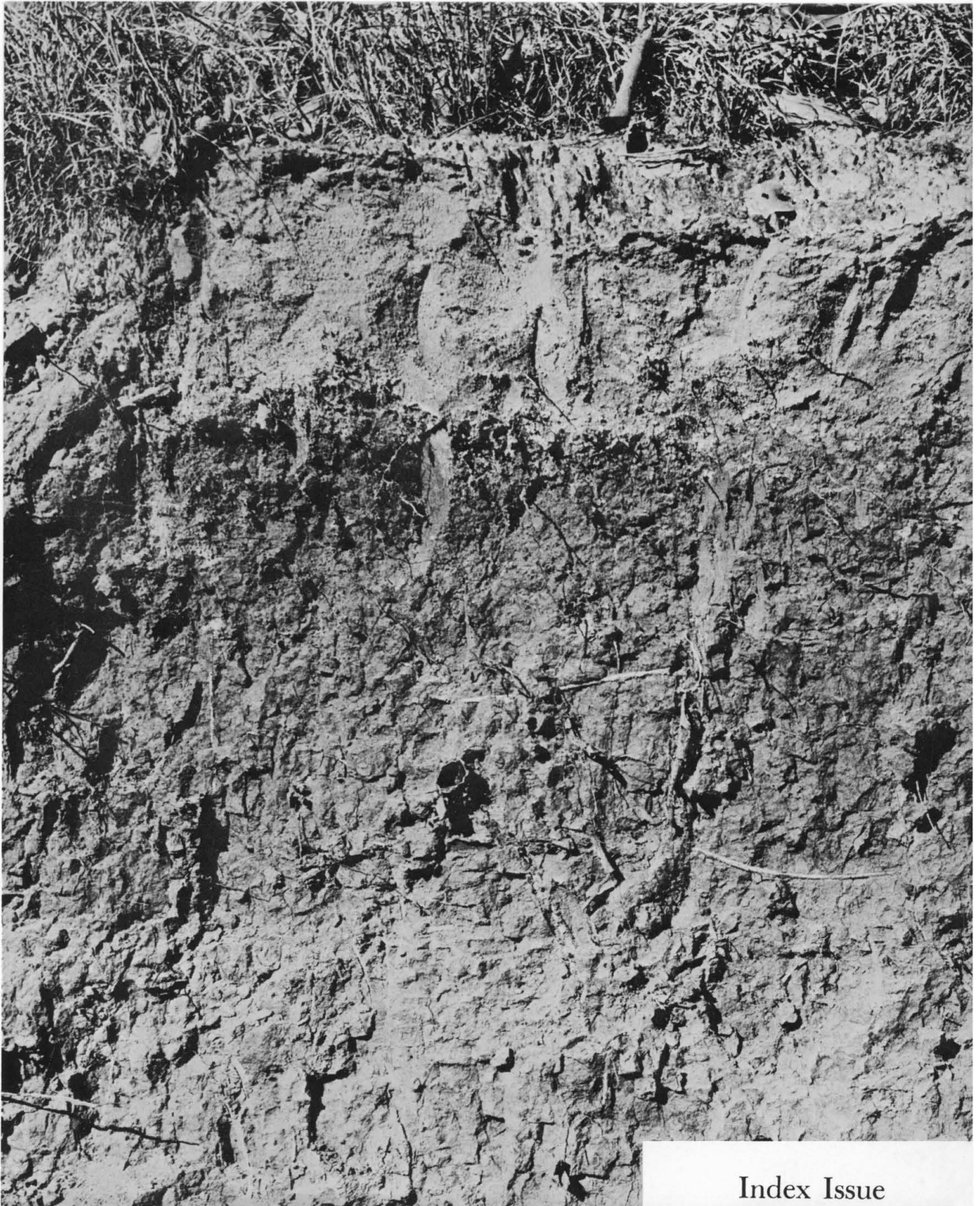


SCIENCE

28 September 1962

Vol. 137, No. 3535

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Index Issue

A phenomenon of the twentieth century. In every field of science, in every line of business, in every nook and cranny of our society—data is multiplying. Where once an atomic physicist might contend with six variables . . . today he has sixty. Where once a businessman needed a few quick facts to make a decision . . . today he more likely needs thousands. ■ This is the information explosion—a condition arising from the tremendous economic and technical progress since World War II. IBM is finding the means to harness the staggering volumes of information that have resulted. In addition to handling huge calculation tasks, computers have been developed by IBM research to sort, retrieve and communicate information. Their expanding capabilities are being felt today in such fields as automatic language translation, atomic energy, medical research and space exploration. ■ In helping to control the information explosion, IBM is providing businessmen and scientists with new tools for solving many of the complex problems of this changing world.

IBM[®]



SCULPTURE BY HARRY BERTOIA: THE INFORMATION EXPLOSION



TEARS OR TAP WATER?

Now you've done it. Late lunch. Baby howling. You should boil the water, but . . . just this once. He's husky. Probably he'll be fine. *Probably* isn't in the vocabulary of Nutritional Biochemicals. Biochemicals *have* to be pure. For medicine. For research. No probables will do. Nutritional Biochemicals prepares 2600 different biochemicals. Ships them all over the world. Sells enough of them to keep prices unusually low. But never compromises on purity. Customers depend on N.B.Co. for pure biochemicals. All of the time. Send for *free* 2600-item catalog. Or,

for immediate delivery, call MONTROSE 2-0214, Cleveland, Ohio.

NUTRITIONAL BIOCHEMICALS CORPORATION
21010 Miles Avenue • Cleveland 28, Ohio

Send for our free Aug., 1962 Catalog containing more than 2600 items. Fill out coupon and mail today for your copy.

SC

Name

Organization

Address

City

State Zone



Wavelength ranges covered by Perkin-Elmer low-cost infrared spectrophotometers.

	0.8	1.5	3	6	12	25 μ
MODEL 137-G	0.83	2.65	2.45	7.65		
237			2.5	5.0	7.7	16
137 NaCl			2.5		15	
137 KBr					12.5	25

performance-proved instruments for INFRARED SPECTROSCOPY

KEEP YOUR LAB AHEAD IN INFRARED WITH THESE LOW-COST SPECTROPHOTOMETERS

Each member of the Perkin-Elmer low-cost infrared spectrophotometer line does so

many jobs so quickly and so well—in both large and small laboratories—it frequently saves its cost within a short period. Simple in design, all Perkin-Elmer low-cost spectrophotometers are easy to operate, rugged and reliable. They are capable of solving a high percentage of the problems encountered in chemical research and development, process and quality control.

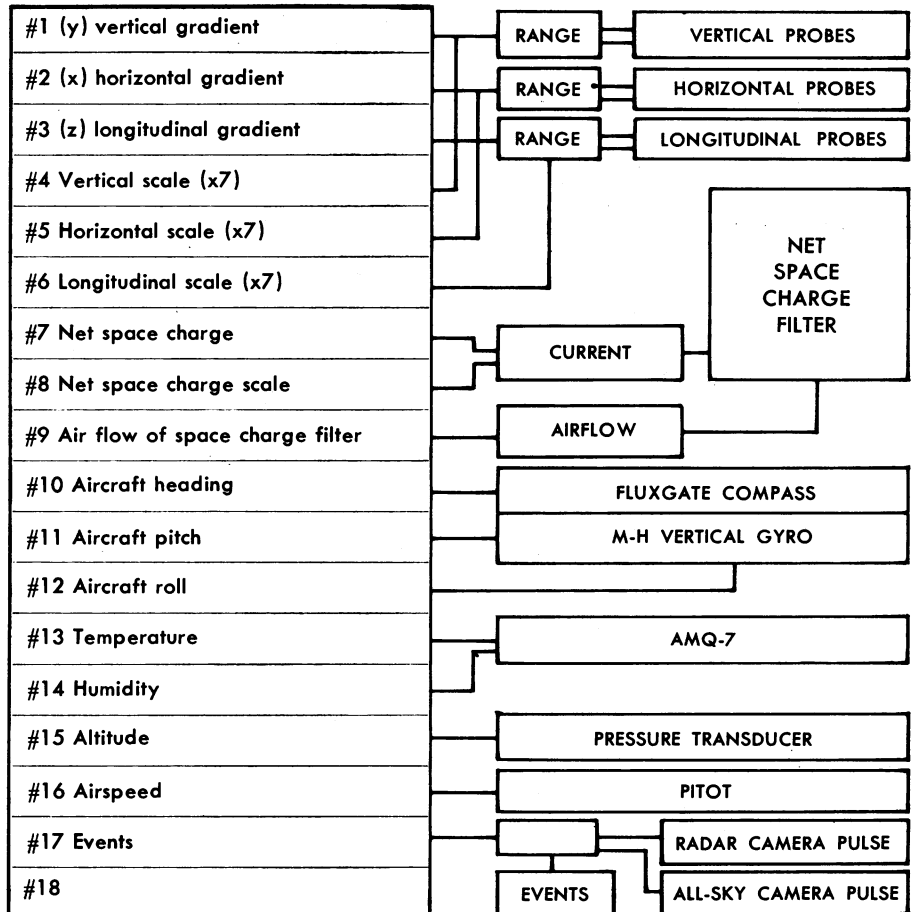
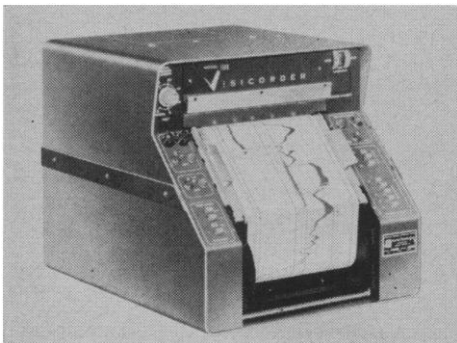
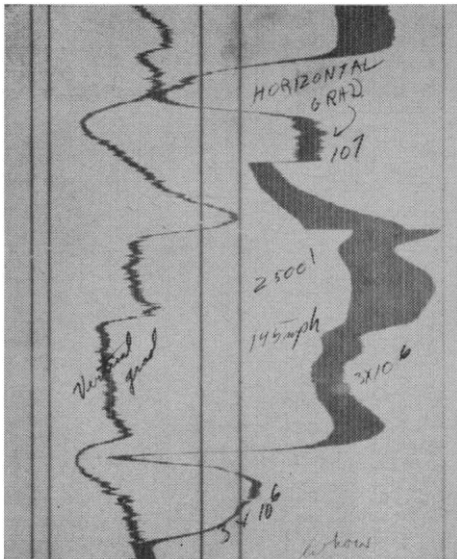
Low-cost infrared spectrophotometers can be ordered from Perkin-Elmer in any of four linear wavelength spectral ranges: the

NaCl prism Model 137B from 2.5 μ to 15 μ ; the KBr prism Model 137B from 12.5 μ to 25 μ ; the high-resolution grating Model 137G, with two ranges covering .83 μ to 7.5 μ ; and the double-grating Model 237, operating also in two ranges, from 2.5 to 7.7 μ and from 5.0 to 16 μ . Both 137G and 237 are available also in linear wave-number modes. For descriptive literature, including sample spectra, write to Instrument Division, Perkin-Elmer Corporation, 910 Main Avenue, Norwalk, Connecticut.



PERKIN-ELMER

Editorial	Stability and Change	1025
Articles	Soil Classification in the United States: <i>R. W. Simonson</i>	1027
	Classification of soils at any point in history largely reflects current understanding of soil genesis.	
	Sexual Sterilization of Insects by Chemicals: <i>A. B. Borkovec</i>	1034
	Eradication of harmful insects may be achieved with analogs of cancer chemotherapeutic agents.	
News and Comment	The Swedes Respond to the Population Explosion	1038
Book Reviews	Chemicals and Pests: <i>I. L. Baldwin</i>	1042
	Man's use, misuse, and abuse of the products of science determine whether these valuable assets are also harmful.	
	<i>The Collected Papers of Lord Rutherford of Nelson</i> , reviewed by <i>E. Segrè</i> ; other reviews	1044
Reports	Migration of Proteins along the Axons of the Sciatic Nerve: <i>B. Droz</i> and <i>C. P. Leblond</i>	1047
	Chromatographic Validation of Two Morphologically Similar Hybrids of Different Origins: <i>R. E. Alston</i> et al.	1048
	Metabolic Requirements for the Swimming Activity of Three Antarctic Fishes: <i>D. E. Wohlschlag</i>	1050
	Alveolar Pathways during 90-Foot Breath-Hold Dives: <i>K. E. Schaefer</i> and <i>C. R. Carey</i>	1051
	Reinforcing Brain Stimulation in Competition with Water Reward and Shock Avoidance: <i>E. S. Valenstein</i> and <i>B. Beer</i>	1052
	Incidence of Color in Immediately Recalled Dreams: <i>E. Kahn</i> et al.	1054
	Melting Point of Graphite at High Pressure: Heat of Fusion: <i>F. P. Bundy</i>	1055
	Direct Conversion of Graphite to Diamond in Static Pressure Apparatus: <i>F. P. Bundy</i>	1057
	Circadian Rhythm in the in vitro Response of Mouse Adrenal to Adrenocorticotrophic Hormone: <i>F. Ungar</i> and <i>F. Halberg</i>	1058
	Conditioning of Extrasystoles in Humans with Respiratory Maneuvers as Unconditional Stimulus: <i>J. Perez-Cruet</i>	1060
	Isolation of the Sex Attractant of the American Cockroach: <i>D. R. A. Wharton</i> et al.	1062
	Generation of Electric Potentials by Bone in Response to Mechanical Stress: <i>C. A. L. Bassett</i> and <i>R. O. Becker</i>	1063
Association Affairs	Election of AAAS Officers	1065
Departments	Letters from <i>A. G. Huntsman</i> ; <i>J. Mayer</i> ; <i>N. I. Harway</i>	1019
	Meetings: Forthcoming Events	1070
	New Products	1077
Cover	Horizons of a soil profile. See page 1027. [R. W. Simonson, U.S. Soil Conservation Service, Beltsville, Md.]	



Which comes first...the lightning or the rain?

The Visicorder Oscillograph directly records electrical charges in the atmosphere.

What effect do electrical charges on the atmosphere have on cloud formation? What causes cloud droplets to grow into raindrops? Why does one cloud produce rain while another does not?

These questions are being answered in part by a Model 1108 Honeywell Visicorder Oscillograph, shock mounted in a C45 Beechcraft, flown 15,000 feet over cloud formations above an electrically-charged air-space in Central Illinois.

The Illinois State Water Survey has scattered a network of 50 rain gages across about 400 square miles

downwind from 30 miles of small stainless steel wire stretched in a grid-like pattern 30 ft. above the ground. Seven power supplies energize the wire to about 20,000 volts with each supply having an output of 1 to 3 milliamperes.

Timelapse sky cameras, radar, and other observatory equipment make records of electrical fields, wind speed and direction. A low-flying Piper traces the plume of electrical charge as it rises from the ground; the Visicorder at 15,000 feet measures the movement of the charge in the higher air, how and where it scatters or dissipates, and what effect it has on the growth of cloud droplets.

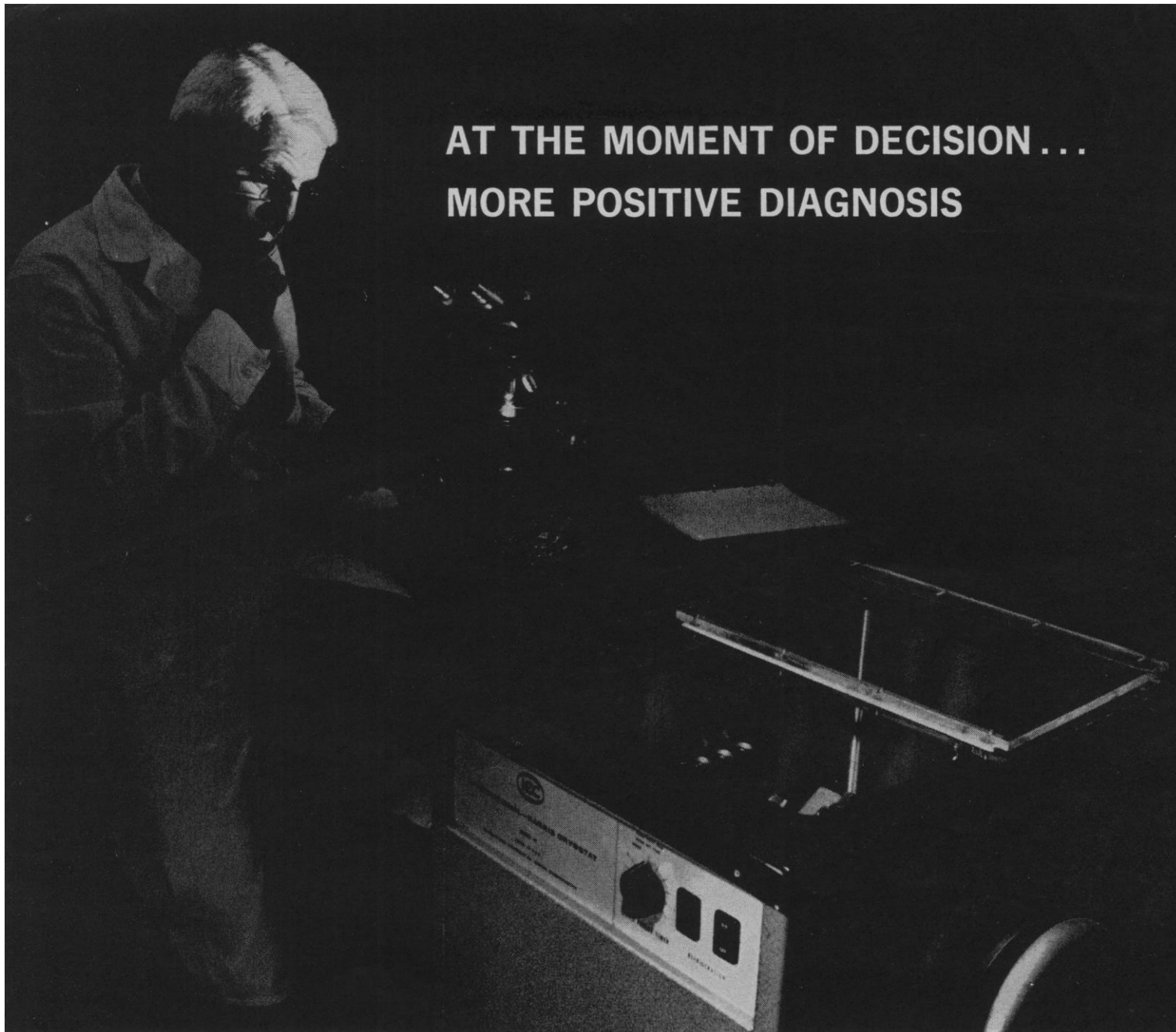
Maybe your research project is not as glamorous as these weather studies, but if it is at all complex, or requires high speeds or sensitivities, or if you need to record many parameters simultaneously—or directly—the amazingly versatile Visicorder can do your job.

The schematic diagram of these cloud studies will give you an idea of the many capacities of the Visicorder.

For more details about the Model 1108 (24 channels) and other Honeywell Visicorders, write Minneapolis-Honeywell, Heiland Division, 4800 E. Dry Creek Road, Denver 10, Colorado. Our DDD phone number is 303-794-4311.

Honeywell

 First in Control



**AT THE MOMENT OF DECISION . . .
MORE POSITIVE DIAGNOSIS**

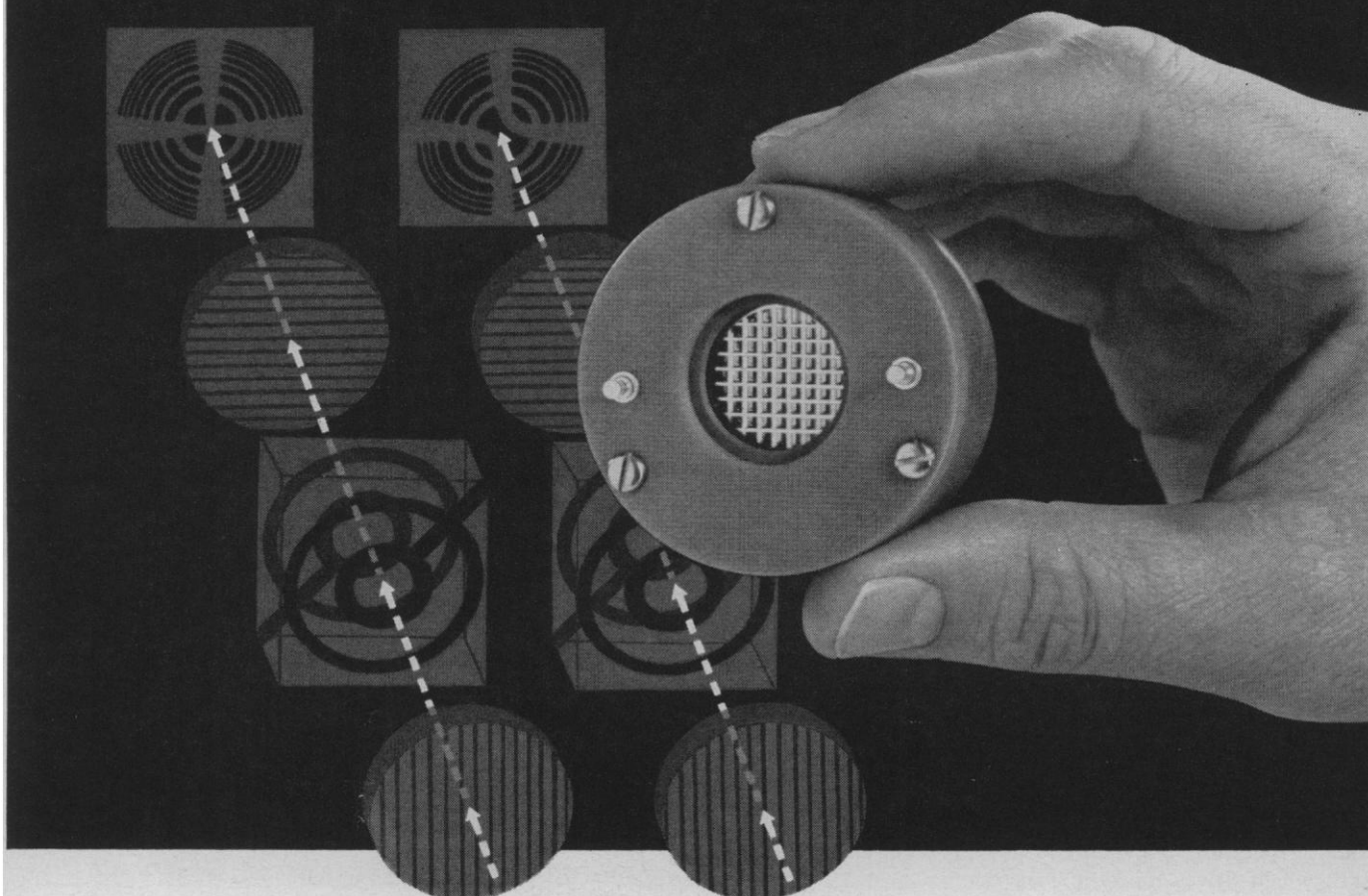
To provide more positive diagnosis . . . to speed slide preparation . . . to perfect it technically and thereby produce exceptional cytological detail in thin undistorted sections . . . these are the aims and accomplishments of International's new model CT Microtome Cryostat.

Everything necessary for precise, frozen sectioning has been conveniently packaged in one superbly engineered compact instrument. From fresh tissue to finished slide in minutes. There is a new, integral Freon fast freezing arrangement. Controlled temperatures from -10°C to -20°C are held even with the top open. Laboratories significantly speed their service. Pathologists get the best possible sections to help them achieve diagnostic certainty even under pressure of time. Write for our latest brochure.

INTERNATIONAL  EQUIPMENT CO.

1284 SOLDIERS FIELD ROAD • BOSTON, MASS.

Introducing... ELECTRO-OPTIC light modulator



The B/A Electro-Optic Light Modulator, a solid state device, provides a practical source of light pulses in the micro-second range and serves as a light beam modulator at frequencies from D.C. through the video region. Numerous applications have been found for these units in the fields of laser modulation, communications, polarimetry, densitometry, photography, photometry, interferometry and the measurement of semiconductor parameters.

B/A now has a series of standard models, each bridging a specific range of operations. For example, types are available for applications that require large linear aperture with no obstructions. These units are manufactured with transparent electrodes. A model is also made giving maximum contrast ratio with low driving voltage achieved through the use of double crystal construction.

If your application involves modulation at high frequencies, thick single crystal units are available from

stock that can be operated continuously up to 5 megacycles.

Continuing research by Baird-Atomic scientists has demonstrated that the crystals used in these modulators can be operated at frequencies of 80 megacycles and pulse times of 20-30 nanoseconds. Others have operated similar crystal units at frequencies as high as 25 Kilo-megacycles.

Baird-Atomic engineers invite you to submit your modulation specifications.

Write Adv. Dept. today for current brochure.

Engineers and scientists: *Investigate challenging opportunities with B/A. Write Industrial Relations Director. An equal opportunity employer.*



BAIRD-ATOMIC, INC.

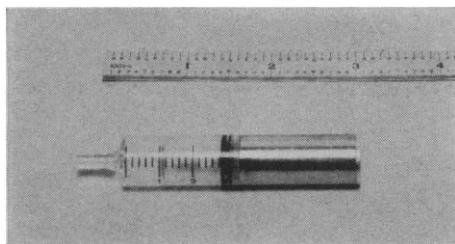
33 University Road • Cambridge 38, Mass.

THE SAGE COMMENTARY on Instruments for Medical and Biological Research

...periodic report
on new developments
from

SAGE
INSTRUMENTS

World's Smallest Infusion Pump*



Miniature size (3" long x $\frac{5}{8}$ " diameter) is only one of the virtues of the Sage Micro-Flow Pump. Lightweight (28 grams), portable, and battery-operated, it's ideally suited to continuous infusion of fluid into unrestrained animals and to a host of other laboratory uses. Customers are using it for infusion of heparin, tranquilizers, radioactive materials, etc. The Micro-Flow Pump has a capacity of 1 ml, and its unique electrolytic pumping principle permits setting it to pump at a variety of rates from 1 ml/ $\frac{1}{2}$ hr to 1 ml/20 hr.

Attach a hypodermic needle, set up your experiment at 4 P.M. and go home. The Micro-Flow Pump will work steadily through the night, and up to noon the next day. Those in more of a hurry can use the faster rates. Throughout the run, flow is linear. Flow rate is remarkably reproducible.

The pump works by electrolysis, uniformly generating a gas that moves a piston which drives the fluid. Sage supplies the pump complete with 1 ml/hr flow rate capsule, battery pack and supply of electrolyte for \$55.00 F.O.B. White Plains, New York. Extra battery packs and electrolyte are available. We also offer a flow rate capsule kit with four rate-setters: 1 ml/ $\frac{1}{2}$ hr; 1 ml/2 hr; 1 ml/8 hr; 1 ml/20 hr for \$20.00. Catalog data is yours for the asking, and we're also happy to accept your mail orders now.

*Patent pending.

Uniform Flow Pumps

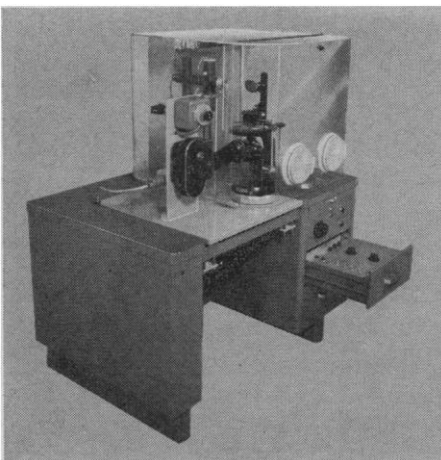
In answer to a custom problem, Sage developed a uniform flow pump that met more rigid specifications than those of any comparable pump commercially available. Word got around and led to development of additional models in a variety of ranges (from 0 to 6.4 ml/min to 0 to 1800 ml/min). Compatible with blood, plasma, and most fluids likely to be found in a laboratory, the pump is continuously ad-

justable over its entire range. The development model has been performing yeoman service for well over a year, and its accuracy and reproducibility are such that our customer has long since given up calibrating it.

The pump is self-priming, flow rate is virtually unaffected by increases in back pressure (it operates against a maximum pressure difference of 300 mm Hg). Flow is linear, and its reproducibility is 0.1% of maximum flow rate. Based on three cam-actuated pistons, reciprocating in independent cylinders, it also can be used as one, two or three separate pulsatile pumps simultaneously (ideal for cross-transfusion).

The pump is not inexpensive, \$1,525. However, if you need its superb performance, it's well worth it. Specification data is, of course, available.

Time Lapse Pictures Through the Microscope



Time lapse cinephotomicrography is an unexcelled technique for studying tissue cultures, blood samples, fungi, and other materials which change with time. Motion picture equipment takes photographs through the microscope at regularly spaced time intervals. Projection at standard speed shows in a few minutes what has happened over hours of time. You frequently come up with findings that might otherwise have been missed.

Sounds simple, but it involves a raft of problems. Sensitivity to light and heat of living materials is one, vibration is

another. Home-made assemblies, using available components, frequently have led to more frustration than results.

Shown here is the Sage Time Lapse apparatus, an integrated system that produces pictures of exceptional quality at high magnification. The instrument is suited to phase contrast as well as other methods of microscopic observation. The system is built into a steel desk, and is ready to go at the flick of a few switches.

Major components are camera, drive, and observation eyepiece; dual light source; anti-vibration mount; and incubator. The 16 mm camera may be driven at a choice of 8 framing rates (from 1 frame/4 min to 32 frames/min). An observation eyepiece permits observation of the field being photographed. The light source (tungsten for observation and xenon flash for photography) minimizes the possibility of exposing sensitive living materials to unwanted light or heat. The picture-taking assembly is carefully isolated from all sources of vibration. The incubator provides temperature control.

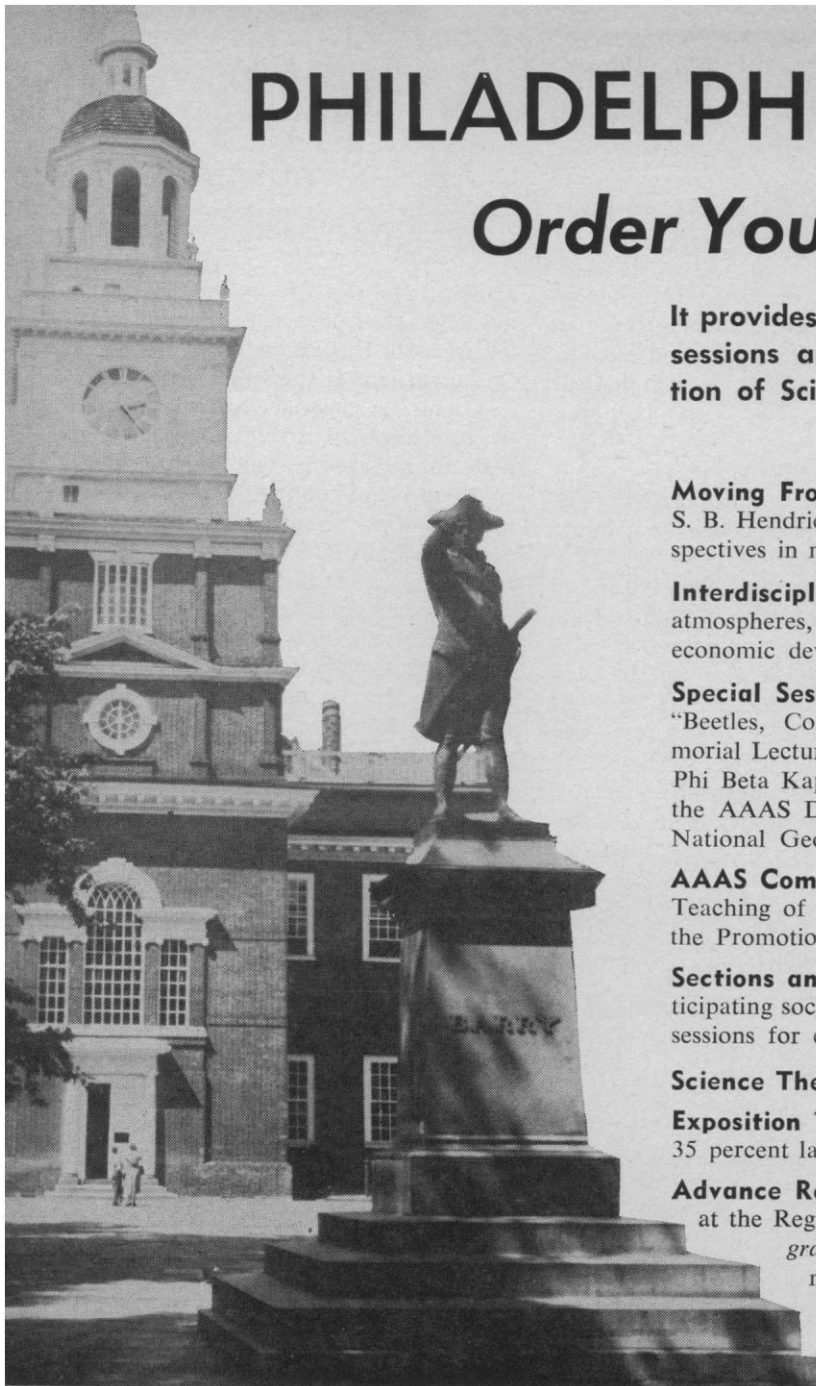
Pictured is the Model 065. The apparatus is available in various models to go with the microscope of your choice. We install this instrument in your laboratory. Send for the four-page brochure which gives detailed specifications.

Some background on Sage . . . and custom instruments

Since its formation almost three years ago, Sage Instruments, Inc. has been developing, along with its products, custom instruments in response to specific requests from people who do research. Those of our readers who are connected with the medical colleges and major hospitals in the northeast may already know us through our quarterly four-page bulletin, also called The Sage Commentary. Send a brief note and we'll be glad to add your name to our mailing list. If you have a problem which requires special instrumentation not commercially available, we'll be happy to hear about it, study it and propose a solution if it's within our fields of competence. We look forward to your inquiries.

SAGE INSTRUMENTS, INC.

2 SPRING STREET, WHITE PLAINS, NEW YORK • AREA CODE 914 WHITE PLAINS 9-4121



PHILADELPHIA • 129th AAAS

Order Your General Program

It provides complete, detailed information about all the sessions and symposia scheduled, the Annual Exposition of Science and Industry, and the Science Theatre.

Program Highlights

Moving Frontiers of Science H. E. Newell on space science, S. B. Hendricks on biological timing mechanisms, S. Brenner on perspectives in molecular biology, W. O. Baker on industrial research.

Interdisciplinary Symposia AAAS day: Dynamics of planetary atmospheres, the spread of technical knowledge as an instrument of economic development, biochemistry of genetic transcription.

Special Sessions AAAS Presidential Address by Thomas Park on "Beetles, Competition, and Population"; the George Sarton Memorial Lecture by Gerald Holton; the Joint Address of Sigma Xi and Phi Beta Kappa by Loren C. Eiseley on "Man: The Lethal Factor"; the AAAS Distinguished Lecture, the Tau Beta Pi address; and the National Geographic Society Illustrated Lecture.

AAAS Committees Sessions of the Cooperative Committee on the Teaching of Science and Mathematics, the Committee on Science in the Promotion of Human Welfare, and others.

Sections and Societies The 20 AAAS Sections and some 50 participating societies are scheduling specialized symposia, and many have sessions for contributed papers.

Science Theatre The latest foreign and domestic films.

Exposition The Annual Exposition of Science and Industry will be 35 percent larger than it was last year.

Advance Registration By registering in advance, you avoid delay at the Registration Center on arrival, you receive the *General Program* in time to plan your days at the meeting, and you permit your name to be posted in the Visible Directory of Registrants when the meeting opens.

Use the coupon below for advance registration or to order your advance copy of the *General Program*.

AAAS
1515 Massachusetts Ave., N.W.
Washington 5, D.C.

(Check 1a or 1b)

1a. ☐ Enclosed is \$3.50 Advance Registration Fee. This brings me the General Program and Convention Badge.

1b. ☐ Enclosed is \$2.50 for the General Program. (if I attend the meeting, the badge, which I need to obtain the privileges of the meeting, will cost me \$1.00 more.)

2. FULL NAME (Dr., Miss, etc.)
(Please print or typewrite) (Last) (First) (Initial)

3. OFFICE ☐ OR HOME ☐ ADDRESS
(For receipt of General Program)

CITYZONESTATE

4. ACADEMIC, PROFESSIONAL, OR
BUSINESS CONNECTION

5. FIELD OF INTEREST

6. CONVENTION ADDRESS
(May be added later, after arrival)

Please mail this coupon and your check or money order for the total amount to the AAAS.

MEETING • 26-30 DECEMBER

Reserve Your Hotel Room

Make sure you have the accommodations you prefer. A list of headquarters hotels of participating societies appears on page 235, *SCIENCE*, 20 July. The AAAS headquarters is the Sheraton.

The hotels for the AAAS Philadelphia meeting have established special, low flat rates and have reserved large blocks of rooms for the meeting.

Use the coupon below to make your hotel reservation in Philadelphia. Send your application to the AAAS Housing Bureau in Philadelphia, not to any hotel. Give a definite date and estimated hour of arrival, and also probable date of departure. The Housing Bureau will make the assignment and send you a confirmation in two weeks or less.

A rollaway bed can be added to any room at \$3.00 per night. Mail your application now to secure your first choice of accommodations.

HOTEL RATES*
AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE

For a list of the headquarters of each participating society and section, see page 235, *Science*, 20 July.

Hotel	Single Bed	Double Bed	Twin Beds	Suites
Sheraton**	\$8.50		\$14.00	\$35.00—\$45.00
Bellevue Stratford**	8.50		14.00	32.00— 60.00
Warwick**	8.50		14.00	30.00— 65.00
Franklin Motor Inn	8.50		14.00	
Robert Morris	5.50—7.50	\$9.00—\$11.00	10.00—11.00	
Sylvania	7.50	11.00	12.00	
Adelphia	7.50	11.00	12.00	
Benjamin Franklin	8.50	12.00	14.00	32.00— 60.00

* All rooms are subject to a 4% Pennsylvania state sales tax.
** Hotels with sessions.



AAAS Housing Bureau, Hospitality Center.
16th Street and Pennsylvania Boulevard
Philadelphia 2, Pa.

Date of Application

Please reserve the following accommodations for the 129th Meeting of the AAAS in Philadelphia, 26—30 December, 1962

First Choice Hotel Second Choice Hotel Third Choice Hotel

Type of room: Single ☐ Double ☐ Double, twin beds ☐ Suite ☐ Rates: Desired Maximum

Number in party..... Sharing this room will be:
(List name and address of each person, including yourself. Attach list if space is insufficient.)

DATES: ARRIVAL A.M. P.M. DEPARTURE
(These must be indicated—add approximate hour, A.M. or P.M.)

NAME
(Individual requesting reservation) (Please print or type)

ADDRESS
(Street) (City and Zone) (State)

Mail this coupon now to the Housing Bureau. Rooms will be assigned and confirmed in order of receipt of reservation.

BELL LABORATORIES' NEW CONNECTOR STREAMLINES CABLE SPLICING



Telephone craftsman uses special pneumatic tool to flatten connector onto insulated wires. Metal tangs pierce insulation and produce a splice that is equivalent to a soldered joint.

Along the cable routes of the Bell System, wires are spliced at a rate of 250,000,000 a year. Conventionally, connections are made by "skinning" the insulation, twisting the bare wires together, and slipping on an insulating sleeve. Now, with a new connector initiated at Bell Telephone Laboratories, (diagram at lower right) splices can be made faster, yet are even more reliable.

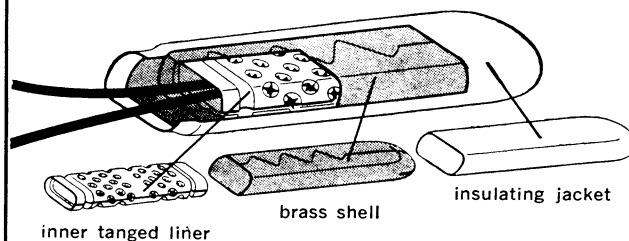
The craftsman slips the two wire ends—with insulation intact—into the connector, then flattens the connector with a pneumatic tool. Springy phosphor bronze tangs inside the connector bite through the insulation to contact the copper wire. The stable, low-resistance splice established is maintained for many years, even under conditions of high humidity, corrosive atmospheres and vibration.

Ultrasensitive measuring techniques devised by our engineers demonstrate that the new connector provides the equivalent of a soldered connection,

even with voltages as low as 25-millionths of a volt.

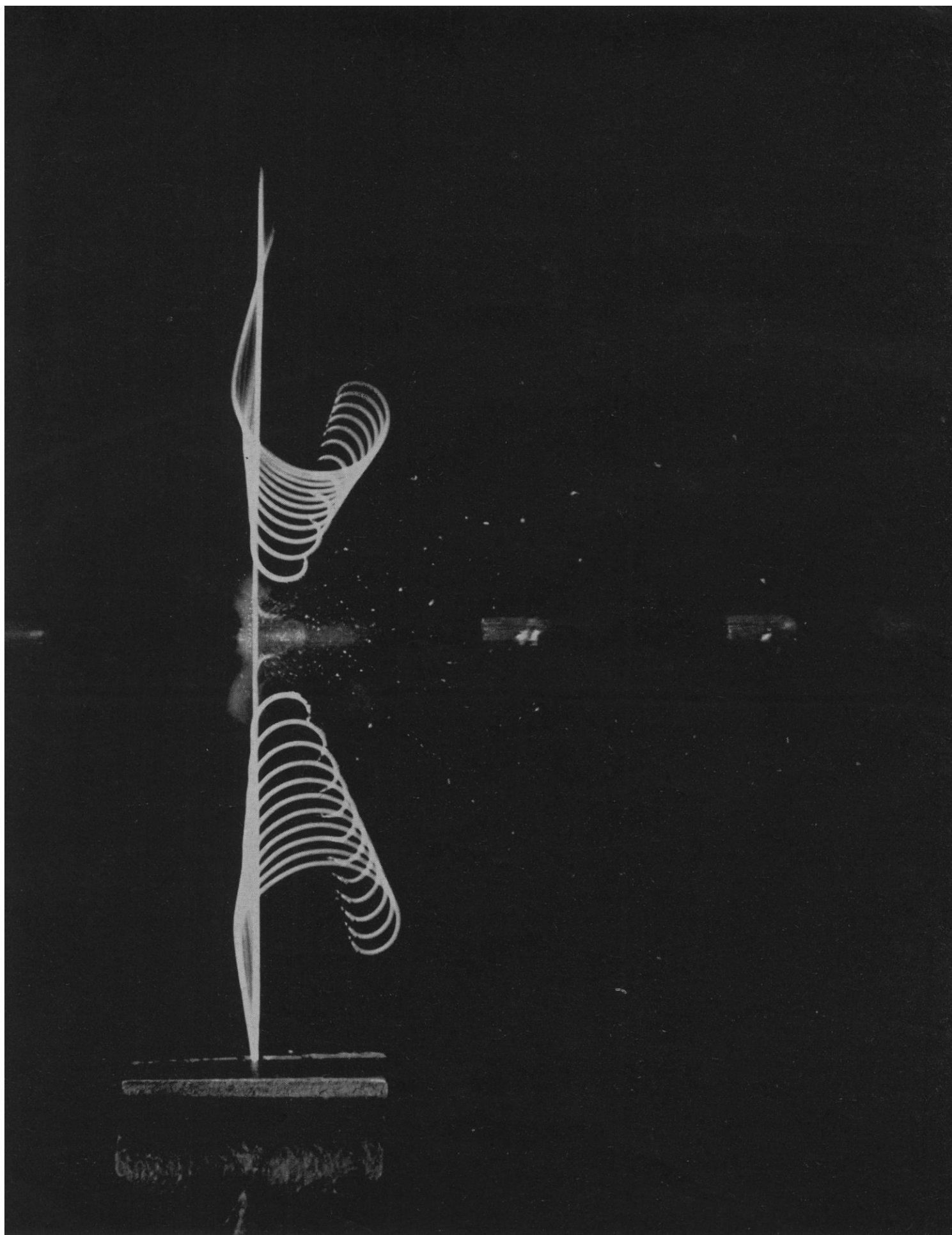
Working with our manufacturing partners at Western Electric, our engineers developed this connector into a design capable of being mass-produced at low cost. It is being introduced in the Bell System.

NEW WIRE CONNECTOR HAS THREE PARTS:

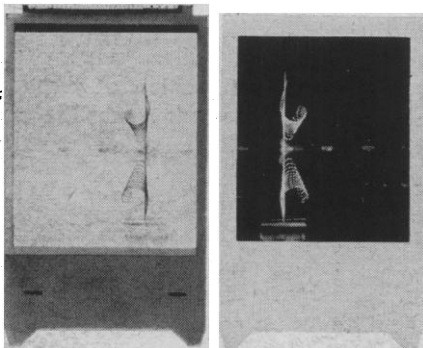


BELL TELEPHONE LABORATORIES

World center of communications research and development



Dr. Harold Edgerton had a fully developed positive and a negative just 20 seconds after he took this multiple exposure of a .22 caliber bullet cutting a single copper wire. He used his new EG&G Multiple Microflash unit with a Speed Graphic loaded with **Polaroid P/N 4x5 film.**



How new Polaroid 4x5 Land Film gives you both negative and positive outside the darkroom in 20 seconds.

Simply load this new film into a Polaroid 4x5 Land Film Holder and use with any camera that has a Graphic, Grafluk or similar back. This film is panchromatic, has an ASA equivalent rating of 100. Expose as you would with any other film.

Twenty seconds later you have a negative which meets professional standards of contrast, fine grain and long scale. The resolution is in the range of 100 to 150 lines per mm. Enlargement up to 25 times original size shows virtually no evidence of detail breakdown or appearance of grain. And you *know* you have what you want because at the same time you get a finished print that precisely matches the negative in all respects.

The negative and print develop in their own packet outside the camera, outside the darkroom. The negative needs only to be washed in a simple solution to remove the anti-halation dye and residual reagent before being rinsed and dried in the conventional way.

These benefits are now yours: Polaroid P/N Land Film gives your camera more versatility, opens up more opportunities for you in 4x5 photography. POLAROID®

sufficient control of [pestilence and famine] so that they no longer effectively govern his increase in number." It is really absurd to think that man, with all his ability, cannot govern his breeding if he wishes, that "biological law" makes him multiply. He has for long ages been quite able to control his numbers, though without certain refinements now discovered. At a recent meeting in the Toronto General Hospital that was devoted to "new concepts in fertility and dysfertility," I asked how many children a couple might have. The physician who undertook to answer the question said that they might perhaps have a thousand children. This is vastly short of the 200,000 ova and about 200 million spermatozoa (per ejaculation) that Dorn states are seemingly available. But even this number will not be easily achieved; it should not be considered to pose a threat of overpopulation!

A. G. HUNTSMAN

Department of Zoology,
University of Toronto,
Toronto, Canada

References

1. N. E. Himes, *Medical History of Contraception* (Allen, London, 1936).
2. C. M. Turnbull, *The Forest People* (Simon and Schuster, New York, 1961).
3. E. Halley, *Phil. Trans. Roy. Soc. London* A17, 596, 654 (1693).
4. K. Davis, *Ann. Am. Acad. Polit. Soc. Sci.* 237, 1 (1945).

Studies on the Metric System Proposal

I read with interest the editorial "Weights and measures" in a recent issue of *Science* [136, 1085 (1962)]. As one who made a 2-year professional study of the subject some decades back, with a large staff of assistants, I appreciate the objectivity in the pros and cons you list. More could hardly be gotten into a short editorial, and I do not propose to pursue the pros and cons much further here. I should like to make some comments in the interest of perspective, however, on the preamble, rebuttal, and conclusion.

I feel sure it is just a slip (though it may leave a wrong impression) when you say "the question of *adopting* the metric system in the United States is again being debated" (*italics mine*). Nearly 100 years ago (in 1866) the metric system was legally adopted in this country. The question today is rather one of penalizing the use of our thoroughly standardized English sys-

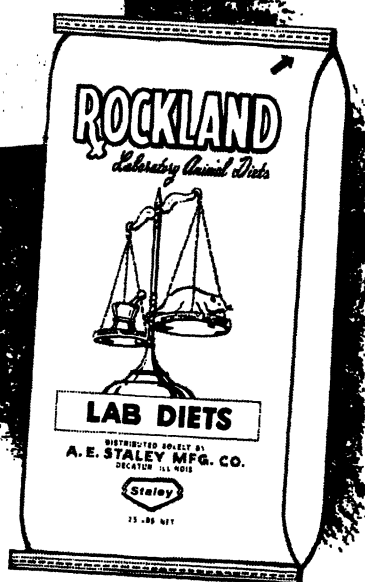
tem, thus destroying it, and substituting the metric system as the *sole* system for the United States.

In my study (in 1921) it was found that, after nearly 60 years of legal right, not more than one-tenth of 1 percent of the American people used the metric units. Of the rest, relatively few had even heard of this system, and yet the 99.9 percent would be the people to suffer and to be much more than inconvenienced by a compulsory change, whether it took 33 or 333 years. (The latter period is the more likely if the experience of France is to be used as a criterion.)

This is the other side of the "rebuttal"; and there is another question one should raise in view of the fact that the metric system is neither scientific nor convenient except for fine-instrument making and foreign trade: By what kind of effrontery does one-tenth of 1 percent of our population keep on insisting that it should benefit at the expense of 99.9 percent of the people? In *Forbes* magazine, beginning with the issue of 19 January 1924, five articles were published (three by proponents of the proposal that the metric system be made mandatory and two by me). The following statement, in the 12 April 1924 issue, closed the series: "It is just about as sensible to attempt to substitute the metric for the English system in the United States as it would be to attempt to substitute in this country the French for the English language."

As for the conclusion, I should like to point out that a *very* considerable and objective study of the "facts" has already been made on at least two occasions, including the fact that there is nothing *scientific* about the existing metric system. The first study was made in 1821 by John Quincy Adams. It was this thoroughgoing analysis which Congress had before it in adopting the English rather than the metric units for the United States at that time. The second study was made 100 years later, by me. It was sponsored and financed by the National Industrial Conference Board, was published by the Century Company, went into every conceivable aspect of the subject, and was guided by an able committee of five outstanding American scientists, engineers, and businessmen. Two favored the metric system, two favored the English system, and one (the chairman) was uncommitted. The report (261 pages) had the unanimous approval of this committee, which was composed of E. M. Herr, president of the Westinghouse

News from ROCKLAND



NEW COAT for an old friend

This functional new bag gives greater convenience—and more assurance than ever that Rockland Diets will retain their original, dependable uniformity and consistency. We think you'll like:

1. New pull tab—neatly rips open the new zip-top in a jiffy.
2. Greater strength—less chance of contamination through bags bursting in handling.
3. Anti-skid surface. No slick finish to let stacked bags slide. Sure, easy handling.

In its crisp uniform of forest green the new Rockland bag emphasizes that here are the standard reference diets formulated specifically, and under the most rigid controls, to help you achieve consistent efficiency. Get Rockland diets from your dealer, or A. E. Staley Mfg. Co., Decatur, Illinois.

Rockland Standard Reference Stock Diets:
RAT DIET (complete) • LABORATORY PRIMATE DIET • RAT DIET (D-Free)
GUINEA PIG DIET • MOUSE DIET • RABBIT DIET
MOUSE BREEDER DIET
MONKEY DIET • DOG DIET

Rockland Diets are available
world-wide through Staley
International—Cable: STACOR



ROCKLAND DIETS

Electric and Manufacturing Company; Fred J. Miller, past president of the American Society of Mechanical Engineers; Henry D. Sharpe, treasurer of Brown and Sharpe Manufacturing Company; Henry R. Towne, chairman of the board of Yale and Towne Manufacturing Company (I); and Frank O. Wells, president of Greenfield Tap and Die Company.

Another study may of course be in order at this time. If it takes up where these two definitive analyses and the five *Forbes* articles left off, if some means is devised to make certain that it is unbiased and objective (not left entirely in the hands of the Bureau of Standards), and if, in addition, it goes into the lobbying and propaganda activities that lie behind the perennial agitation for making the metric system mandatory in the United States, a useful purpose may be served. But it surely should not cost the American taxpayers \$500,000.

JOSEPH MAYER

929 Chestnut Lane,
Oxford, Ohio

Note

1. Writing to Henry P. Fowler, president of the U.S. Chamber of Commerce, on 27 July 1921, Towne designated the 1921 report, which is entitled "The Metric versus the English System of Weights and Measures," as "the most comprehensive and complete presentation . . . since the notable report of John Quincy Adams in 1821 . . . a veritable mine of information for those who are interested in this subject."

Early Comments on the Moon Illusion

In their recent articles on the moon illusion [*Science* 136, 953, 1023 (1962)], Kaufman and Rock note the long history of concern with this phenomenon. It is of interest that an experimental proof for the view that the presence of intervening terrain creates a sense of greater distance leading to the greater apparent size of the horizon moon was offered by Malebranche in 1693 ["Réponse à M. Regis," *Oeuvres de Malebranche* (Librairie Philosophique J. Vrin, Paris, 1960), vol. 17, pp. 266–7]. In translation, the passage reads as follows.

"Take a flat piece of glass such as a broken glass pane. Heat it gradually and evenly while passing it over a candle flame at a distance of 3 or 4 fingers so that it won't break. When it becomes warm, lower it into the

flame and leave it there until it is covered with smoke, so that by looking through it you are able distinctly to see the flame without seeing other, less brilliant objects.

"With a glass thus blackened, one will see the sun and the moon to be of the same size at the horizon . . . provided the glass is close enough to the eyes to entirely exclude the sky and the land. . . . If the sun is at the horizon, the interposition of the glass will make it appear approximately two times nearer and four times smaller, as here precision is not necessary. But if it is risen high above the horizon, the glass will produce no considerable change either in its distance or in its apparent size. . . .

"This being so, it is clear that the interposition of the glass does not change the actual size of the retinal image made by the moon, as it loses nothing of its apparent size when we look at it above our head through this glass. But when it is at the horizon, its distance and its apparent size are notably diminished by the interposition of the glass; this does not at all change its image and only excludes other objects. Thus it is evident that the reason the moon appears large is that the perception of the surrounding land makes us judge it farther away."

Malebranche recognized that the illusion disappeared when one could not see the intervening terrain, and that it was the horizon sun or moon which decreased both in apparent size and in apparent distance. He emphasized that the terrain had to be entirely eclipsed, else the illusion would remain: "For, if one glimpsed the sky and the terrain even a little, this glass would not change the apparent size of the sun, because one would judge it to be more distant than the terrain which one saw dimly."

Kaufman and Rock suggest that if the illusion is defined in terms of size constancy, one must conclude that it is based on the smaller appearance of the zenith moon. While neither moon, horizon, nor zenith would be perceived as equal in size to a disk approximately 2162 miles in diameter at the earth's surface, the illusion can be eliminated most easily by procedures which reduce the apparent size of the horizon moon.

NORMAN I. HARWAY

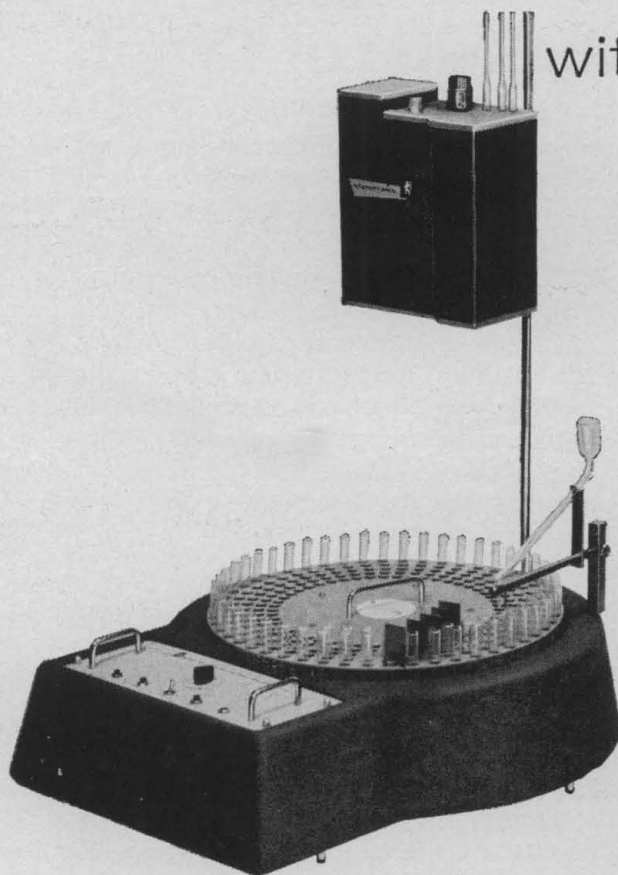
School of Medicine and Dentistry,
University of Rochester,
Rochester, New York

U

monitoring

V

...across the spectrum
with just a turn of a **DIAL**



Now with just a turn of a dial you can continuously monitor column effluent for compounds absorbing at any wave length in the ultraviolet spectrum. Vanguard's all-new Model 1056 Automatic UV Analyzer performs with greater sensitivity and versatility than ever thought possible. Dual-beam operation utilizing sample and reference cuvettes provides continuous base line compensation for gradient elutions and for other applications where the optical density of the eluent may change. Operates with minimum supervision and compatible with all Fraction Collectors. Automatic chart recorder marking system speeds identification by quickly and accurately locating test tubes in which absorbing materials are located.



To learn how you can save time while assuring positive identifications—even in the presence of highly absorbing solvents—write direct for complete details on the new Vanguard Model 1056 Automatic UV Analyzer.

- Analyzes across the spectrum—from 200 to 400 millimicrons
- Particularly well-suited for gradient elution techniques—even when highly absorbing solvents are utilized
- Monochromator-coupled hydrogen light source permits selective dialing across UV spectrum
- Automatic chart recorder marking system locates absorbing materials by test tube
- Compatible with all Fraction Collectors—regardless of make or model
- Fully transistorized for long, precision service

VANGUARD



INSTRUMENT COMPANY

DESIGNERS AND MANUFACTURERS OF PRECISION INSTRUMENTATION FOR RESEARCH

P.O. Box 244 • LaGrange, Illinois • Fleetwood 4-5656

Regional Offices: New York, New York, 520 Fifth Avenue, TN 7-1998; San Francisco, California, 115 New Montgomery Street, EXbrook 2-0511

NEW LEITZ MICRO-PROJECTOR MODEL XI C

4 different magnifications at the twist of 1 knob

Finest detail brilliantly illuminated from macro—high power...even in extra-large lecture halls! The Leitz Model XI C continues as the world's unrivaled leader in micro-projection after nearly a half-century of continuous refinement of successive models. Yet, despite its unmatched precision and virtually unlimited versatility, its operation is almost as simple as that of a home slide-projector. Some of its most outstanding advanced features are:

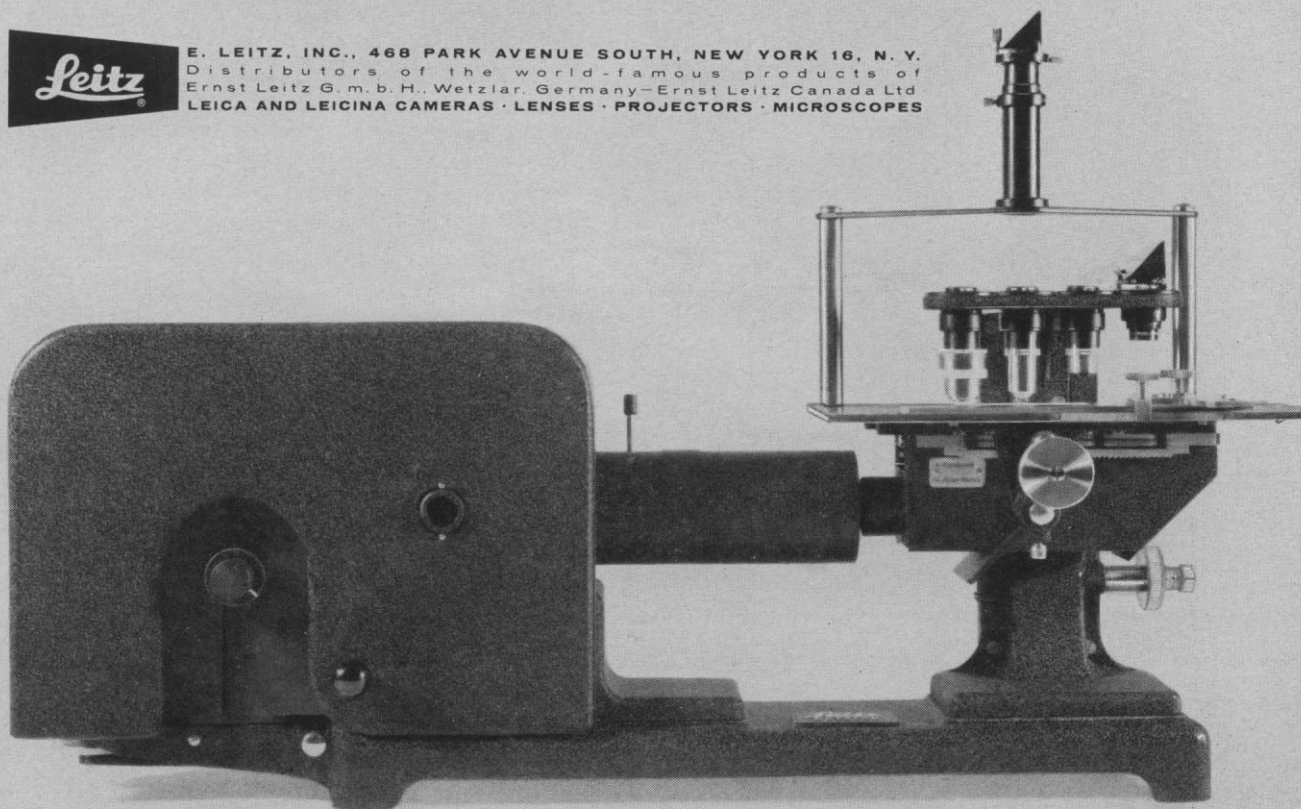
- Instant click-stop change of systematically graded

- magnification without changing exact focus or field of view.
- Permanent alignment of microscope and light source.
- Specially engineered cooling protects delicate specimens.
- Built-in mechanical stage permits traverse of specimen area.
- Four plano-flatfield or regular objectives for optimum performance.
- Specially mounted low-power survey objective and reflecting prism for surveying large sections.
- Coaxial coarse and fine focusing.
- Individual condensers to match the chosen objectives.

45262

Leitz

E. LEITZ, INC., 468 PARK AVENUE SOUTH, NEW YORK 16, N. Y.
Distributors of the world-famous products of
Ernst Leitz G. m. b. H., Wetzlar, Germany—Ernst Leitz Canada Ltd.
LEICA AND LEICINA CAMERAS · LENSES · PROJECTORS · MICROSCOPES



AMERICAN ASSOCIATION
FOR THE
ADVANCEMENT OF SCIENCE

Board of Directors

THOMAS PARK, *Retiring President, Chairman*
 PAUL M. GROSS, *President*
 ALAN T. WATERMAN, *President Elect*
 HENRY EYRING DON K. PRICE
 H. BENTLEY GLASS MINA REES
 MARGARET MEAD ALFRED S. ROMER
 WILLIAM W. RUBEY
 PAUL A. SCHERER, *Treasurer*
 DAEL WOLFLE, *Executive Officer*

Editorial Board

KONRAD B. KRAUSKOPF H. BURR STEINBACH
 EDWIN M. LERNER WILLIAM L. STRAUS, JR.
 PHILIP M. MORSE EDWARD L. TATUM

Editorial Staff

DAEL WOLFLE HANS NUSSBAUM
Publisher Business Manager

PHILIP H. ABELSON
Editor

ROBERT V. ORMES ELLEN E. MURPHY
Managing Editor Assistant Editor

NANCY TEIMOURIAN, *Assistant to the Editor*

News: DANIEL S. GREENBERG, PATRICIA D. PADDOCK

Book Reviews: SARAH S. DEES

Editorial Assistants: ELEANOR J. BUTZ, GRAYCE A. FINGER, NANCY S. HAMILTON, OLIVER W. HEATWOLE, EDGAR C. RICH, JOHN E. RINGLE, CECIL F. SWEENEY, CONRAD YUNG-KWAI

Staff Assistants: LILLIAN HSU, MARION Y. KLINE, KAY E. KROZELY

Advertising Staff

EARL J. SCHERAGO, *Director*

HAZEL SANDS, *Production Manager*

Sales: RICHARD L. CHARLES and ROBERT S. BUGBEE (New York, N.Y., PE 6-1858); C. RICHARD CALLIS (Old Bridge, N.J., CL 4-3680); HERBERT BURKLUND (Chicago, Ill., DE 7-4973); Ed BIG (Monterey Park, Calif., CU 3-8600)

SCIENCE, now combined with THE SCIENTIFIC MONTHLY, is published each Friday by the American Association for the Advancement of Science at National Publishing Company, Washington, D.C. SCIENCE is indexed in the *Reader's Guide to Periodical Literature*.

Editorial correspondence should be addressed to SCIENCE, 1515 Massachusetts Ave., NW, Washington 5, D.C. Manuscripts should be typed with double spacing and submitted in triplicate. The AAAS assumes no responsibility for the safety of manuscripts. Opinions expressed by authors are their own and do not necessarily reflect the opinions of the AAAS or the institutions with which the authors are affiliated. For detailed suggestions on the preparation of manuscripts, see *Science* 125, 16 (4 Jan. 1957).

Advertising correspondence should be addressed to SCIENCE, Room 1740, 11 West 42 St., New York 36, N.Y.

Change of address notification should be sent to 1515 Massachusetts Ave., NW, Washington 5, D.C., 4 weeks in advance. Furnish an address label from a recent issue. Give both old and new addresses, including zone numbers.

Annual subscriptions: \$8.50; foreign postage, \$1.50; Canadian postage, 75¢. Single copies, 35¢. School year subscriptions: 9 months, \$7.00; 10 months, \$7.50. Cable address: Advancesci, Washington.

Copyright © 1962 by the American Association for the Advancement of Science.

Stability and Change

Over the past 15 years it has been emerging with increasing clarity and force that the communication of information is as centrally important in nature as it is between men.

When a virus invades a cell it introduces a packet of chemically coded genetic information, so unambiguous and dictatorial that it may completely reorganize the previous contents of the cell in strict accordance with the imported message. When the cells of an organism divide, the continuing genetic integrity of the whole depends upon the essentially errorless transmission of the information coded onto the DNA molecules. The capacity of an organism to recognize itself depends upon immunological messages which we do not now understand in any detail, but which are certainly both intricate and precise.

Over the very long haul nature requires, for the evolutionary process, that infrequent slips occur. The mutated messages almost always turn out to contain useless misspellings which nature wisely discards. Only once in a very great while is a good new word formed.

In his lovely book, *The Ideas of Biology*, John Tyler Bonner has suggested that the reason why nature utilizes the nucleic acids in the storing and transmission of information is that they are chemically stable and hence cause "relatively few errors or changes."

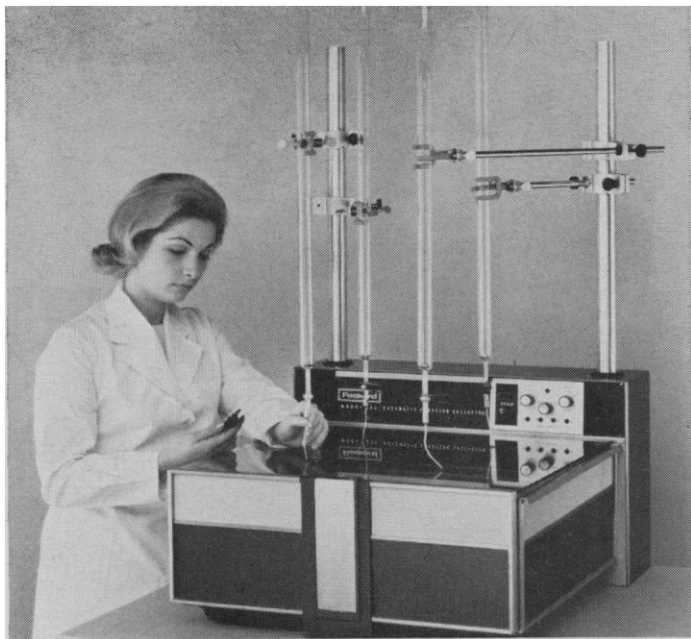
Man seems to be much more careless about preserving the integrity of his inter-communication. Lawyers, especially in their terms of art, and scientists, in their use of a precise and well-defined vocabulary, appear to be the chief guardians of verbal and syntactical stability. For all others, the modern idea seems to be that "language is a living, growing, thing"; and growth in all directions, including downwards toward the low level of the street, apparently seems entirely acceptable to many.

One must grant that language is alive and evolving. Human words should change occasionally, but I think that at the best these mutations are the result of the radiant effect of poetic imagination or the responses to new necessities. It does seem reasonable to hope that new words should not be accredited merely because they are used by substantial numbers of careless, lazy, or ignorant persons.

Indeed, should we not protest in general against current trends towards more and more sloppiness with words and with grammar?

I want to make a plea for the older editions of Fowler's *English Usage*; for Strunk's *The Elements of Style*; for the continued use of the subjunctive mood; for the universal use of a comma before the final "and" in a series of listed items; and for all those similar rules of established grammatical virtue which have of late been scorned by so many.

I would enjoy adding comments about the newly revised Webster. But *Science* must be sent through the mail.—WARREN WEAVER, *Alfred P. Sloan Foundation, Rockefeller Center, New York.*



400 SAMPLE CAPACITY

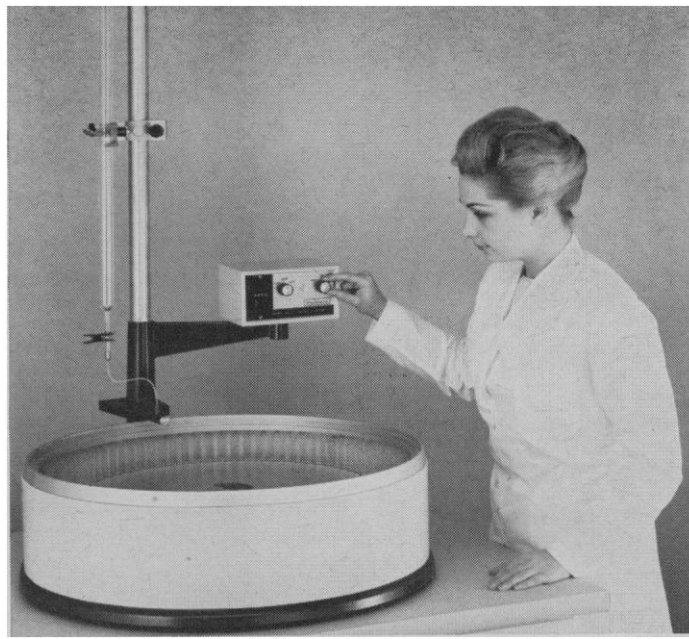
MODEL 234 FRACTION COLLECTOR

■ Here is a totally new concept in fraction collectors, featuring a unique method of operation wherein the test tubes remain stationary while the column effluent is conveyed to each tube. Indexing is silent and rapid. Capacity of the Model 234 is 400 test tubes (up to 18mm diameter), positioned in four polyethylene racks designed to allow the circulation of coolant during collection. Racks are easily removable for further processing and cleaning. ■ The Model 234 may be operated on either time, drop or volumetric basis. When operating on a time basis, the effluent from either one, two or four columns may be collected simultaneously. Controls are provided for time operation to a maximum of 100 minutes and for drop counting from 1 to 10^4 drops. Options include volumetric operation and an aliquot sample feature which automatically collects alternate aliquots of any amount of the preceding sample. ■ For additional information, consult your Packard Sales Engineer or write for Bulletin 1012.

Packard

PACKARD INSTRUMENT COMPANY, INC.
BOX 428 • LA GRANGE, ILLINOIS • HUNTER 5-6330

Sales offices in principal cities of the world



216 SAMPLE CAPACITY

MODEL 231 FRACTION COLLECTOR

■ Large capacity, convenience of operation, and durable, tested design are outstanding features of this new Packard fraction collector. The turntable holds three circular rows of 72 —18mm test tubes each. As each row is filled the column effluent is automatically indexed to the next row. A compact drop counter is built into the column support post and the control console swivels to any position for operating convenience. An electrical timer provides for time operation up to 100 minutes, or alternately, drop counting from 1 to 10^4 drops may be selected. ■ Volumetric collection and an aliquot sample feature are available as options. Test tubes are protected from external contamination by a plate-glass cover which opens easily for access to the tubes. Space-saving design, modern styling, and quality construction make this modestly priced laboratory tool a valuable addition to any research facility. ■ For more information on the Model 231 Fraction Collector consult your Packard Sales Engineer or write for Bulletin 1012.

Packard

PACKARD INSTRUMENT COMPANY, INC.
BOX 428 • LA GRANGE, ILLINOIS • HUNTER 5-6330

Sales offices in principal cities of the world

LINEAR LOG

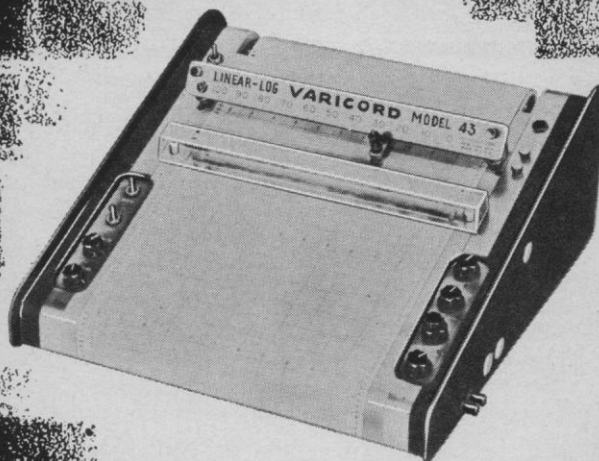
RECORDER

**A versatile sensitive
Servo-Recorder for
General laboratory use**

VARICORD 43 \$885

■ Multi-range, potential and current recorder. ■ Choice of per cent transmission or absorbance indication in spectrophotometry. ■ For gas chromatography by conductivity or ionization. ■ True potentiometric input. ■ Less than 1 second pen speed – 10 millivolt full scale sensitivity. ■ Output connector for integrating and telemetering.

Write for Bulletin #1130



PHOTOVOLT

PHOTOVOLT CORPORATION ■ 1115 BROADWAY ■ NEW YORK 10, N.Y.

BACTRONIC COLONY COUNTER

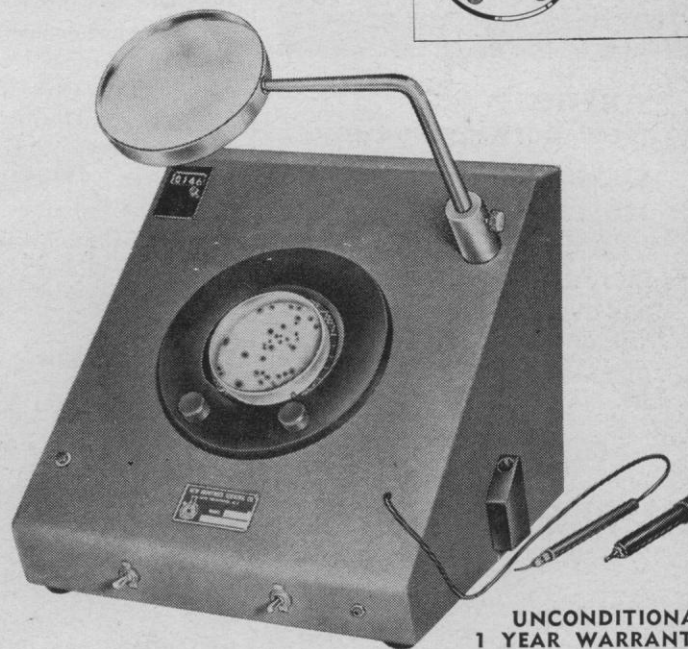
**All-Transistor Electronic Colony Counter
Marks as it Counts Automatically
In Open and Closed Petri Dishes**

Four precision counting devices make this instrument indispensable for routine colony counting and in phage and bacterial genetics: an Electronic Marking Probe; A Plug-in Marking Grease Pencil or Plug-in Marking Pen; and a Pushbutton Counter.

Colonies are accurately recorded in a *single* probing action that leaves an identifying puncture in the agar. The Electronic Probe picks up radio impulses on contact with *any* agar medium and actuates the counting mechanism. Electrical splattering is completely eliminated by the low voltage input. Where puncturing is undesirable, the Plug-in Grease Pencil or Marking Pen is used to mark the back of the plate as it counts.

Plates are flooded with brilliant white light that is cool, soft and easy on the eyes. Specimens are illuminated in bold relief against a contrasting agar background, revealing colony morphology. Even pinpoint colonies are easily discerned.

The instrument has an automatic numerical reset to zero, a sterilizing Probe Well and a magnifying lens.



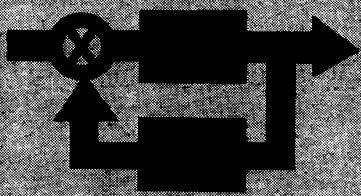
**UNCONDITIONAL
1 YEAR WARRANTY**

**WRITE FOR
CATALOG
C110S/9282**



NEW BRUNSWICK SCIENTIFIC CO., INC.
PRECISION LABORATORY APPARATUS
P.O. BOX 606, NEW BRUNSWICK, NEW JERSEY

*Attend the
Seventeenth
Annual*



ISA

**INSTRUMENT-
AUTOMATION**

**CONFERENCE
and EXHIBIT**

*Oct. 15-18, 1962
New York City*

**EXHIBIT
New York Coliseum
CONFERENCE
Hotel New Yorker**

More than 400 exhibits,
and over 200 papers, will
demonstrate and report
on...

**PROGRESS IN
INSTRUMENTATION / 62**

Plan now to attend!



**INSTRUMENT SOCIETY
of AMERICA**

Penn-Sheraton Hotel, 530 Wm. Penn Place
Pittsburgh 19, Pa.

trist, Veterans Administration Mental Hygiene Clinic, Los Angeles, 1948, Good Samaritan Hospital, 1948-49, Mt. Sinai Hospital, 1955-58, Compton Sanatorium, 1955-58, Edgemont Hospital, 1956-58; medical director, American Psychiatric Association, 1958-62; Fulbright research scholar, University of Groningen, Netherlands, 1962-63; editor-in-chief, *Mental Hospitals*, 1958-62; consultant and lecturer, Department of Neuropsychiatry, Walter Reed Army Medical Center, 1958-; special professional lecturer, George Washington University Medical School, 1962-; member, Editorial Board, *Excerpta Medica*, 1953-56; member, Board of Directors, American Society of Mental Hospital Business Administrators, 1959-62.

AAAS activities: member, Council, 1958-.

Kenneth C. Spengler

Kenneth C. Spengler, 47 (meteorology), statistician, Pennsylvania Department of Labor and Industry, 1937-38; accountant, Pennsylvania Public Utility Commission, 1938-40; secretary, Weather Research Center, U.S. Air Force, 1941; chief, Climatological and Forecast Verification Sections, Air Weather Service, 1942-43; chief, Weather Central, Headquarters U.S. Air Force, 1944-45; deputy chief, Research and Development Division, Headquarters Air Weather Service, 1945-46; executive secretary, American Meteorological Society, 1946-; member, Harvard Visiting Committee (Blue Hill Observatory), 1951-59; member, Advisory Committee on Weather Services, U.S. Department of Commerce, 1953-54; member, National Advisory Committee on Weather Control, 1953-58; member, Board of Directors, National Federation Science Abstracting and Indexing Services, 1959-.

AAAS activities: member, Council, 1949-; member, Council Agenda and Resolutions Committee, 1958-60; member, Committee on Council Affairs, 1961.

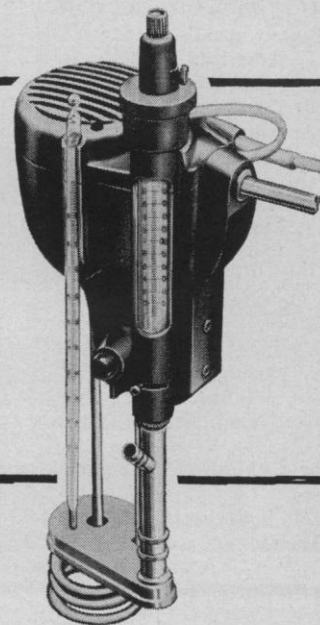
Forthcoming Events

October

29. **Vacuum Microbalance Techniques**, symp., Los Angeles, Calif. (Cahn Instrument Co., 15505 Minnesota Ave., Paramount, Calif.)

29-30. **Large Rockets**, natl., Sacramento, Calif. (Inst. of the Aerospace Sciences, 2 E. 64 St., New York 21)

**heats
circulates
stirs
pumps**



**BRONWILL
CONSTANT
TEMPERATURE
CIRCULATOR**

Here's everything you need in one compact unit. Smaller, lighter weight and more accurate (to $\pm 0.01^\circ\text{C}$), this new model instantly converts any suitable container to an efficient, closely controlled, constant temperature bath or circulating system. Easy to use—easy to store—always ready for the next bath. Like more information? Just drop us a note and we'll rush complete data.



**BRONWILL
SCIENTIFIC**

A DIVISION OF WILL SCIENTIFIC, INC.
1409 N. GOODMAN ST, ROCHESTER 3, N.Y.

29-31. Domestic and Industrial Water Supply, conf., Klagenfurt, Austria. (Österreichischer Wasserwirtschaftsverband, Graven 17, Vienna I, Austria)

29-31. Dynamics of Manned Lifting Planetary Entry, symp., Philadelphia, Pa. (A. C. Harrison, Room 1308M, General Electric Co., Valley Forge Space Technology Center, P.O. Box 8555, Philadelphia 1)

29-31. Entomological Soc. of Canada—Entomological Soc. of Manitoba, annual, Winnipeg, Manitoba. (L. L. Reed, K. W. Neatby Bldg., Carling Ave., Ottawa, Ont., Canada)

29-31. Society of Rheology, Baltimore, Md. (J. C. Miller, Union Carbide Plastics Co., Bound Brook, N.J.)

29-1. American Dental Assoc., Miami Beach, Fla. (H. Hillenbrand, 222 E. Superior St., Chicago 11, Ill.)

29-2. American Soc. for Metals, natl. congr. and intern. exposition, New York, N.Y. (M. A. Scheil, A. O. Smith Corp., Milwaukee, Wis.)

29-2. Basic Environmental Problems of Man in Space, symp., Paris, France. (A. R. Weiller, Intern. Acad. of Astronautics, 12 rue de Gramont, Paris 2^e)

29-2. National Safety Council, annual congr., Chicago, Ill. (R. L. Forney, NSC, 425 N. Michigan Ave., Chicago 11)

29-19. International North Pacific Fisheries Commission, Seattle, Wash. (INPFC, 209 Wesbrook Bldg., Univ. of British Columbia, Vancouver 8, B.C., Canada)

30-31. Spaceborne Computer Engineering Technology, natl. conf., Anaheim, Calif. (W. C. Chambliss, California Computer Products, Inc., 8714 E. Cleta St., Downey, Calif.)

31-2. Antimicrobial Agents and Chemotherapy, interscience conf., Chicago, Ill. (American Soc. for Microbiology, 19875 Mack Ave., Detroit 36, Mich.)

31-3. American Vacuum Soc., annual symp., Los Angeles, Calif. (G. H. Bancroft, Consolidated Vacuum Corp., 1775 Mt. Read Blvd., Rochester 3, N.Y.)

31-3. Neurological Surgeons, congr., Houston, Tex. (E. Weiford, 4706 Broadway, Kansas City 12, Mo.)

31-3. Non-Proprietary Names for Pharmaceutical Preparations, Geneva, Switzerland. (World Health Organization, Palais des Nations, Geneva)

November

1-2. Alkaline Pulping Conf., Savannah, Ga. (Technical Assoc. of the Pulp and Paper Industry, 360 Lexington Ave., New York 17)

1-2. Chemtronics, conf., New York, N.Y. (E. C. Torkelson, Bell Telephone Laboratory, 463 West St., New York)

1-2. Educational Conf., annual, New York, N.Y. (A. E. Traxler, Educational Records Bureau, 21 Audubon Ave., New York 32)

1-2. Kidney, annual conf., Princeton, N.J. (National Kidney Disease Foundation, 145 E. 35 St., New York 16)

1-2. Medical Practice Management, 1st annual conf., Las Vegas, Nev. (Soc. of Professional Business Consultants, 420 Madison Theatre Bldg., Detroit 26, Mich.)


1-2. Product Engineering and Produc-



MEASURE RADIATION DOSAGE ...faster, easier, safer

This new Bausch & Lomb Microdosimeter Reader measures X-Ray or Gamma or High Energy Electron radiation... in the range of 10 to 10,000 rads... accurate to at least $\pm 4\%$. It reads changes of fluorescence in B&L Microdosimeter Rods (1mm x 6mm cylinders of silver-activated phosphate glass) as precise measurements of individual or cumulative dosage or radiation to which the rods have been exposed.

15 seconds is all it takes to load one of these rods into the Microdosimeter Reader, set the controls, read the radiation measurement, unload. And you're sure of your results because there's no chipping of the rods in loading—you measure *total* dosage every time. Put this dependable Microdosimeter Reader to work in your area of responsibility—personnel safety, aero/space investigation, medical research—for only \$1225.

BAUSCH & LOMB 

**BAUSCH & LOMB
INCORPORATED**
85633 Bausch Street
Rochester 2, N. Y.

- ☐ Please demonstrate Microdosimeter Reader.
☐ Please send Catalog D-299.

NAME.....

PROFESSIONAL
ADDRESS.....

CITY..... ZONE..... STATE.....

tion, natl. conf., San Francisco, Calif. (H. R. Traver, Hewlett-Packard Co., 1501 Page Mill Rd., Palo Alto, Calif.)

1-3. American Chemical Soc., annual southeastern regional meeting, Gatlinburg, Tenn. (F. A. Griffiths, Maryville College, Maryville, Tenn.)

1-3. Delayed Effects of Captivity, intern. medical congr., Brussels, Belgium. (R. Laumond, Intern. Confederation of Former Prisoners of War, 46 rue Copernic, Paris 16^e, France)

2-3. American Geophysical Union, regional meeting, Seattle, Wash. (F. A. Richards, Dept. of Oceanography, University of Washington, Seattle)

2-3. Fat as a Tissue, intern. research

conf., Philadelphia, Pa. (Division of Research, Medical Science Bldg., Lankenau Hospital, Philadelphia 51)

4-7. Engineering in Biology and Medicine, annual conf., Chicago, Ill. (Program Committee, P.O. Box 1475, Evanston, Ill.)

4-9. American Acad. of Ophthalmology and Otolaryngology, Las Vegas, Nev. (W. L. Benedict, 15 Second St., SW, Rochester, Minn.)

4-10. Interamerican Red Cross Conf., San Juan, Puerto Rico. (American Natl. Red Cross, 17 St. between D and E Sts., NW, Washington, D.C.)

5-7. American Soc. for Cell Biology, annual, San Francisco, Calif. (ASCB, Box

2982, Duke Univ. Medical Center, Durham, N.C.)

5-7. Protection against Radiation Hazards in Space, symp., Gatlinburg, Tenn. (E. P. Blizzard, Oak Ridge Natl. Laboratory, P.O. Box X, Oak Ridge, Tenn.)

5-9. American Inst. of Mining, Metallurgical, and Petroleum Engineers, fall meeting, Chicago, Ill. (Executive Secretary, AIME, 345 E. 47 St., New York 17)

5-9. German Ceramics Soc., annual, Baden-Baden. (Deutsche Keramische Gesellschaft, Menzenbergerstr. 47, Bad Honnef am Rhein, Germany)

5-9. Metallurgical Congr., intern., Chicago, Ill. (C. Wells, American Soc. for Metals, 7301 Euclid Ave., Cleveland, Ohio)

5-9. Practical Applications of Short-Lived Radioisotopes Produced in Small Research Reactors, seminar, Vienna, Austria. (Intern. Atomic Energy Agency, 11 Kärntner Ring, Vienna 1)

5-17. World Meteorological Organization, South-West Pacific Regional Assoc., Noumea, New Caledonia. (Secretariat, WMO, Geneva, Switzerland)

7-10. Acoustical Soc. of America, Seattle, Wash. (W. Waterfall, Amer. Inst. of Physics, 335 E. 45 St., New York 17)

7-10. Corrosion of Metals, symp., Kanpur, India. (Defense Research Laboratory, Kanpur)

7-10. Fetal and Infant Liver Function and Structure, conf., New York, N.Y. (E. T. Minor, New York Acad. of Sciences, 2 E. 63 St., New York 21)

7-10. Geological Soc. of America, Houston, Tex. (F. Betz, Jr., GSA, 419 W. 117 St., New York, N.Y.)

8-9. Operations Research Soc. of America, Philadelphia, Pa. (G. D. Shellard, New York Life Insurance Co., 51 Madison Ave., New York 10)

8-10. American Soc. of Cytology (formerly Inter-Soc. Cytology Council), annual, St. Louis, Mo. (P. A. Younge, 1101 Beacon St., Brookline 46, Mass.)

8-10. Gerontological Soc., Miami Beach, Fla. (R. W. Kleemeier, Dept. of Psychology, Washington Univ., St. Louis, Mo.)

8-13. International Office of Epizootics, American regional conf., Mexico City, Mexico. (R. Vittoz, 12 rue du Prony, Paris 17^e, France)

9-8. Dec. United Nations Educational, Scientific, and Cultural Organization, general conf., Paris, France. (UNESCO, Place de Fontenoy, Paris 7^e)

11-16. World Medical Assoc., general assembly, New Delhi, India. (L. H. Bauer, 10 Columbus Circle, New York 19)

11-17. Veterinary Medicine, Pan American congr., Mexico City, Mexico. (J. Santivanez, P.O.B. 1697, Coral Gables 34, Fla.)

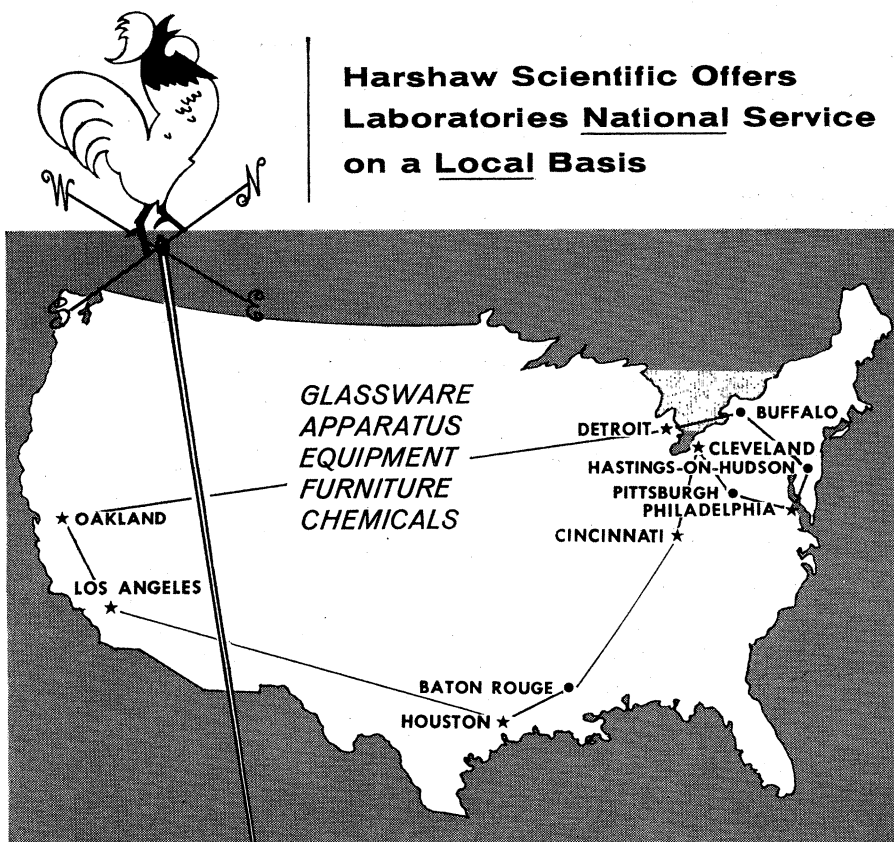
11-22. Plastics, intern. fair and convention, Göteborg, Sweden. (Interfair, Inc. AB, Intern. Trade Fair, S. Tullgatan 4, Malmö C, Sweden)

12-13. Genetics Symp., Columbia, Mo. (Director, Postgraduate Medical Education, M176 Medical Center, Univ. of Missouri, Columbia)

12-14. Paleontological Soc., Houston, Tex. (H. B. Whittington, MCZ, Harvard Univ., Cambridge 38, Mass.)

12-15. Magnetism and Magnetic Materials, conf., Pittsburgh, Pa. (Inst. of

Harshaw Scientific Offers Laboratories National Service on a Local Basis



BRANCHES ★

CLEVELAND 6, OHIO
1945 East 97th Street
Tel. RANDolph 1-8300

CINCINNATI 37, OHIO
6265 Wiehe Rd.
Tel. REDwood 1-9100

DETROIT 28, MICHIGAN
9240 Hubbell Avenue
Tel. VERmont 6-6300

HOUSTON 11, TEXAS
6622 Supply Row
Tel. WALnut 3-1627

LOS ANGELES 22, CALIF.
3237 So. Garfield Ave.
Tel. OVerbrook 5-8060

OAKLAND 1, CALIF.
5321 E. 8th Street
Tel. KELlog 3-9169

PHILADELPHIA 48, PA.
Jackson & Swanson Sts.
Tel. HOward 2-4700

Our Branch Warehouses and Sales Offices are strategically located to serve you. Select the one nearest you and contact them today. Our combined stock, which is probably the largest in the country, is at your disposal regardless of where it is located. Tell us what you need. We'll get it to you, *when you need it.*



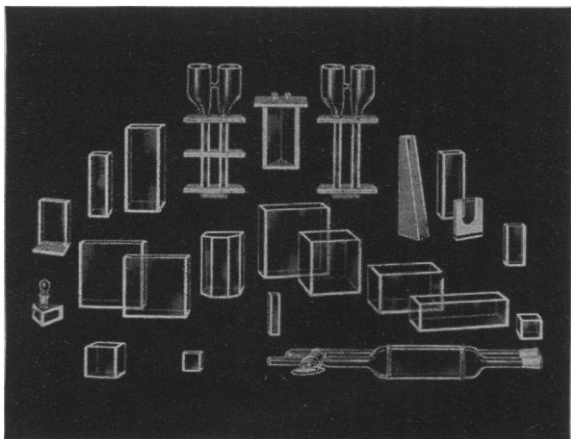
Harshaw Scientific, Division of The Harshaw Chemical Company is unique among laboratory supply houses. We know what laboratories require since our company employs several hundred chemists, scientists, engineers and technicians in its many research, development and control laboratories and we stock accordingly. — Glassware - Apparatus - Equipment - Furniture - Chemicals.

HARSHAW SCIENTIFIC

Division of The Harshaw Chemical Company
Cleveland 6, Ohio

SALES OFFICES • BATON ROUGE 6, LOUISIANA, 3160 Florida Street, Doherty Building, Room 103, Tel. Dickens 3-1933 • BUFFALO 2, NEW YORK, 260 Delaware Avenue, Tel. GARfield 9-2000 • HASTINGS-ON-HUDSON 6, NEW YORK, Tel. HASTings 5-8250 • PITTSBURGH 22, PENNSYLVANIA, 504 Bessemer Building, 6th St. & Fort Duquesne Boulevard, Tel. ATLantic 1-7930.

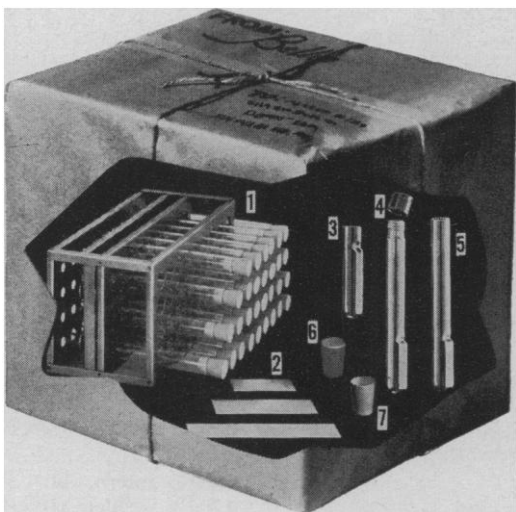
GLASS ABSORPTION CELLS made by **KLETT**



— SCIENTIFIC APPARATUS —
Klett-Summerson Photoelectric Colorimeters—
Colorimeters — Nephelometers — Fluorimeters—
Bio-Colorimeters — Comparators — Glass Stand-
ards—Klett Reagents.

Klett Manufacturing Co.
179 East 87 Street, New York, New York

A PACKAGE UNIT FOR TISSUE CULTURE TUBE STUDIES!

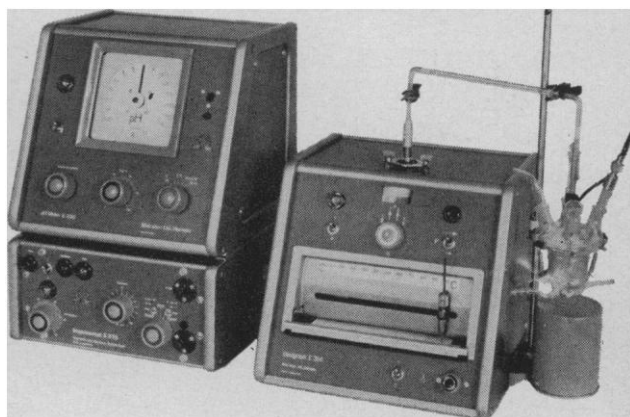


- | | |
|------------------------|----------------------------|
| 1. Self-locking rack | 5. Rubber stoppered tube |
| 2. PRECUT cover slides | 6. Rubber stopper |
| 3. Short type tube | 7. Silicone rubber stopper |
| 4. Screw cap tube | |

WRITE FOR COMPLETE DETAILS
BELCO GLASS INC.
DEPT. 55 — VINELAND, NEW JERSEY

pH STAT

...AND
TITRATION CURVES



May be used for fully automatic control and recording of titrant volume dosaged (pH Stat), for recording of a potentiometric titration curve (pH, mV) or as a regular end point titrator.

EXCLUSIVE FEATURES:

- 1) Micro and macro assemblies for burette volumes of 1.0, 5.0, 10.0, 20.0 and 50.0 ml.
- 2) Built-in switch over system for different recorder speeds.
- 3) Magnetic stirrer.
- 4) Temperature controlled titration vessels for various volumes from 1.0-140 ml.
- 5) Recording on single sheets or strip chart—with trouble-free ball point pens.
- 6) Electronic sensitivity 0.001 pH; drift guaranteed to be less than 0.01 pH over 24 hours.

Write for descriptive catalog No. pH5



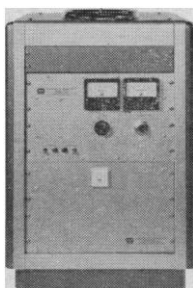
METROHM
BRINKMANN INSTRUMENTS, INC. 115 Cutter Mill Road, Great Neck, New York
PHILADELPHIA · CLEVELAND · HOUSTON · MIAMI · MENLO PARK, CAL. · ST. LOUIS



SUPER REGULATED HIGH VOLTAGE DC POWER SUPPLIES

FOR ELECTRON BEAM AND
OTHER CRITICAL APPLICATIONS

0.001% LINE & LOAD
REGULATION (NL to FL)
0.001% RIPPLE & HUM



Model 6VT6C

50 KV
at
.5 MA

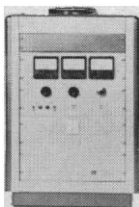
Continuously
Variable 0-50 KV
0.1% Resetability

The Calmag Model 6VT6C is the only instrument of its kind now available to the scientific world. Extremely stable, well regulated and ripple-free, the Model 6VT6C is ideally suited for investigations requiring pure direct current at high voltages. It is an excellent source for electron probes and assures the necessary super-regulation and stability demanded in critical electron beam and other applications. Extremely compact for a high voltage source, the Calmag unit requires only 24½" panel space.

Calmag instruments are now in use by, or on order for such leading scientific organizations as Applied Research Laboratories, the National Bureau of Standards, Sandia Corporation and many others.

ALL-NEW MODEL 6VT8

This newest development from Calmag engineers provides external high voltage electron gun filament power and filament DC bias control — all contained in the same size oil tank as the 6VT6C and utilizing one output Machlett connector and cable.



Model 6VT8



CALMAG DIVISION
CALIFORNIA MAGNETIC
CONTROL CORPORATION

11922 Valerio St. • North Hollywood, Calif.
Phone: 875-0880

Calmag manufactures a complete line of precision super-regulated power supplies of unequalled quality and proven superiority.

Radio Engineers, Office of the Professional Groups Secretary, 1 E. 79 St., New York 21)

12-16. Australasian Corrosion Assoc., annual conf., Auckland, New Zealand. (Conference Secretary, ACA, Box 995, Auckland)

12-16. Conservation and Management of Temperate Marshes and Wetlands, conf., Arles or Saintes-Maries-de-la-Mer, France. (L. Hoffman, Station Biologique de la Tour de Valat, Par Le Sambuc (B. du Rh.), France)

12-16. Problems of Methodology of Agricultural Problems, conf., U.N. Economic Commission for Europe, Geneva, Switzerland. (UNECE, Palais des Nations, Geneva)

12-17. Czechoslovak Medical Congress, Prague. (K. Räska, Czechoslovak Medical Soc. J. E. Purkyně, Sokolská 31, Prague)

12-24. Aeronautical Fixed Telecommunications Network, European-Mediterranean regional meeting, Paris, France. (Intern. Civil Aviation Organization, Intern. Aviation Bldg., 1080 University St., Montreal 3, P.Q., Canada)

13-15. Birth Defects, science writers' seminar, Ann Arbor, Mich. (Science Information Div., National Foundation, 800 Second Ave., New York 17)

13-15. Institute of Radio Engineers, Northeast research and engineering meeting, Boston, Mass. (L. G. Cumming, IRE, 1 E. 79 St., New York 21)

13-18. American Rocket Soc., annual meeting and space flight exposition, Los Angeles, Calif. (ARS, 500 Fifth Ave., New York 36)

13-22. Soil, intern. conf., Wellington, New Zealand. (ISC, Secretary General, P.O. Box 8001, Wellington)

14-17. Society of Naval Architects and Marine Engineers, annual, New York, N.Y. (Secretary, SNAME, 74 Trinity Place, New York 6)

15-17. Cold Metal Working, intern. conf., Budapest, Hungary. (Hungarian Soc. of Mechanical Engineers, Szabadság tér 17, Budapest 5)

15-18. American Anthropological Assoc., Chicago, Ill. (S. T. Boggs, 1530 P St., NW, Washington 5)

15-18. International Federation of Blood Donors' Organizations, Congr., Monaco. (V. Formentano, Largo Volontari del Sangue 1, Milan, Italy)

16-17. American Mathematical Soc., Tallahassee, Fla. (AMS, 190 Hope St., Providence 6, R.I.)

16-17. Communications, symp., Montreal, P.Q., Canada. (A. B. Oxley, Canadian IRE Symp. on Communications, Box 802, Station B, Montreal)

17. American Mathematical Soc., Los Angeles, Calif. (AMS, 190 Hope St., Providence 6, R.I.)

18-21. American Speech and Hearing Assoc., New York, N.Y. (K. O. Johnson, 1001 Connecticut Ave., NW, Washington 6)

18-21. Brain Mechanisms for External Inhibition (closed meeting), Los Angeles, Calif. [Air Force Office of Scientific Research (attention: SRL), Washington, D.C.]

19-20. Mid-America Electronics Conf., Kansas City, Mo. (J. Warfield, Dept. of Electrical Engineering, Univ. of Kansas, Lawrence)

Outstanding RONALD books . . .

Regeneration 20th Growth Symposium

Edited by DOROTHEA RUDNICK,
Albertus Magnus College and Yale University

Just Published! This volume contains the contributions prepared for the 20th Symposium of the Society for the Study of Development and Growth. Discussions deal with new and special aspects of regeneration posed by invertebrates; asexual reproduction in sponges; the perennial growth of Hydra; neoblastic regulation and tissue interaction in flatworms. Regeneration in plants provoked by tumor-producing agents and by excision and culture of parts is analyzed in new conceptual frames. Later chapters show the classic vertebrate organs, Amphibian limb and eye, being studied with new methods and posing new questions as older problems are resolved. 8 Contributors. 1962. 272 pp., illus. \$9

Other Growth Symposia—

Synthesis of Molecular and Cellular Structure, Dorothea Rudnick, Ed., with 9 Contributors. 1961. 255 pp., illus. \$9

Developing Cell Systems and Their Control, Dorothea Rudnick, Ed., with 10 Contributors. 1960. 240 pp., illus. \$8

Cell, Organism, and Milieu, Dorothea Rudnick, Ed., with 12 Contributors. 1959. 326 pp., illus. \$8

Developmental Cytology, Dorothea Rudnick, Ed., with 10 Contributors. 1959. 215 pp., illus. \$8

Control Mechanisms in Cellular Processes

Edited by DAVID M. BONNER,
University of California, San Diego

The 7th annual symposium publication of the Society of General Physiologists presents nine studies on the regulatory mechanisms by which chemical processes are organized and integrated in living cells and organisms. The approach is through concrete consideration of the integration of separate biochemical events and the coordinate regulation of cellular biochemistry. Discussions include: DNA and RNA and their roles in enzyme formation; estrogenic steroids in hormonal control; control by light and time; control of growth in plant cells by hormones; etc. 10 Contributors. 1961. 248 pp., illus. \$8.50

Other S. G. P. Symposia—

Macromolecular Complexes, M. V. Edds, Jr., Ed., with 14 Contributors. 1961. 257 pp., illus. \$8.50

Subcellular Particles, Teru Hayashi, Ed., with 20 Contributors. 1959. 213 pp., illus. \$8.50

Physiological Triggers and Discontinuous Rate Processes, Theodore H. Bullock, Ed., with 16 contributors. 1957. 179 pp., illus. \$7.50

Electrolytes in Biological Systems, Abraham M. Shanes, Ed., with 11 Contributors. 1955. 243 pp., illus. \$8.50

The Story of Pollination

B. J. D. MEEUSE, University of Washington

This stimulating volume provides an engagingly written yet scientifically sound account of the complex phenomenon of plant regeneration. Based on personal observation in many parts of the world, the book explores the principles of color vision in animals, the ways flowers create their color effects, the role of the honey guides in leading pollinators to the hidden nectar, etc. It discusses insect pollination, self-pollinating flowers, and those plants whose flowers rely on wind or water for pollination. Superbly illustrated with black-and-white and color drawings and close-up photographs. 1961. 243 pp. \$7.50

THE RONALD PRESS COMPANY
15 East 26th St., New York 10

19-21. **European Packaging Federation**, Congr., Paris, France. (EPF, 3 rue La Boétie, Paris 8^e)

19-23. **Radioactive Dating**, intern. symp., Greece. (Intern. Atomic Energy Agency, 11 Kärntner Ring, Vienna)

19-26. **Paris Intern. Dental Sessions**, Paris, France. (G. Delbart, 3 place de la Gare, Mantes, S.-et-O., France)

20. **Manufacturing Chemists' Assoc.**, mid-year conf., New York, N.Y. (MCA, 1825 Connecticut Ave., NW, Washington 9)

20-24. **Fish Diseases**, intern. symp., Turin, Italy. (R. Vittoz, Intern. Office of Epizootics, 12 rue de Prony, Paris 17^e, France)

22-23. **International Waste Rubber and Plastics Federation**, conf., Antwerp, Belgium. (R. G. Kirkpatrick, Moorgate Hall, Moorgate, London, E.C.2, England)

22-24. **Central Assoc. of Science and Mathematics Teachers**, St. Louis, Mo. (J. Kennedy, Indiana State College, Terre Haute)

22-24. **National Council for Geographic Education**, Chicago, Ill. (L. Kenamer, Univ. of Texas, Austin)

22-27. **Automation and Instrumentation**, Congr., Milan, Italy. (Federazione delle Associazioni Scientifiche e Tecniche di Milano, Via del Politecnico 10, Milan)

22-27. **Thermotechnology**, intern. conf., Milan, Italy. (A Barbieri, Via Marcona 15, Milan)

22-3. **Latin American Forestry Commission**, Santiago, Chile. (U.N. Food and Agriculture Organization, Regional Office, Casilla 10095, Santiago)

23-24. **American Mathematical Soc.**, Chicago, Ill. (AMS, 190 Hope St., Providence 6, R.I.)

23-24. **American Physical Soc.**, Cleveland, Ohio. (K. K. Darrow, APS, Columbia Univ., New York 27)

23-24. **American Soc. of Animal Science**, Chicago, Ill. (C. E. Terrill, Animal Husbandry Research Div., Agricultural Research Center, Beltsville, Md.)

24-25. **American College of Chest Physicians**, Los Angeles, Calif. (ACCP, 112 E. Chestnut St., Chicago 11, Ill.)

25-28. **American Medical Assoc.**, annual clinical meeting, Los Angeles, Calif. (Circulation and Records Dept., AMA, 535 N. Dearborn St., Chicago 10, Ill.)

25-30. **American Soc. of Mechanical Engineers**, New York, N.Y. (ASME, 345 E. 47 St., New York 17)

25-30. **Radiological Soc. of North America**, annual, Chicago, Ill. (M. D. Frazer, 1744 S. 58 St., Lincoln, Neb.)

26-27. **Combustion Inst.**, western states section, Sacramento, Calif. (G. Fenech, Combustion Inst., 16902 Bollinger Dr., Pacific Palisades, Calif.)

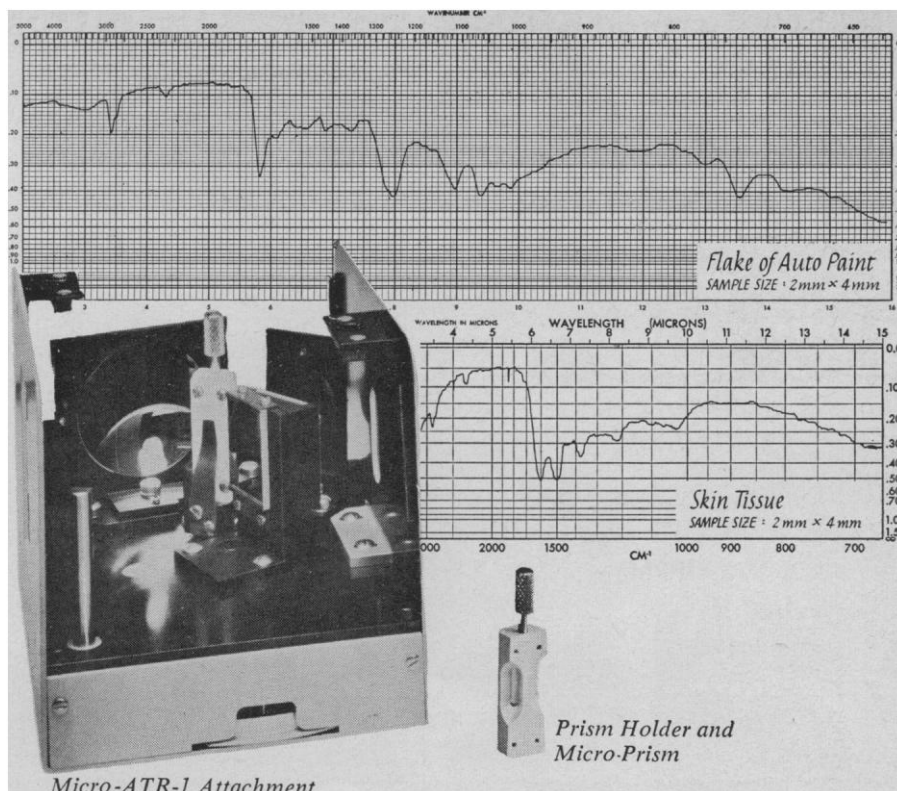
26-28. **Atomic Industrial Forum**, annual, Washington, D.C. (R. Barlow, AIF, 850 Third Ave., New York 22)

26-29. **American Nuclear Soc.**, Washington, D.C. (O. Bizzell, Isotope Technology, Development Branch, Div. of Isotopes Development, U.S. Atomic Energy Commission, Washington 25)

27-29. **AtomFair**, American Nuclear Soc.-Atomic Industrial Forum, Washington, D.C. (R. Barlow, Atomic Industrial Forum, 850 Third Ave., New York 22)

(See 14 September issue for comprehensive list)

28 SEPTEMBER 1962



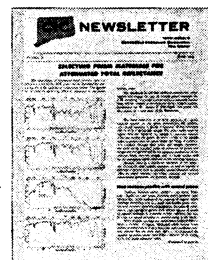
New Micro-ATR Attachment for Analysis of Small Samples

Attenuated Total Reflectance, a new infrared sampling technique, has been finding increased application in the infrared laboratory. The new technique permits the direct infrared analysis of such difficult samples as solids, coatings, dense liquids, plastics and the like, without special sample preparation. Now, the Micro-Attenuated Total Reflectance Attachment makes it possible to obtain spectra on minute samples — such as chemical residue, strands of fiber, and even tiny fragments of tissue as small as 1 mm wide by 4 mm long.

The Micro-ATR Attachment is precision-made and ruggedly constructed so that adjustments are constant over long periods of time — permitting excellent reproducibility. The use of special condensing mirrors results in a 3 to 1 image reduction and little loss in total energy. The Micro-ATR sampling approach greatly simplifies the problem of contacting a sample to a reflecting surface, because contact is required only over a very small area. The Micro-ATR Attachment can be installed quickly on most infrared spectrophotometers. If this piece of equipment is of interest to you, we will be glad to send you additional information.



Ask to be placed on the mailing list
for the CIC Newsletter.



CONNECTICUT INSTRUMENT COMPANY

DIVISION OF BARNES ENGINEERING COMPANY
WILTON, CONNECTICUT, U. S. A.

Telephone: Area Code 203, Porter 2-5545