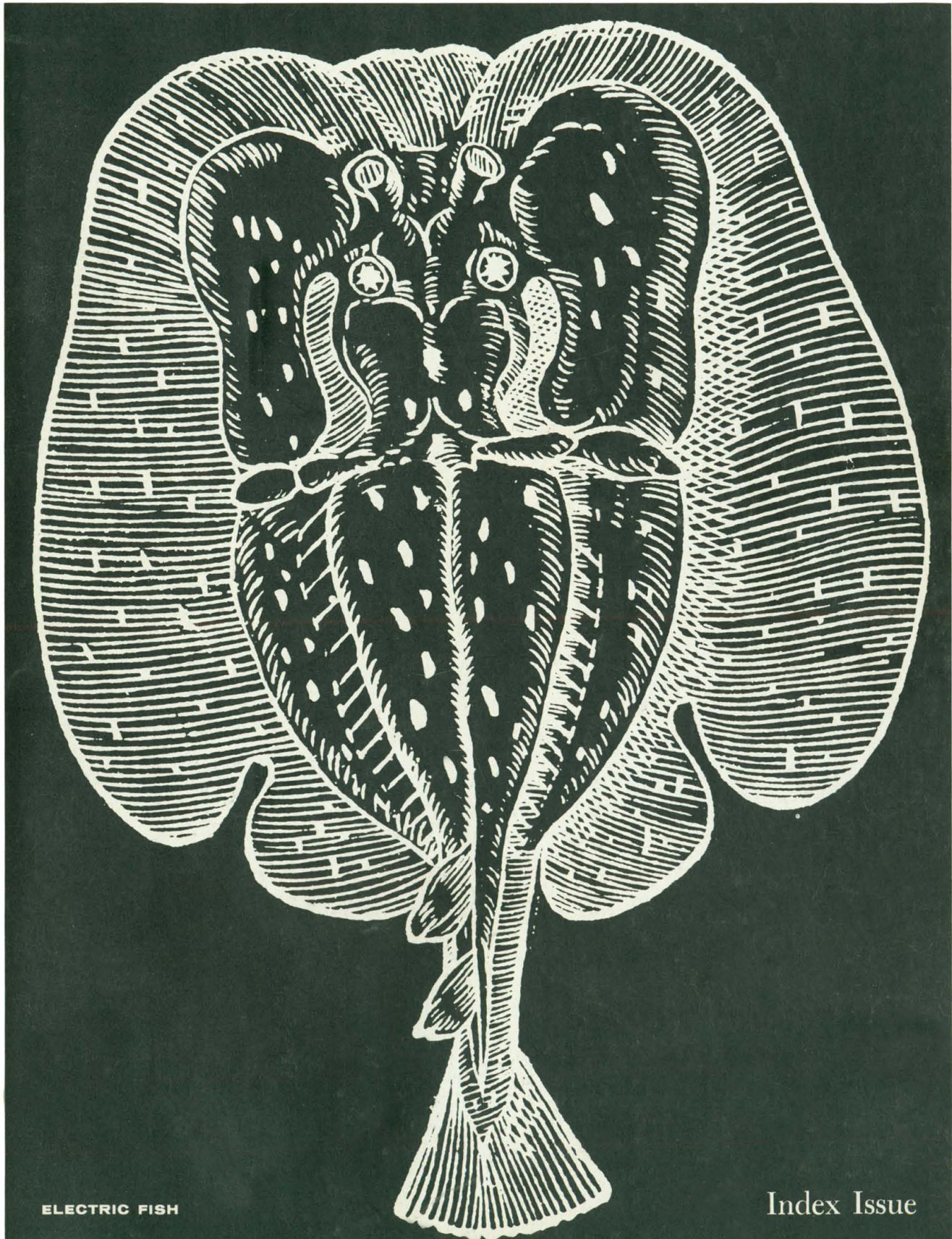


SCIENCE

29 September 1967

Vol. 157, No. 3796

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



ELECTRIC FISH

Index Issue

Quartz gets an infrared high Q test

Crystal oscillators of varied frequencies are used at every turn in the Bell telephone network. So Western Electric builds them by the thousands. The quartz that we use for most of these oscillators we grow artificially. Therein lay a problem.

There are some basic differences between natural and synthetic quartz. One of them is "Mechanical Q," a number which tells just how much internal resistance will be met when a given piece of quartz is set to oscillating. High Q means low resistance, and vice versa. For high

frequency oscillators we need high Q; for lower frequencies we're content with lower Q. But the Q of cultured quartz varies widely, even within a single slice.

Western Electric engineers found that quartz crystals will absorb infrared light in an amount directly related to the Q value. They first recorded the infrared absorption of different types of quartz, and of slices of different thicknesses. Then they determined Q by conventional means in custom-built oscillators. From this data they drew charts that let technicians determine Q directly

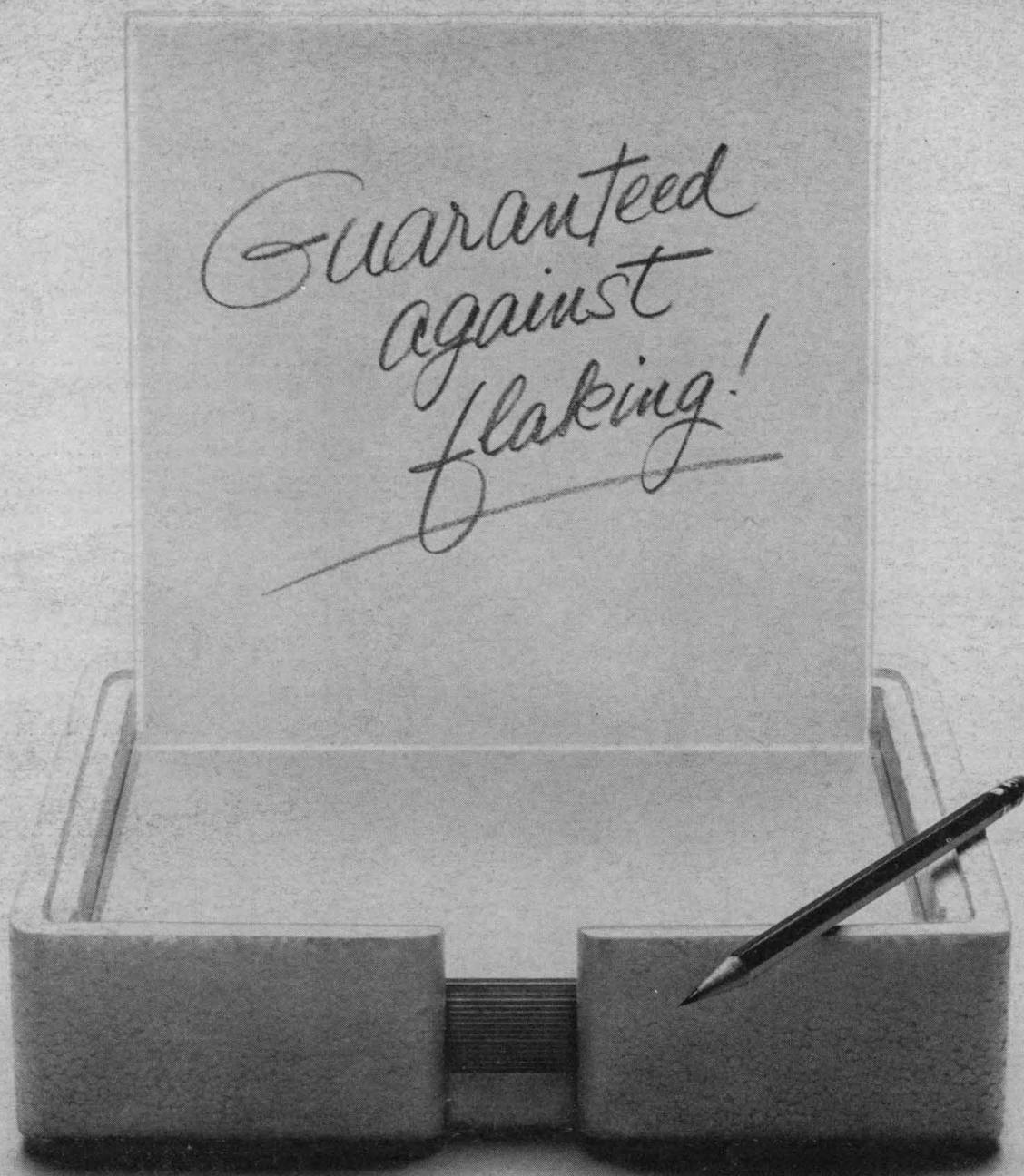
from spectrophotometer readings . . . in minutes. Now we know whether a given quartz crystal will make a good oscillator early in the manufacturing process.

Western Electric is one of the world's largest users of quartz. And the leading manufacturer of cultured quartz. The time and expense we save now building frequency oscillators helps the Bell System continue to bring you dependable telephone service at low cost.



Western Electric
MANUFACTURING & SUPPLY UNIT OF THE BELL SYSTEM





We can put that in writing, right on our TLC plates.

Most pre-coated thin-layer chromatography plates are so loose and powdery that just the slightest touch will remove their coating. That's most definitely not the case with E. Merck (Darmstadt) pre-coated plates for TLC.

Their coating is completely smooth, homogenous, and truly abrasion-resistant. They never flake or scratch. You can even write on them (as we have done above) without disturbing the coating. That's why they can be packed and shipped directly on top of each other in compact, convenient polystyrene containers. And if any TLC plate reaches you in less-than-perfect condition, we'll replace it, unconditionally.

The unique organic binder in E. Merck (Darmstadt)

Analytical and Preparative plates permits the use of all conventional spray reagents, strong polar solvents, stains and charring techniques. They are available with aluminum oxide, cellulose powder and silica coatings, with or without fluorescent indicators, in sizes ranging from 5x10 cm. to 20x20 cm. Prices are the lowest of any pre-coated system currently offered. May we send you a free sample and more information?

Just write: TLC Division, Brinkmann Instruments, Cantiague Road, Westbury, New York 11590.



**E. MERCK, DARMSTADT, DIVISION
BRINKMANN INSTRUMENTS**

29 September 1967

Vol. 157, No. 3796

SCIENCE

LETTERS	Aldabra: An Expensive Folly: <i>W. R. P. Bourne</i> ; Stanford: Student Organizations: <i>D. Kennedy</i> ; Inequities of a Draft Lottery: <i>J. D. Alden</i> ; Further Detractions of Smoking: <i>M. Fry</i> ; Project Hindsight: <i>L. Leiserson</i>	1511
EDITORIAL	The Need for Selective Service Policy	1515
ARTICLES	Relativistic Astrophysics: <i>S. P. Maran</i> and <i>A. G. W. Cameron</i>	1517
	Hydroxylation-Induced Migration: The NIH Shift: <i>G. Guroff</i> et al.	1524
	Graduate Student Stipends: <i>W. R. Gruner</i>	1530
NEWS AND COMMENT	Scientists and Engineers for Johnson: Three Years Later	1533
	The Smale Case: The Furor Continues	1536
	Privacy: How Much Need You Tell a Visiting Federal Investigator?	1539
	The "Columbia" Filter: University Takes a Second Look	1541
BOOK REVIEWS	<i>Mind: An Essay on Human Feeling</i> , reviewed by <i>R. B. MacLeod</i> ; other reviews by <i>J. L. Hirshfield</i> , <i>A. Rapoport</i> , <i>C. Rosenberg</i> , <i>E. Bell</i> , <i>G. E. Bohart</i> , <i>R. D. Cadle</i> ..	1543
REPORTS	Meander Wavelength of Alluvial Rivers: <i>S. A. Schumm</i>	1549
	Mercury: Observations of the 3.4-Millimeter Radio Emission: <i>E. E. Epstein</i> et al.	1550
	Knoll and Sediment Drift near Hudson Canyon: <i>A. Lowrie, Jr.</i> , and <i>B. C. Heezen</i> ..	1552
	Secondary Calcification in the Foraminiferal Genus <i>Globorotalia</i> : <i>W. N. Orr</i>	1554
	Isotopic Analysis of Rare Gases with a Laser Microprobe: <i>G. H. Megrue</i>	1555
	Indoleacetic Acid Oxidase Activity of Apoperoxidase: <i>B. Z. Siegel</i> and <i>A. W. Galston</i> ..	1557
	Phosphorylative Inactivation of Aminoglycosidic Antibiotics by <i>Escherichia coli</i> Carrying R Factor: <i>H. Umezawa</i> et al.	1559

BOARD OF DIRECTORS	ALFRED S. ROMER Retiring President, Chairman	DON K. PRICE President	WALTER ORR ROBERTS President-Elect	BARRY COMMONER DAVID R. GODDARD	HUDSON HOAGLAND GERALD HOLTON
VICE PRESIDENTS AND SECTION SECRETARIES	MATHEMATICS (A) A. M. Gleason Wallace Givens	PHYSICS (B) W. W. Havens, Jr. Stanley S. Ballard	CHEMISTRY (C) Herman F. Mark Milton Orchin	ASTRONOMY (D) John S. Hall Frank Bradshaw Wood	
	ANTHROPOLOGY (H) Cora Du Bois Anthony Leeds	PSYCHOLOGY (I) Leo J. Postman Frank W. Finger	SOCIAL AND ECONOMIC SCIENCES (K) David Truman Eugene B. Skolnikoff	HISTORY AND PHILOSOPHY OF SCIENCE (L) Peter J. Caws	
	PHARMACEUTICAL SCIENCES (Np) Curtis Waldon Joseph P. Buckley	AGRICULTURE (O) Richard Ceyer Ned D. Bayley	INDUSTRIAL SCIENCE (P) Allen V. Astin Burton V. Dean	EDUCATION (Q) Herbert A. Smith Frederic B. Dutton	
DIVISIONS	ALASKA DIVISION Peter Morrison President	Eleanor Viereck Executive Secretary	PACIFIC DIVISION Adolph Hecht President	ROBERT C. MILLER Secretary	SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION Harold E. Dregne President Marlowe G. Anderson Executive Secretary
SCIENCE is published weekly on Friday and on the fourth Tuesday in November by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW Washington, D.C. 20005. Now combined with The Scientific Monthly®. Second-class postage paid at Washington, D.C. Copyright © 1967 by the American Association for the Advancement of Science. Annual subscriptions \$8.50; foreign postage, \$1.50; Canadian postage, 75¢; single copies, 50¢ (back issues, \$1), except Guide to Scientific Instruments, which is \$2. School year subscriptions: 9 months, \$7; 10 months, \$7.50. Provide 4 weeks' notice for change of address, giving new and old address and zip codes. Send a recent address label. SCIENCE is indexed in the Reader's Guide to Periodical Literature.					

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

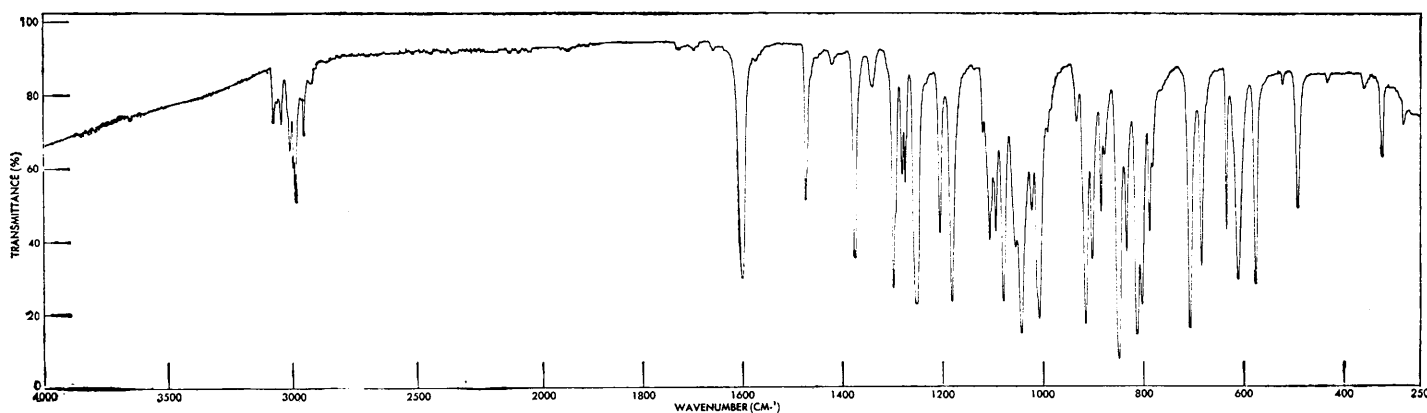
Antibody-Producing Cells in Division: <i>A. J. Claflin and O. Smithies</i>	1561
Circadian Rhythms of Liver Enzymes and Their Relationship to Enzyme Induction: <i>M. Civen et al.</i>	1563
Gynogenesis and Triploidy in the Viviparous Fish <i>Poeciliopsis</i> : <i>R. J. Schultz</i>	1564
Delayed Hypersensitivity in Man: A Correlate in vitro and Transfer by an RNA Extract: <i>D. E. Thor</i>	1567
Mitochondrial Malate Dehydrogenase: A New Genetic Polymorphism in Man: <i>R. G. Davidson and J. A. Cortner</i>	1569
Chemical Bonding Information from Photoelectron Spectroscopy: <i>C. S. Fadley et al.</i>	1571
Strain of Mycoplasma Associated with Human Reproductive Failure: <i>R. B. Kundsinn,</i> <i>S. G. Driscoll, P.-M. L. Ming</i>	1573
Anatomical Connections between Medial and Lateral Regions of the Hypothalamus Concerned with Food Intake: <i>E. A. Arees and J. Mayer</i>	1574
Anomeric Bond-Character in the Pyranose Sugars: <i>H. M. Berman, S. S. C. Chu,</i> <i>G. A. Jeffrey</i>	1576
Erythrocyte Abnormality in Human Myopathy: <i>H. D. Brown, S. K. Chattopadhyay,</i> <i>A. B. Patel</i>	1577
Electrical Phenomena Associated with the Activity of the Membrane-Bound Acetylcholinesterase: <i>T. Podleski and J. P. Changeux</i>	1579
Hemoglobin Gun Hill: Deletion of Five Amino Acid Residues and Impaired Heme-Globin Binding: <i>T. B. Bradley, Jr., R. C. Wohl, R. F. Rieder</i>	1581
Foundress Associations in Polistine Wasps: Dominance Hierarchies and the Evolution of Social Behavior: <i>M. J. West</i>	1584
Autonomic Basis for the Rise in Brain Temperature during Paradoxical Sleep: <i>M. A. Baker and J. N. Hayward</i>	1586
Discharge of Frontal Eye Field Neurons during Eye Movements in Unanesthetized Monkeys: <i>E. Bizzi</i>	1588
<i>Technical Comments:</i> Maternal Behavior in Males of Various Species: <i>F. A. Beach;</i> Tyrosine Transaminase Induced by Cycloheximide: <i>S. Fiata and E. S. Fiata;</i> <i>C. Mavrides and E. A. Lane</i>	1591
ASSOCIATION AFFAIRS Terrestrial Adaptations of Crustacea: <i>D. E. Bliss and L. H. Mantel</i>	1592
Election of AAAS Officers	1594

MINA S. REES ATHELSTAN F. SPILHAUS	H. BURR STEINBACH JOHN A. WHEELER	PAUL E. KLOPSTEG Treasurer	DAEL WOLFLE Executive Officer
GEOLOGY AND GEOGRAPHY (E) Louis Quam Richard H. Mahard	ZOOLOGICAL SCIENCES (F) Colin S. Pittendrigh David E. Davis	BOTANICAL SCIENCES (G) William C. Steere Warren H. Wagner	
ENGINEERING (M) Paul Rosenberg Newman A. Hall	MEDICAL SCIENCES (N) Julius H. Comroe Robert E. Olson	DENTISTRY (Nd) Lester R. Cahn Richard S. Manly	
INFORMATION AND COMMUNICATION (T) Phyllis V. Parkins Ileen H. Stewart		STATISTICS (U) George E. P. Box Rosedith Sitgreaves	

COVER

Sixteenth-century etching of an electric fish (*Torpedo marmorata* Risso). Electric organs appear as a pair of large lobes on both sides of the head. The elementary electrogenic unit, or electroplax, is well suited for studying electrical and chemical properties of excitable membranes. See page 1579. [Rondelet Guillaume (1507-1566), *Libri de piscibus marinis, in quibus verae piscium effigies expressae sunt* . . . Lugduni 1554-1555.]

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.



This scan of the insecticide Dieldrin demonstrates the Model 457's ability to provide complete, uninterrupted scans from 4000 to 250 cm^{-1} without energy fall-off. Note the well-resolved sharp band at 280 cm^{-1} . The instrument was

run at normal slit program; speed was normal from 4000 to 600 cm^{-1} , slow from 600 to 250 cm^{-1} . 2.5 mg of sample were prepared in 300 mg of KBr and run as a 13 mm disk against a 13 mm KBr blank in the reference beam.

4000 to 250 cm^{-1}

The new Perkin-Elmer Model 457 Infra-red Spectrophotometer combines an unusually wide scanning range with fea-

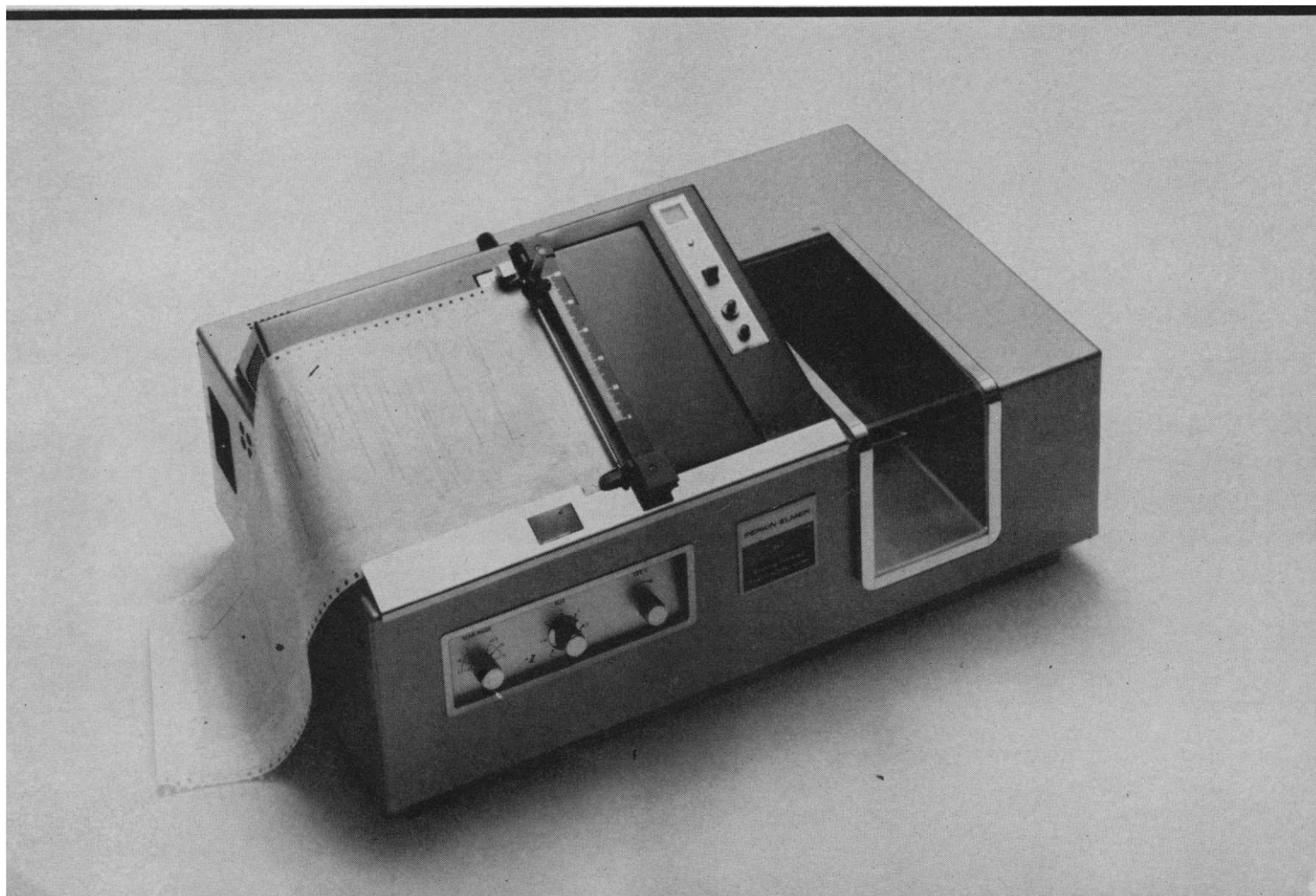
tures that make your work easier and faster. This moderately-priced instrument handles more problems

- with fully automatic scan from 4000 to 250 cm^{-1} —the widest range in its price class
- in a more convenient manner
- continuous, flow-chart linear presentation, providing a full scan, with no gaps or overlaps, on a single chart
- plus push-button operation

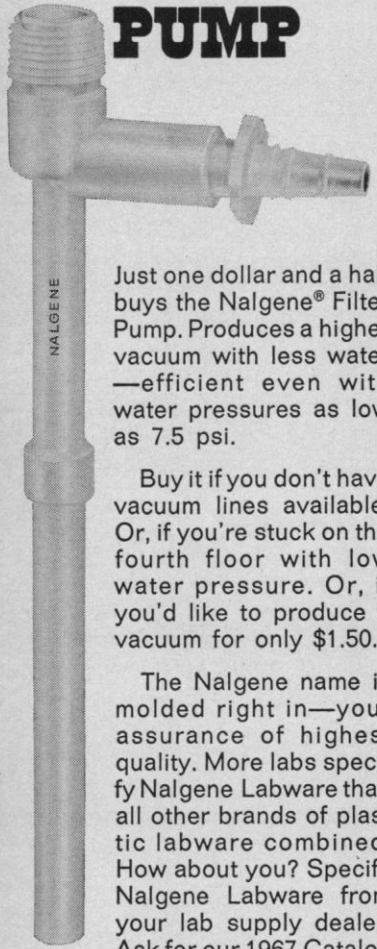
with a choice of conditions

- three scanning speeds
 - resolution of 1 cm^{-1} at 1000 cm^{-1}
 - seven variable slit programs and plenty of help in arriving at the accurate answer.
- For complete information, write Instrument Division, Perkin-Elmer Corporation, 723 Main Avenue, Norwalk, Conn. 06852, or your nearest Perkin-Elmer sales office.

PERKIN-ELMER



WORLD'S ONLY
\$1.50
VACUUM PUMP



Just one dollar and a half buys the Nalgene® Filter Pump. Produces a higher vacuum with less water—efficient even with water pressures as low as 7.5 psi.

Buy it if you don't have vacuum lines available. Or, if you're stuck on the fourth floor with low water pressure. Or, if you'd like to produce a vacuum for only \$1.50.

The Nalgene name is molded right in—your assurance of highest quality. More labs specify Nalgene Labware than all other brands of plastic labware combined. How about you? Specify Nalgene Labware from your lab supply dealer. Ask for our 1967 Catalog or write Dept. 21091, Nalgene Labware Division, Rochester, N.Y. 14602.

SPECIFY NALGENE LABWARE

NALGE
 RITTER-PAUDEL CORPORATION

cigar is a Smoke" ("The Betrothed").

When cigarettes were first introduced they were regarded as very effeminate—in fact "fag" is an early slang term for cigarette. Real he-men preferred the weed in more rugged form. Thus cigarette manufacturers have felt an urgent need to create and maintain an image of virility.

Perhaps the Surgeon General would get better results from his campaign against smoking if he were to emphasize the anaphrodisiac, rather than the carcinogenic, effects of the habit!

MACON FRY

1626 Mount Eagle Place,
 Alexandria, Virginia 22302

Reference

1. R. Magnus, "Nicotiana, Nicotin," *Real Encyclopädie der Gesamten Heilkunde*, vol. 10, ed. 4 (1911), p. 651.

Project Hindsight

The commentaries on Project Hindsight (18 Nov. 1966, p. 872; 2 Dec. 1966, p. 1123; 23 June, p. 1571) are a valuable contribution to the discussion of "directed" and "undirected" research. In the advocacy of basic versus applied research, or science versus invention and engineering, the proponents of any one segment of the continuum of research, development, testing, and engineering are in competition for funds, and usually are also expressing managerial preferences. What is so disheartening in this continuing controversy is the popular assumption that the end product of *all* scientific and productive efforts are measurable in terms of an "end item—a piece of equipment, a process, or an operational procedure" (1). The profitability of transportation systems can be compared very effectively by using numbers, mileage, tonnage, and dollars. However, no matter how effectively funds are spent for prevention of pollution, or a more healthy environment, it is not possible to present comparable figures. The benefits from prevention of sickness, the prevention of wars, the cost of "undirected" science can be measured, but not in terms of technology—medicines, military hardware, or scientific instrumentation. Quite the contrary, the less medicine, military and scientific hardware or money you have to use, the more effective the campaign.

It is self-evident that the systems studied in Project Hindsight, Polaris,

Minuteman, Lance TBM, radar, navigation aids, nuclear warheads, and so on resulted or benefited greatly from the advances of "undirected" science. Credits simply have not been given to preceding concepts and ideas. In a subsequent report, one may anticipate that the military applications of masers and lasers will be attributed to teams of weapon systems engineers, although these truly revolutionary tools, offering order of magnitude differences in ways of doing things, received generous and "undirected" Department of Defense support.

Sherwin and Isenson find that "Despite the very applied nature of the work leading to the innovations, 5 or 10 years often elapsed before an Event was used" (1, p. 1575). They apparently had the layman's misconception that research ideas are quickly transformed into consumer goods or weapon systems. Historically, it often takes many years to make new things practical: witness the airplane or Goddard's rockets

There are two very good reasons to include fundamental research in mission-oriented programs. The first is that such research attracts many outstanding scientists and young investigators to important problem areas. Second, for practical agencies to be receptive to new concepts, approaches and solutions to problems and thereby speed innovation, there have to be people within the agencies who are aware and eager to translate and introduce new ways of doing things to the technologist who may argue against risk and that present solutions are good enough. There is the real question of how one measures the productivity of "undirected" research programs aside from the publication of new knowledge. Perhaps productivity can also be judged by the rate at which technological innovations are incorporated into practice with resulting social improvement. From this standpoint, the shorter time period now between the attainment of new knowledge and its use in many fields, including new systems for which no conceivable requirement existed even 10 years ago (that "scientific toy" satellite), indicates that emphasis on basic research has been healthy.

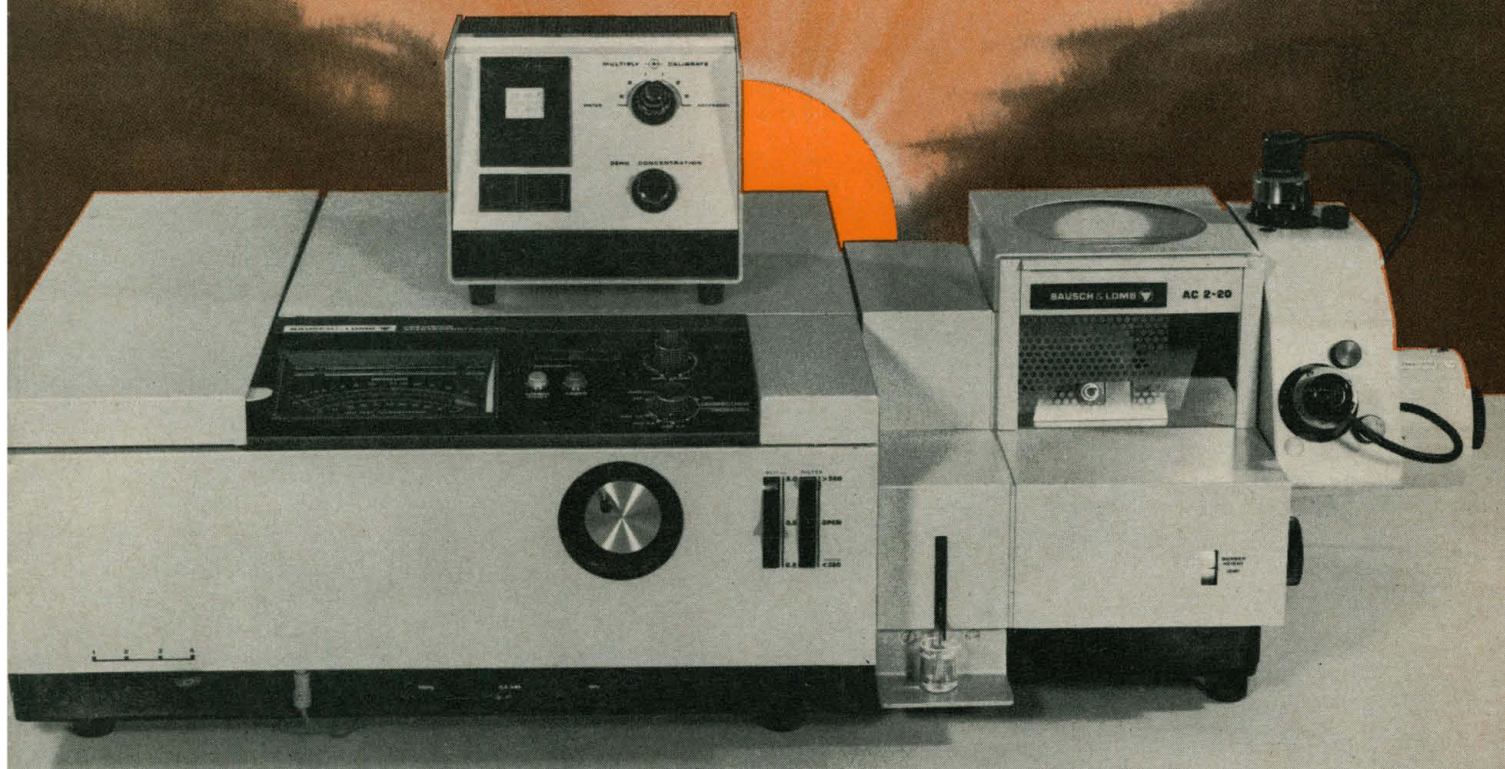
LEE LEISERSON

4307 Ambler Drive,
 Kensington, Maryland 20795

Reference

1. C. W. Sherwin and R. S. Isenson, *Science* 156, 1571 (1967).

ATOMIC ABSORPTION '68



YOUR WAIT

enabled Bausch & Lomb to bring you the most advanced atomic absorption system on the market today. It combines safety, versatility, operational convenience and reliability with superior sensitivity and exceptional performance. Here are just 16 of the reasons why the new AC2-20 Atomic Absorption Spectrophotometer is the best and most contemporary unit available:

For reliability you can really count on . . .

- Use of the finest, high dispersion monochromator with two 1200 lines/mm "Certified-Precision" gratings of highest quality provides superior, linear dispersion; eliminates adjacent interference lines.
- a-c source and detection system (133 Hz) ignores unwanted flame emission, avoids equipment interference and stray light.
- Single pass system utilizes region of highest free atom density where greatest absorbance and homogeneity exist; higher signal-to-noise ratio, too.
- Built-in scale expansion up to 10X.

For unmatched operator convenience . . .

- Three-lamp system with indicator pilot lights, lamp identification, remote switching, easy centering, focusing and interchange.
- Slits and filters easily selected.
- Flowmeters for both fuel and support gas permit reading over entire range, simplify repeatability of settings.
- Direct reading of sample . . . no nulling required.

For maximum safety in atomic absorption


- No flashback in routine operation . . . virtually no danger from burns.
- Designed *from the start* for use with nitrous oxide, and other new gases.
- Teflon* and high-grade stainless steel used throughout.
- Can be ducted to remove toxic fumes and vapors.
- Remote piezoelectric burner ignition.

For outstanding versatility and flexibility . . .

- Instant lamphouse interchange—standard for use of 3 hollow cathode lamps or single lamphouse for 2" lamps.
- 3-in-1 capability: flame emission, UV-visible and atomic absorption spectrophotometer.
- Can be combined with B&L Concentration Computer and many other readout devices.

. . . And many more features. Send for full specifications and description in our Folder 33-2233. Bausch & Lomb, 87845 Bausch St., Rochester, New York 14602.

*Registered trademark for DuPont Fluorocarbon Resins

BAUSCH & LOMB 

ANALYTICAL SYSTEMS DIVISION

ADVANCING ELECTRONIC/OPTICAL
INSTRUMENTATION

This is the revolutionary micropipet with an unbelievably accurate tip and a completely automatic top.

Take the new Eppendorf automatic micropipet in hand and be prepared to have your pipetting habits changed...radically.

For example, you won't have to wash or wipe pipets anymore, or worry about contamination or liquids in your mouth. The Eppendorf holds liquid in disposable plastic tips that are instantly interchangeable and completely separate from the pipet mechanism.

You'll also have to unlearn living with significant pipet error. Unlike glass or ordinary plastic pipet tips which always retain a significant liquid film on their inner surface, the Eppendorf polypropylene tips assure virtually complete sample recovery—over 99% with aqueous solutions, 97% with serum. And look at this precision: at 5 μ l, standard deviation is under 0.04 μ l, or less than 1%.

But the easiest thing to get used to with the new Eppendorf is the ease and speed of pipetting. Just press the button on top to fill. To empty, press again. That's all. Blowout of the entire sample is automatic and complete.

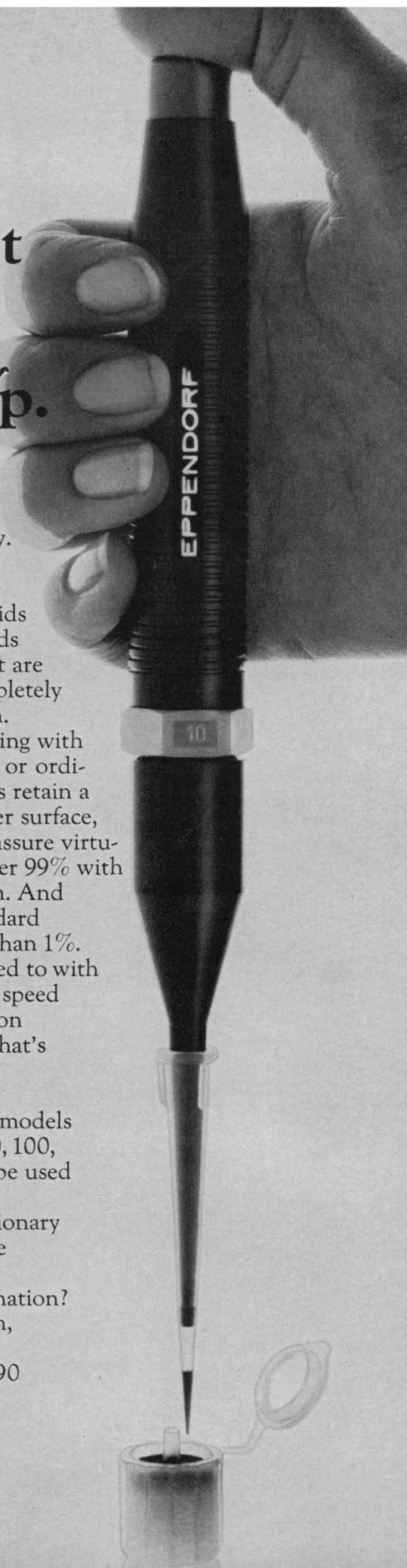
The Eppendorf is available in models dispensing volumes of 5, 10, 20, 50, 100, 200, 500 and 1,000 μ l. It can even be used with acids and organic solvents.

Once you've tried the revolutionary Eppendorf, you'll never want to use conventional micropipets again.

May we send you more information?

Just write: Eppendorf Division,
Brinkmann Instruments, Inc.,
Cantiague Rd., Westbury, N.Y. 11590

Eppendorf®
MICROPIPETS



AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Editorial Board

ROBERT L. BOWMAN	EVERETT I. MENDELSON
JOSEPH W. CHAMBERLAIN	NEAL E. MILLER
JOHN T. EDSALL	JOHN R. PIERCE
EMIL HAURY	KENNETH S. PITZER
ALEXANDER HOLLAENDER	ALEXANDER RICH
WILLARD F. LIBBY	DEWITT STETTIN, JR.
GORDON J. F. MACDONALD	CLARENCE M. ZENER

Editorial Staff

Editor

PHILIP H. ABELSON

Publisher

DAEL WOLFLE

Business Manager

HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

Assistant Editors: ELLEN E. MURPHY, JOHN E. RINGLE

Assistant to the Editor: NANCY TEIMOURIAN

News Editor: DANIEL S. GREENBERG

News and Comment: Staff writers: JOHN WALSH*, ELINOR LANGER, LUTHER J. CARTER, BRYCE NELSON, ROBERT J. SAMUELSON, KATHLEEN SPERRY, GILLIAN PARRILLO. Contributing correspondents: NIGEL CALDER, VICTOR K. McELHENY

Book Reviews: SYLVIA EBERHART

Editorial Assistants: JOANNE BELK, ISABELLA BOULDIN, ELEANORE BUTZ, BEN CARLIN, GRACEY FINGER, NANCY HAMILTON, OLIVER HEATWOLE, ANNE HOLDSWORTH, KONSLYNNIETTA HUTCHINSON, ELEANOR JOHNSON, PAULA LECKY, KATHERINE LIVINGSTON, HELEN OLNEY, LEAH RYAN, BARBARA SHEFFER

*European Office: Lime Tree Farm, East Hagbourne, Berkshire, England, Telephone Didcot 3317

Advertising Staff

Director

EARL J. SCHERAGO

Production Manager

ROSE MARIE ROMAGNOLO

Advertising Sales Manager: RICHARD L. CHARLES

Sales: New York, N.Y., 11 W. 42 St. (212-PE-6-1858): ROBERT S. BUGBER

Scotch Plains, N.J., 12 Unami Lane (201-889-4873): C. RICHARD CALLIS

Medfield, Mass. 02052, 4 Rolling Lane (617-359-2370): RICHARD M. EZEQUELLE

Chicago, Ill. 60611, 919 N. Michigan Ave., Room 426 (312-DE-7-4973): HERBERT L. BURKLUND

Los Angeles 45, Calif., 8255 Beverly Blvd. (213-653-9817): WINN NANCE

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

The Need for Selective Service Policy

Unless the current disagreements on basic policy and operational procedures of the Selective Service System are resolved soon, 1968 will bring serious difficulties for the Army, for universities, and for graduate students.

The basic policy of the Selective Service System has been to allocate men where they could serve best. Thus some men have been drafted (or allowed to volunteer when draft seemed imminent); others have been deferred because they were engaged in critical occupations; and still others have been deferred because they would be of greater military or civilian value after further training or education. The system sometimes worked quite imperfectly, but its intent was clear: young men were to be used where they could best serve the national interest. An advisory panel appointed by the House Committee on Armed Services recommended a number of specific changes but advocated continuation of this basic policy.

Another commission, appointed by the President, proposed that equality of risk for military duty, regardless of wealth, color, status, or ability, become the fundamental policy. Accordingly, it recommended abolition of most deferments and use of a lottery to select from among 19- and 20-year-olds.

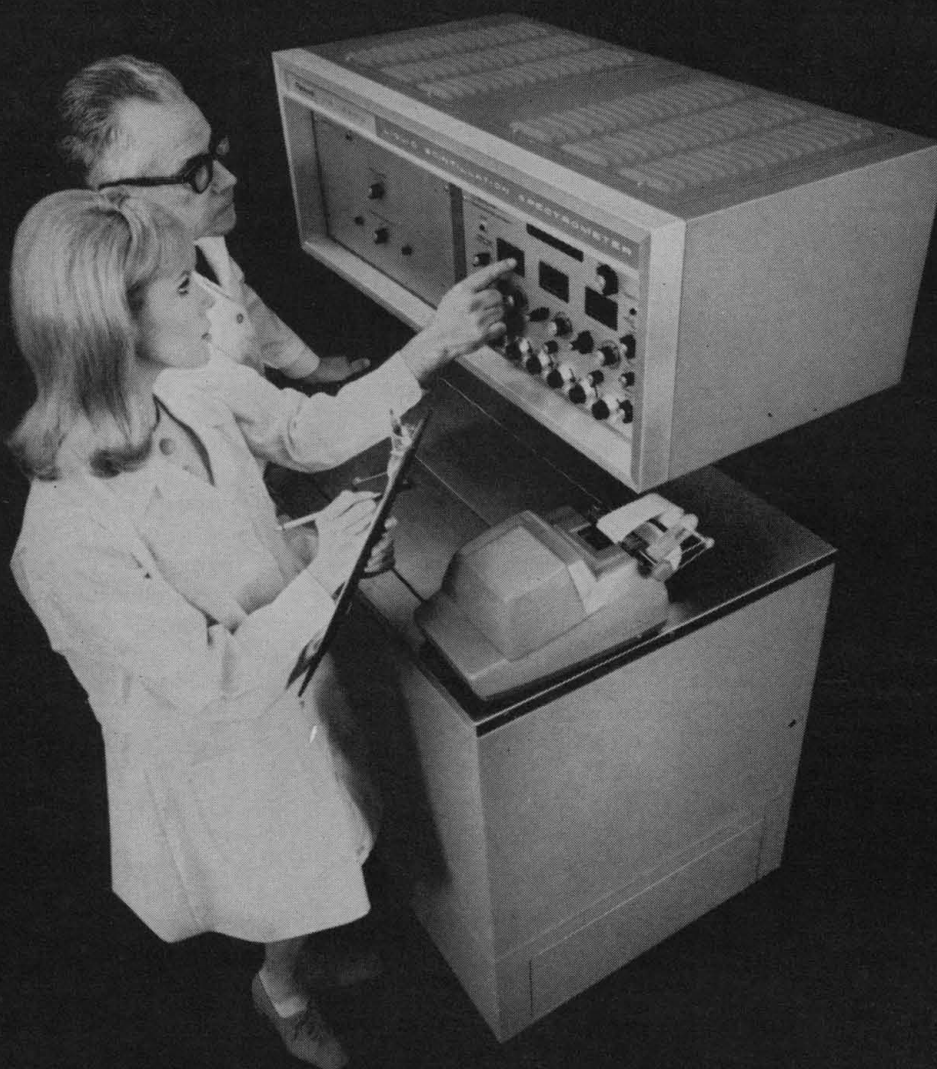
Congress did not accept the recommendations of the President and his advisory commission, but did make some changes. Undergraduate deferments will be easy to secure, but the student will pay a high price in later and long-continued draft liability. Graduate-student deferments will probably be substantially curtailed. The practice of drafting the oldest eligible men first may be reversed, so that younger ones will be called first. The President is still expected to submit plans for a lottery to replace selection through the discretion of the draft boards.

Depending on what agreements are reached next year, the services may, in the years beyond 1968, either (i) continue to induct a majority of young men and a minority of more mature and better educated ones, or (ii) secure only 19- and 20-year-olds from the Selective Service System and develop other means of finding the necessary number of junior officers, medical and health specialists, and men for other technical specialties. (The President's commission recognized that their proposal might require double jeopardy or double service for some men, at age 19 to 20 and again after college.)

However these questions may be answered for the future, the immediate problem is what to do about the summer of 1968. According to existing regulations, college graduates of next June and students who entered graduate school this fall will go into the draft-eligible pool in June. Under the existing practice of calling the oldest eligible men first, the services would suddenly get a group of men who are older than they want and better educated than any group they have ever had. Graduate students and prospective graduate students obviously want to know whether this is in fact to be the situation. Younger men of draft age are also concerned, for they want to be able to estimate their prospects. The colleges and universities must know what the policies will be if they are to plan in any sensible fashion on the size of graduate enrollments in the fall of 1968. The armed services also need to have decisions made so they can make their plans.

The time for deciding what should be done is limited. The President is not expected to submit new recommendations before Congress reconvenes in January. Quick decisions will then be necessary if those concerned are to have reasonable time for planning. Only the next 3 or 4 months are available for thoughtful consideration of what the new rules ought to be. —DAEL WOLFLE

New, Low-Price Model 3310 Tri-Carb[®] Liquid Scintillation Spectrometer

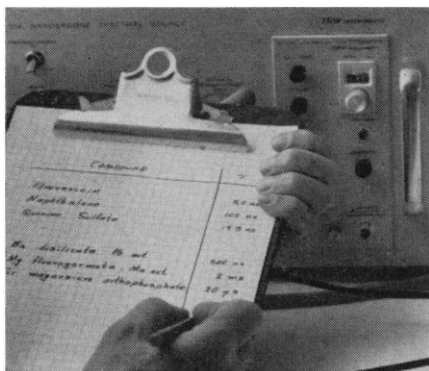


- 200 Samples ■ Controlled Temperature ■ 3 Channels (Simultaneous)
- Automatic External Standardization ■ Background Subtraction
- Optional Gamma Counting, Continuous Flow and Data Processing
- High Figure of Merit (E^2/B) ■ Proven Performance and Reliability
- Prices starting at \$8950.00

For more information ask your Packard Sales Engineer for Bulletin 1057U, or write to Packard Instrument Company, Inc., 2200 Warrenville Road, Downers Grove, Illinois 60515, or Packard Instrument International S.A., 8001 Zurich, Switzerland.

Packard

Want current fluorometric data in a cumulative handbook?



If you do, we'll be glad to put your name on our distribution list to get the following information as we publish it:

- data sheets on decay times
- application notes
- instrumentation techniques
- digests of pertinent papers

Direct decay time measurements of fluorescent properties, only calculated by older methods, are being generated by TRW Nanosecond Spectral Source System users in physical, chemical, biological, and medical labs and by our applications research staff. This material is yours for the asking, pre-punched to fit an attractive 6 x 9 stiff binder. Clip the coupon below and mail it to us.

TRW INSTRUMENTS

139 Illinois Street, Dept. S-967
El Segundo, California 90245
(213) 535-0854



() I want to be on your mailing list to receive fluorometric data at no charge.

() I enclose \$1.75 for the fluorometric data binder.

Name _____
Title _____
Co./University _____
Dept. _____
Address _____
City _____
State _____
Zip _____

TRW

1958-63; lecturer in political science, Massachusetts Institute of Technology, 1963-66, associate professor, in charge of Science and Public Policy Program, 1966-; visiting lecturer, Fletcher School of Law and Diplomacy, Tufts University, 1965-; Research Advisory Committee, Agency for International Development, 1963-67; consultant, Department of State, 1963-, Agency for International Development, 1963-67, Office of Science and Technology, 1963-, Ford Foundation, 1964-66, Organization for Economic Cooperation and Development, 1965-66, Institute for Defense Analyses, 1966; secretary, Study Group on Science and the National Interest, Council of Foreign Relations, 1965-; Pugwash Committee on Science and Economic Development, 1966-; professional engineer (District of Columbia), 1956-; patent: hybrid circuits, 1950; author of *Science, Technology and American Foreign Policy*, 1967.

AAAS activities: secretary, Section on Social and Economic Sciences (K), 1966-; Council, 1966-; AAAS Sociological Prize Committee, 1966-.

Edward Wenk, Jr.

Edward Wenk, Jr., 47 (mechanics), ship structural designer, Boston Navy Shipyard, 1941-42; supervisor, Turret Test Section, David Taylor Model Basin, U.S. Navy Department, 1942-45, superintendent, Structural Dynamics Section, 1945-48, Submarine Structural Branch, 1948-50, head, Structural Division, 1950-56; chairman, Department of Engineering Mechanics, Southwest Research Institute, 1956-59; senior specialist in science and technology, Legislative Reference Service, Library of Congress, 1959-61; technical assistant to the President's Science Adviser, 1961; executive secretary, Federal Council for Science and Technology, Office of Science and Technology, 1962-64; head, Science Policy Research Division, Legislative Reference Service, and special adviser to the Librarian in science and engineering, Library of Congress, 1964-66; executive secretary, National Council on Marine Resources and Engineering Development, 1966-; consultant, British Admiralty, Swedish Government; Executive Committee, Mechanics Division, American Society of Civil Engineers; Welding Research Council: Executive Board, Pressure Vessel Research Committee, and chairman, Design Division, 1953-59; consultant, Committee on Undersea Warfare, Na-



Edward Wenk, Jr.

tional Academy of Sciences, 1957-58; Society for Experimental Stress Analysis: president, 1957-58, Murray lecturer, 1966; Sigma Xi national lecturer, 1966; reviewing editor, *Experimental Mechanics* and *Engineering Mechanics Journal*; author of *A Guide for the Analysis of Ship Structures* (with others), 1959; Meritorious Civilian Service Award, U.S. Navy, 1946. *AAAS activities:* Council, 1966-.

Calendar of Events—October

National Meetings

1-4. **Neurosurgical Soc. of America**, New York, N.Y. (C. H. Davis, Jr., Bowman Gray School of Medicine, Winston-Salem, N.C. 27103)

1-4. **Society of Petroleum Engineers**, Houston, Tex. (J. B. Alford, 6200 North Central Expressway, Dallas, Tex. 75206)

2-4. **Stochastic Optimization and Control Procedures**, mtg., Madison, Wis. (H. F. Karreman, Mathematics Research Center, Univ. of Wisconsin, Madison)

2-5. **American Petroleum Inst., Div. of Refining**, fall mtg., Dallas, Tex. (API, 1271 Avenue of the Americas, New York 10020)

2-5. **American Soc. of Photogrammetry/Cong. on Surveying and Mapping**, conv., St. Louis, Mo. (C. E. Palmer, 105 N. Virginia Ave., Falls Church, Va. 22046)

2-5. **Research Equipment and Instrument Symp.**, 17th annual, Bethesda, Md. (J. B. Davis, Chief, SMB, NIH, Bldg. 12A, Room 4003, Bethesda 20014)

2-6. **American College of Surgeons**, Chicago, Ill. (J. P. North, 55 Erie St., Chicago 60611)

2-6. **Animal Care Panel**, 18th annual, Washington, D.C. (J. J. Garvey, Box 1028, Joliet, Ill. 60434)

2-6. **National Aeronautic and Space**

Engineering and Manufacturing mtg., Los Angeles, Calif. (W. I. Marble, SAE, 485 Lexington Ave., New York 10017)

4-6. **Nuclear Metallurgy** Conf., Phoenix, Ariz. (K. E. Horton, Fuels and Materials Branch, Div. of Reactor Development and Technology, U.S. Atomic Energy Commission, Washington, D.C. 20545)

5-7. **American Ceramic Soc.**, Bedford, Pa. (ACS, 4055 N. High St., Columbus, Ohio 43214)

8-13. **Electrochemical Soc.**, fall mtg., Chicago, Ill. (E. G. Enck, 30 E. 42 St., New York 10017)

8-13. **Water Pollution Control** Federation, 40th annual conf., New York, N.Y. (R. E. Fuhrman, 3900 Wisconsin Ave., NW, Washington, D.C. 20016)

9-11. **Single-Cell Protein** Conf., Cambridge, Mass. (c/o Room 16-325 Massachusetts Inst. of Technology, Cambridge 02139)

9-11. **Society of Aerospace Material and Process Engineers**, 12th natl. symp., Orange County, Calif. (R. O. Burton, 12742 Elizabeth Way, Tustin, Calif.)

9-12. **Association of Official Analytical Chemists**, annual mtg., Washington, D.C. (L. G. Ensminger, Box 540, Benjamin Franklin Station, Washington 20044)

10-11. **Industrial Hygiene** Foundation, 32nd annual mtg., Pittsburgh, Pa. (R. T. de Treville, 4400 Fifth Ave., Pittsburgh 15213)

11-13. **Optical Soc. of America**, annual mtg., Detroit, Mich. (M. E. Warga, 1155 16th St., NW, Washington, D.C. 20036)

15-18. **American Oil Chemists Soc.**, Chicago, Ill. (D. E. Weber, 35 E. Wacker Dr., Chicago 60601)

15-19. **American Assoc. of Medical Record Librarians**, annual mtg., Los Angeles, Calif. (M. Waterstraat, 211 E. Chicago Ave., Chicago, Ill. 60611)

16-17. **Systems Science and Cybernetics**, conf., Boston, Mass. (M. D. Rubin, Mitre Corp., Bedford, Mass.)

16-18. **Aerospace and Electronic Systems**, conv., Washington, D.C. (M. N. Abramovich, Washington Technical Consultants, 422 Washington Bldg., Washington 20005)

16-19. **Molecular Dynamics and Structure of Solids**, Gaithersburg, Md. (R. S. Carter, Inst. for Materials Research, National Bureau of Standards, Washington, D.C. 20234)

16-20. **Metallurgical Soc.**, fall mtg., Cleveland, Ohio. (J. V. Richard, 345 E. 47 St., New York 10017)

16-20. **American Soc. of Civil Engineers**, annual mtg., and **Water Resources**, engineering conf., New York, N.Y. (W. H. Wisely, ASCE, 345 E. 47 St., New York 10017)

16-20. **American Soc. for Metals**, Cleveland, Ohio. (Meetings Manager, Metals Park, Ohio)

16-20. **Society for Non-Destructive Testing**, Cleveland, Ohio. (SN-DT, 914 Chicago Ave., Evanston, Ill. 60202)

18-20. **Exploding Wire Phenomenon**, 4th conf., Boston, Mass. (W. G. Chase, Air Force Cambridge Research Labs., L. G. Hanscom Field, Bedford, Mass. 01730)

18-22. **American Soc. of Clinical Hypnosis**, 10th annual scientific mtg., New York, N.Y. (F. D. Nowlin, 800 Washing-

What's your laboratory recorder IQ?

Test your knowledge—can you qualify for a Degree in Recording?

1. A high performance potentiometric recorder has a wide number of applications in:

- ☐ Research laboratories
- ☐ Analytical laboratories
- ☐ Hexamethylchickenfat analysis
- ☐ Clinical laboratories
- ☐ Rock 'n roll music

2. Potentiometric laboratory recorders can be used with:

- ☐ Great abandon
- ☐ Gas chromatographs
- ☐ Spectrophotometers
- ☐ High fidelity record players
- ☐ pH meters

3. For convenience in use, a recorder should:

- ☐ Have functional grouping of operating controls
- ☐ Do away with internal knobs and screwdriver adjustments
- ☐ Be operable after a few minutes of instruction
- ☐ Be readily connected to a variety of instruments
- ☐ Have a snooze alarm

4. Ten-inch flat-bed recorders:

- ☐ Give more accurate recordings than smaller recorders
- ☐ Give easier to read charts than smaller recorders
- ☐ Are easier to make notations on than vertical recorders
- ☐ Are less lumpy than other recorders
- ☐ Can be obtained with drawer-type enclosure or tilt frame accessories

5. To handle the variety of requirements for general laboratory use, a recorder needs:

- ☐ Ability to accept a wide magnitude of input signals
- ☐ All the help it can get
- ☐ An adjustable control
- ☐ A little bit of luck
- ☐ Small size for portability

6. Beckman's high performance Ten-Inch Recorder:

- ☐ Has all of the qualities listed previously
- ☐ Has none of the qualities listed previously
- ☐ Has an accuracy of 0.25% and a pen response of less than 0.5 second
- ☐ Has a dead band of less than 0.1% full scale
- ☐ Costs less than comparable recorders

7. A dead band is:

- ☐ A measure of recorder sensitivity
- ☐ A group of expired musicians
- ☐ A small signal not discernible by the recorder
- ☐ Something like hysteresis
- ☐ Most desirable when very small

8. Beckman Instruments, Inc.:

- ☐ Makes a ten-inch laboratory recorder for high accuracy applications
- ☐ Makes a five-inch laboratory recorder for less demanding uses
- ☐ Has offices in 46 cities throughout the U.S.
- ☐ Provides rapid delivery
- ☐ Provides local service

After many hours of diligent study, I am submitting my completed examination. Hopefully, having met all requirements, I am now qualified for a Degree in Recording.

To further my education:

- ☐ Send me your two eight-page textbooks on Five- and Ten-Inch Potentiometric Recorders, plus texts on accessory items.
- ☐ Have a Beckman tutor visit me.

Name _____ Title _____

Organization _____

Address _____

City _____ State _____ Zone _____

Beckman®

INSTRUMENTS, INC.

SCIENTIFIC INSTRUMENTS
DIVISION

FULLERTON, CALIFORNIA • 92634

INTERNATIONAL SUBSIDIARIES: GENEVA; MUNICH; GLENROTHES, SCOTLAND;
TOKYO; PARIS; CAPE TOWN; LONDON; MEXICO CITY