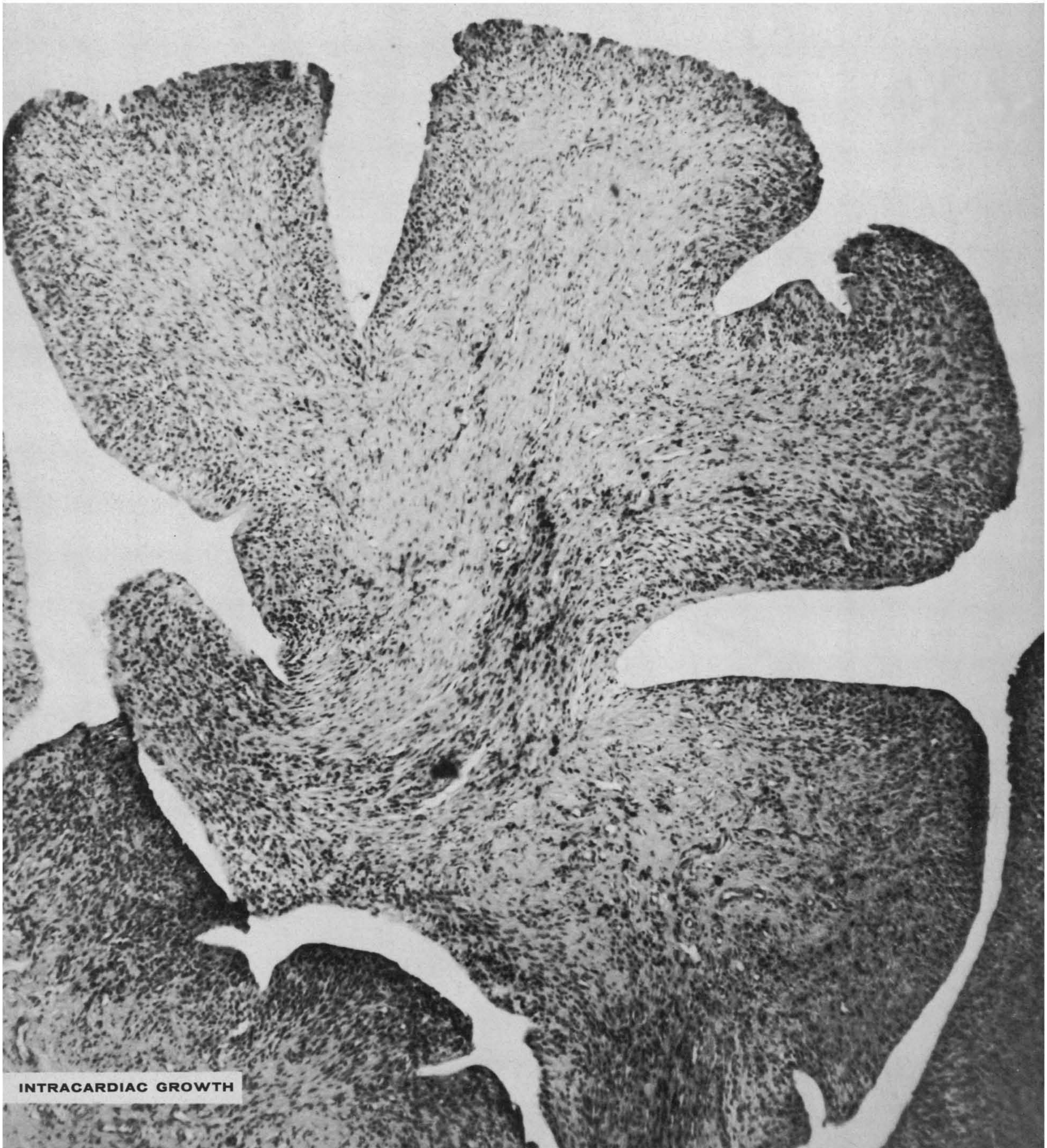
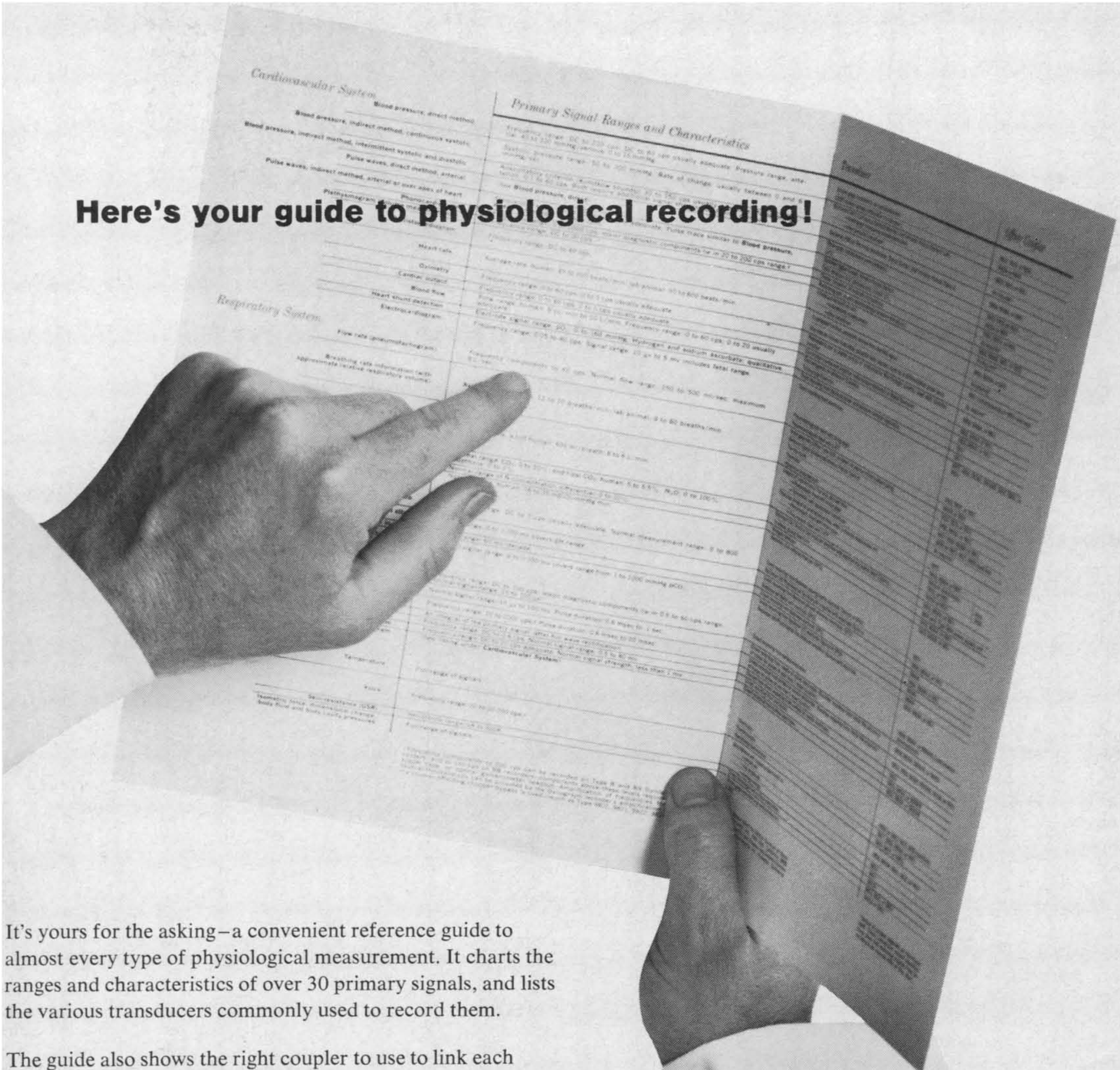
SCIENCE

20 March 1964
Vol. 143, No. 3612

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE



Here's your guide to physiological recording!



It's yours for the asking–a convenient reference guide to almost every type of physiological measurement. It charts the ranges and characteristics of over 30 primary signals, and lists the various transducers commonly used to record them.

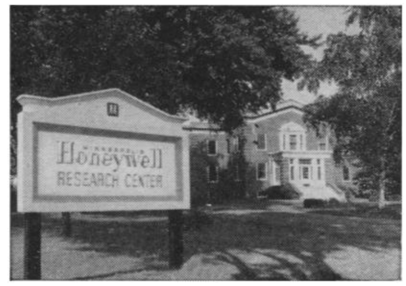
The guide also shows the right coupler to use to link each transducer to an Offner Dynograph® recorder. These small plug-in couplers are an outstanding benefit of Dynograph recorders–they can be interchanged in seconds to record virtually all physiological phenomena.

Would you like a copy of this handy chart? We'll send you one by return mail. Ask for Chart 220-5.

Beckman® INSTRUMENTS, INC.
SPINCO DIVISION
PALO ALTO, CALIFORNIA • 94303

International Subsidiaries: Geneva, Switzerland; Munich, Germany; Glenrothes, Scotland; Paris, France; Tokyo, Japan; Capetown, South Africa.

Basic Research at Honeywell
Research Center
Hopkins, Minnesota



Studies of Small Gap Semiconductors for Infrared Detection

The window in the atmosphere between 8 and 14 microns has stimulated work on devices that will detect longer wave lengths. New semiconductor materials may make practical the detection of longer wave lengths and therefore targets with far lower temperatures.

The atmosphere offers several windows for energy transmission in the infrared spectrum. One particularly good one occurs between 8 and 14 microns where energy is transmitted freely. However, radiation on either side of the window is blocked due to absorption by the molecules in the atmosphere.

All objects at temperatures above absolute zero give off radiations and the lower the temperature the longer the wave length. Therefore, if long wave lengths can be detected by a practical means, targets of much lower temperatures could be recognized.

Infrared detectors use either intrinsic or extrinsic semiconductors. Intrinsic detectors use electron transitions within the atoms that make up the semiconductor material itself. The extrinsic type utilizes electron transitions that occur due to the presence of impurity atoms introduced into the semiconductor material. (See Fig. A.)

While the extrinsic materials permit detection of infrared radiation beyond 6 microns, these materials require cooling to below 40°K. This calls for bulky, heavy apparatus undesirable for airborne applications and difficult to design into multi-element detectors.

Until now no one has been able to make an intrinsic conductor that will detect photons in the longer wave lengths. In an intrinsic detector the narrower the energy gap between the valence band and the conduction band the easier it is to excite an electron across the gap. This excitation occurs two ways: by photon excitation and by thermal excitation. The problem is to produce a material with a gap narrow enough to respond to long wave lengths (that is, low energy photons) but wide enough so that practical cooling temperatures will be sufficient to minimize thermal excitation.

Honeywell scientists have performed a theoretical analysis which shows the feasibility of making an 8 to 14 micron intrinsic detector capable of operating at liquid nitrogen temperature, 77°K. (−320°F.)

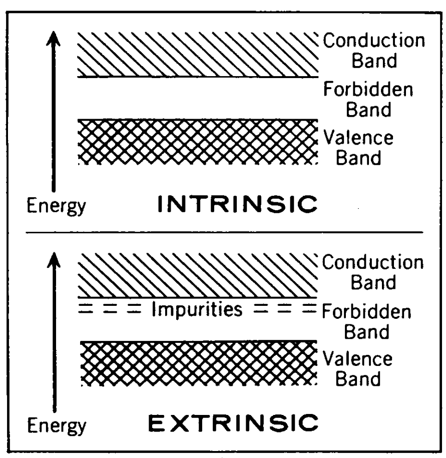


FIG. A

The analysis also shows that by the use of intrinsic material the detectors operating at 77°K could be made so sensitive that the only limitation is imposed by the randomness of the photons coming from the radiation background. Problems present themselves in selecting elements for the semiconductor. For example: while some narrow gap materials meet many of the requirements, their gap is so narrow that the required cooling is impractical. (This is the case with mercury telluride.)

Honeywell's contribution to the development of a suitable detector has been to prepare a compound semiconductor composed of different proportions of mercury, cadmium and tellurium and to develop a theory capable of explaining the behavior of this material.

The compound is difficult to synthesize. Mercury evaporates readily at room temperature yet the compound requires heating to 800°C. At this temperature the pressure of mercury within the capsule is very high.

A number of different compositions have been formulated. Most promising is a compound of approximately 80% mercury telluride and 20% cadmium telluride. With this compound Honeywell scientists, for the first time, have been able to demonstrate photon detection at wave lengths out to 14 microns. Previous workers had been able to demonstrate only thermal effects in these materials.

Further work is under way at Honeywell's Research Center on purification of the material and improvement of its crystal structure. At the same time additional theoretical work is under way to further understand the very complex band structure of small gap semiconductors. If the transitions in these materials can be explained, new insights in semiconductor theory will be attained. This research is partially supported by the Aeronautical Systems Division, Air Force Systems Command.

If you are engaged in scientific work involving small-gap semiconductors and would like to have copies of papers on the subject by Honeywell scientists, you are invited to correspond with Dr. Paul W. Kruse, Honeywell Research Center, Hopkins, Minnesota.

If you are interested in a career at Honeywell's Research Center and hold an advanced degree, you are invited to write Dr. John Dempsey, Director of Research at this same address.

Honeywell
First in Control

20 March 1964

Vol. 143, No. 3612

SCIENCE

EDITORIAL BOARD

DAVID M. BONNER, MELVIN CALVIN, ERNEST COURANT, FARRINGTON DANIELS, JOHN T. EDSALL, DAVID R. GODDARD, ALEXANDER HOLLAENDER, ROBERT JASTROW, KONRAD B. KRAUSKOPF, EDWIN M. LERNER II, WILLARD F. LIBBY, NEAL E. MILLER

EDITORIAL STAFF

Editor: PHILIP H. ABELSON. Publisher: DAEL WOLFLE. Business Manager: HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES. Assistant Editor: ELLEN E. MURPHY. Assistant to the Editor: NANCY TEIMOURIAN. News and Comment: DANIEL S. GREENBERG, JOHN R. WALSH, ELINOR LANGER, MARION ZEIGER. Book Reviews: SARAH S. DEES.

ADVERTISING STAFF

Director: EARL J. SCHERAGO. Production Manager: RAYMONDE SALAMA

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

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

SCIENCE is published weekly 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 © 1964 by the American Association for the Advancement of Science. Annual subscriptions $8.50; foreign postage, $1.50; Canadian postage, 75¢; single copies, 35¢. School year subscriptions: 9 months, $7; 10 months, $7.50. Provide 4 weeks' notice for change of address, giving new and old address and zone numbers. Send a recent address label. 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. Indexed in the **Reader's Guide to Periodical Literature**.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PHILIP M. MORSE — DeWITT STETTEN, JR. — JOHN R. WINCKLER
COLIN S. PITTENDRIGH — WILLIAM L. STRAUS, JR. — CLARENCE M. ZENER
KENNETH S. PITZER — EDWARD L. TATUM

Editorial Assistants: ISABELLA BOULDIN, ELEANORE BUTZ, SYLVIA EBERHART, GRAYCE FINGER, NANCY HAMILTON, OLIVER HEATWOLE, ANNE HOLDSWORTH, MARCIA ISAAK, RUTH KINGERLEE, HOWARD NATHENSON, EDGAR RICH, JOHN RINGLE.

Staff Assistants: VIRLINDA M. GIBSON, LILLIAN HSU, BARBARA J. SHEFFER.

Chicago, Ill., 6 W. Ontario St.: HERBERT BURKLUND (312-DE7-4973)
Los Angeles 45, Calif., 8255 Beverly Blvd.: WINN NANCE (213-653-9817)

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C., 20005. Phone: 202-DU 7-7171. Cable: Advancesci, Washington. Manuscripts should be submitted in triplicate, double-spaced throughout. The AAAS assumes no responsibility for the safety of manuscripts. 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.

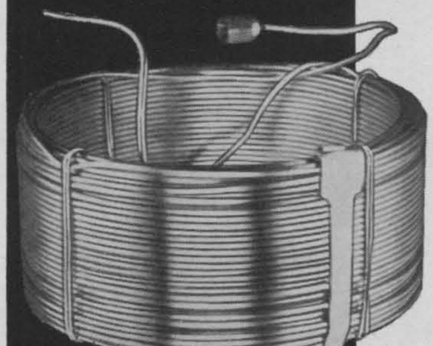
COVER

This branched papillary growth, lined with endocardium, was taken from a cauliflower-like excresence in the left atrium of the heart. Such growths develop at sites which undergo increased friction (hematoxylin-eosin stain, about × 33). See page 1341.

Specify the BARBER-COLMAN
Series 5000 SELECTA-SYSTEM
with capillary column capability...

for the BEST in Gas Chromatography

Your gas chromatograph is not capable of giving you the very best in gas chromatographic analysis unless it is equipped with capillary* columns.



Consider these advantages of capillary columns:

- Resolutions which are impossible on packed columns.
- Analyze very small samples with ionization detector systems.
- Temperature programming extends the range of capillary columns, simultaneously providing excellent resolution and high sensitivity to report trace constituents in extremely complex mixtures.
- Better resolution of complex samples with very similar structural groups.
- A complete analysis in 20 minutes which may take more than an hour with packed columns.
- Analyses which require temperature programming with packed columns can normally be performed isothermally with capillary columns.

Also of Prime Importance . . .

Barber-Colman has been a leader in the manufacture of capillary columns and capillary column gas chromatographs for many years.

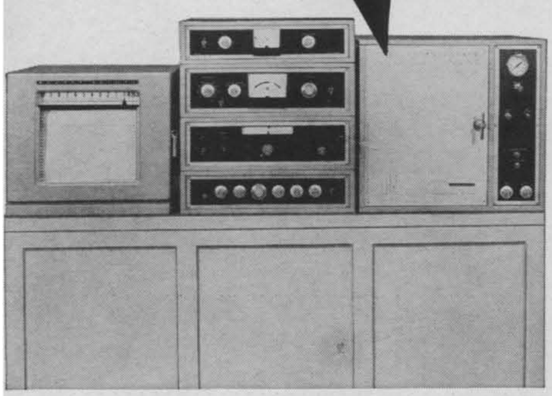
You Should Also Know that . . .

The Barber-Colman Series 5000 Selecta-System Gas Chromatographs were designed for capillary column systems and they feature:

- Model 5061 Column Bath with Linear Sample Inlet Splitter.
- Model 5121 High Temperature Flame Detector. Detectability —10^{-14} Mole/sec.
- Model 5041 Battery Electrometer — Noise level 10^{-14} Amps.

For further information on capillary column chromatographs and other superior performance gas chromatographs available in the Selecta-System, contact one of the 42 Barber-Colman Branch Offices — see the Yellow Pages.

*Licensed under Golay Patent 2920478.



The Barber-Colman Series 5000 Selecta-System represents a most flexible system for keeping abreast of a fast-changing technology. The modular unitized system fits your needs now and later — over 20 different components help to make up more than 50 different system combinations.

BARBER COLMAN

BARBER-COLMAN COMPANY

Dept. C, 15131 Rock Street, Rockford, Illinois, U.S.A.
BARBER-COLMAN of CANADA, Ltd., Dept. C, Toronto & Montreal • Export Agent: Ad. Auriema, Inc., N.Y.

NEW DEEP-SEA AMPLIFIER TRANSMITS 128 TELEPHONE CONVERSATIONS

Our engineers have developed a new amplifier which simultaneously transmits 128 telephone conversations in both directions over a single cable. It is designed to operate without repair or maintenance on the ocean floor for 20 years.

The new amplifier (illustration below) is an important advance in deep-sea communications technology.

To make a single amplifier operate in two directions, it was necessary to provide a precise, complex filter system to separate the signals. Signals traveling in one direction occupy a frequency band from 116 to 512 kc., and those traveling in the other direction, from 652 to 1052 kc.

The gain of each amplifier must accurately compensate for its share of cable loss. The total loss varies over the frequency band and, in a transatlantic system, reaches a maximum of 9000 decibels. Since there is no way to adjust an amplifier on the ocean floor, the performance of each one must be pre-established with extreme precision.

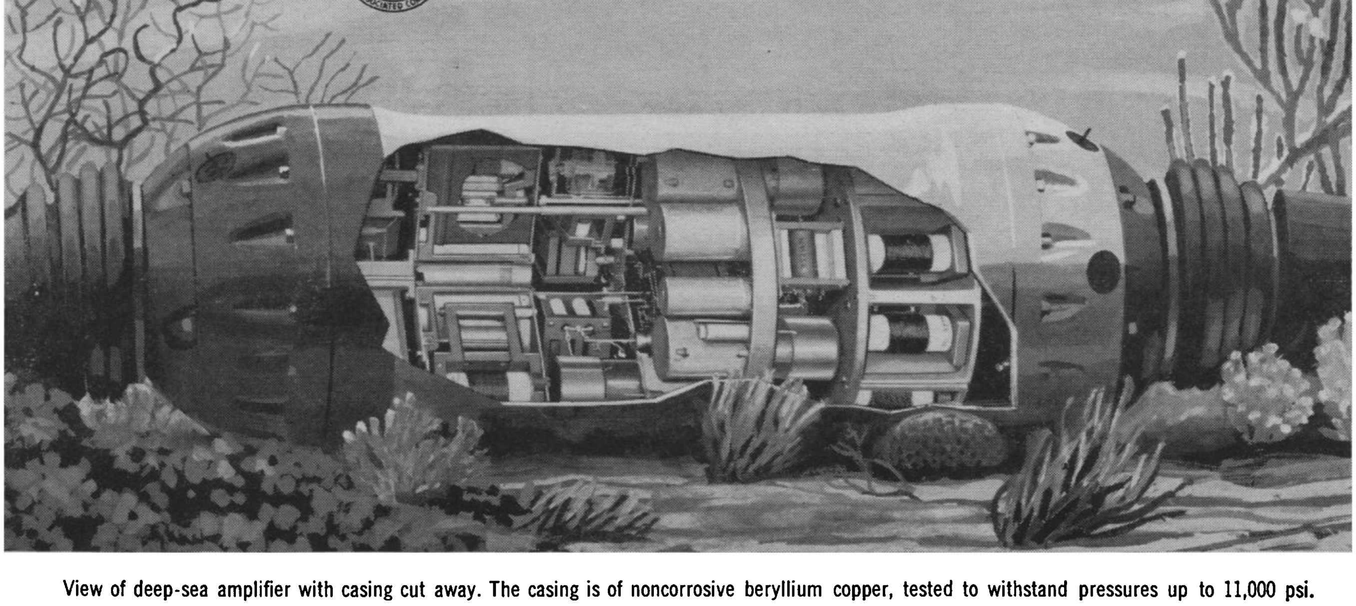
A 3600-mile cable link, with its 180 amplifiers, includes 36,000 electronic components. Each component has to be endowed with a reliability far in excess of the requirements of conventional land systems.

The casing and its seal to the cable must prevent minute water seepage at ocean bottom pressures. This could accumulate fatally over the years, and so production tests employing radioactive isotopes are used to search for any such microscopic leakage.

In bringing the new underseas system to production we worked closely with Western Electric, the manufacturing unit of the Bell System. Our joint objective was to create a system of high reliability that could be manufactured economically. The new amplifiers are being used first in the new deep-sea telephone link from Florida to Jamaica and Panama.

BELL TELEPHONE LABORATORIES

World center of communications research and development



View of deep-sea amplifier with casing cut away. The casing is of noncorrosive beryllium copper, tested to withstand pressures up to 11,000 psi.

12 NEW BOOKS IN SCIENCE AND MEDICINE

New Techniques ...New Procedures

THE CHEMICAL ORIGIN OF LIFE *by* **Alexander I. Oparin,** *U.S.S.R. Academy of Sciences, Moscow, U.S.S.R. Translated from the Russian by Ann Synge.* In this classic monograph Doctor Oparin discusses three great problems which have attracted the minds of mankind for centuries—*the nature of life, the origin of life, and the distribution of life.* Makes extensive use of data of evolutionary biochemistry to describe later development of biological metabolism and cellular structure. *Feb. '64, about 120 pp., 33 il. (Amer. Lec. Living Chemistry), about $4.75*

LECTURES FOR MEDICAL TECHNOLOGISTS *by* **H. Ivan Brown,** *The Methodist Hospital of Central Illinois, Peoria, Ill.* Designed to cover the medical background for various specialty fields represented in the clinical laboratory. Includes hematology, blood coagulation, blood banking, serology, bacteriology, parasitology, physiological chemistry, metabolic studies, urinalysis, toxicology, and histopathology. *Feb. '64 660 pp. (7 x 10), 285 il., $19.50*

AN INTRODUCTION TO RESPIRATORY CYTOLOGY *by* **Winifred Liu,** *The Youngstown Hospital Association, Youngstown, Ohio.* Written in the simplest of language . . . amply illustrated . . . designed for use in the early phase of cytotechnology training. *Stresses thorough familiarity with benign cells as an essential element in basic training.* To acquaint students with commonly used terminology, a comprehensive glossary of respiratory diseases and syndromes is included. *Jan. '64, 120 pp., 97 il., $5.75*

CHEMISTRY AND TREATMENT OF ADRENOCORTICAL DISEASES *by* **F. T. G. Prunty,** *Univ. of London, London, England.* The adrenal abnormalities considered include primary and secondary adrenocortical hypofunction, Cushing's syndrome, primary aldosteronism, adrenal virilism with a discussion of interaction between adrenals and gonads, and adrenocortical tumours. Over 1,000 references are included. *Feb. '64, 418 pp., 99 il. (Amer. Lec. Living Chemistry), $14.00*

MATHEMATICAL ELEMENTS OF LAMELLAR BONE REMODELLING *by* **H. M. Frost,** *Henry Ford Hosp., Detroit, Mich.* The purpose of this monograph is to aid others who, like the Henry Ford Hospital group, wish to use *morphometric analysis of bone* as a means for studying cell dynamics both qualitatively and quantitatively. Includes a Glossary in which definitions are expressed in basic and common scientific language. *Feb. '64, 140 pp., 45 il. (Henry Ford Hospital Surgical Monograph edited by Conrad R. Lam), $6.75*

AUTOMATION IN CLINICAL CHEMISTRY *by* **Walton H. Marsh,** *State Univ. of New York, Brooklyn, N. Y.* This book is a must for individuals who are faced with the difficult problem of selecting equipment. Deals with automated instruments of multitest function, individual tests and automated instruments of unit-test function, and automated aids to analysis. *Sept. '63, 148 pp., 46 il. (Amer. Lec. Living Chemistry edited by I. Newton Kugelmass), $6.00*

SOME MEDICAL ASPECTS OF MATHEMATICAL BIOLOGY *by* **Nicolas Rashevsky,** *Univ. of Chicago, Chicago, Ill.* Shows how mathematical biology may be applied to such medical problems as retention of particulate material in the respiratory passages, cardiovascular dynamics, pharmacological problems, endocrine system and periodic psychoses, and the central nervous system with special reference to neuroses. *Feb. '64, 342 pp., 60 il., 31 tables (Amer. Lec. Living Chemistry), $12.75*

THE PHYSICS OF RADIOLOGY (*2nd Ed., 2nd Ptg.*) *by* **Harold Elford Johns,** *Univ. of Toronto, Toronto, Canada.* Includes chapters on diagnostic radiology, isotopes, protection, radiobiology, and rotation therapy. All statements of dose for x-rays, radium and isotope therapy are based on the rad. Radiation physicists will be especially interested in extensive data on absorption coefficients and related topics. *Feb. '64, 788 pp. (7 x 10), 469 il. (Amer. Lec. Radiation Therapy edited by Milton Friedman), about $23.00*

COMPUTER APPLICATIONS IN MEDICINE *by* **Edward E. Mason** *and* **William G. Bulgren,** *both of State Univ. of Iowa, Iowa City, Iowa.* The authors review early reports on the application of computers to problem solving in medicine. Covers also design of experiments, data collection, selection of computer library programs, writing a special program in FORTRAN, and processing and interpretation of results. *Jan. '64, 188 pp., 7 il. (Amer. Lec. Living Chemistry), $6.75*

THE TREATMENT OF MYCOTIC AND PARASITIC DISEASES OF THE CHEST *edited by* **John D. Steele,** *San Fernando, Calif. (With 14 Contributors)* Physicians and laboratory workers alike will share a mutual interest in this first detailed monograph on mycotic and parasitic diseases of the chest. The chapter on laboratory aspects of the pulmonary mycoses is a complete manual in itself. *March '64, 280 pp., 161 il. (The John Alexander Monograph Series), $14.75*

Kabat and Mayer's EXPERIMENTAL IMMUNOCHEMISTRY (*2nd Ed.*) *by* **Elvin A. Kabat,** *Columbia Univ., New York City. With Chapters on "Complement and Complement Fixation and Kjeldahl Nitrogen Determination by Manfred M. Mayer, The Johns Hopkins Univ., Baltimore, Md.* ". . . unreservedly recommended . . . should be on the shelf of every serious student of bacteriology and immunology as well as in the library of any chemist with a biological bent."—*The Yale Journal of Biology & Medicine '61, 920 pp., 458 il., $26.50*

THE REDUCTION OF PATIENT DOSE BY DIAGNOSTIC RADIOLOGIC INSTRUMENTATION *edited by* **Robert D. Moseley** *and* **John H. Rust,** *both of Univ. of Chicago, Chicago, Ill. (With 29 Contributors)* Engineers, physicists and radiologists from industrial and academic research and development laboratories share their research experience, their newest developments and their theoretical considerations in an effort to reduce patient exposure. *Jan. '64, 300 pp., 145 il., $12.50*

SEND FOR OUR NEW 1964 CATALOG

CHARLES C THOMAS · PUBLISHER 301-327 East Lawrence Avenue **SPRINGFIELD · ILLINOIS**

And they're all high precision.

Several Beckman pH meters double as sodium ion analyzers, oxygen analyzers, chloride ion analyzers, potassium ion analyzers, millivolt meters, silver ion analyzers, lithium ion analyzers, carbon dioxide analyzers, halogen ion analyzers, redox analyzers, ammonium ion analyzers, and as indicators for electrometric titrations.

That's a lot of extra work for a pH meter. But, these Beckman instruments can do it and still give you the precision and reliability you demand for any pH analysis.

You can select from nine versatile Beckman pH meters, too, with different features to meet your specific applications. Some models have null balance for maximum accuracy. Battery power makes others fully portable. The most popular have convenient pushbutton control.

Your Beckman Sales Engineer understands pH meters and their many other uses better than anyone else. He talks pH fluently. Call him or write direct for Data File LPH-38-164.

INTERNATIONAL SUBSIDIARIES: GENEVA, SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND; PARIS, FRANCE; TOKYO, JAPAN; CAPETOWN, SOUTH AFRICA

Beckman INSTRUMENTS, INC.

SCIENTIFIC AND PROCESS INSTRUMENTS DIVISION

FULLERTON, CALIFORNIA

Recent AAAS Symposium Volumes

#75. Mechanisms of Hard Tissue Destruction.

1963. 776 pages. 430 illustrations.
One color plate.
Edited by: Reidar F. Sognnaes.
Symposium by 49 outstanding co-authors on destruction of mineralized structures by organisms and by physical and chemical agents, ranging from rock boring to bone resorption and tooth decay.

Price: $13.00. *AAAS Member's Cash Price:* $11.00.

#74. Aridity and Man.

The Challenge of the Arid Lands in the United States.
1963. 604 pages. 98 illustrations.
Edited by: Carle Hodge and Peter C. Duisberg.
Experience of the United States with its arid zones as reported to the first UNESCO Conference on Arid Lands in Latin America.

Price: $12.00. *AAAS Member's Cash Price:* $10.00.

#73. Land and Water Use.

With special reference to the Mountain and Plains Regions.
1963. 364 pages. 8 illustrations.
Edited by: Wynne Thorne.
Problems associated with the increasing competitive demands for use of publicly owned lands. Uses by livestock and timber processors versus recreation, wildlife, and water production. Adjustments in public land use in relation to uses of adjacent or intermingled privately owned lands. These and other problems are explored by recognized leaders in the field.

Price: $8.00. *AAAS Member's Cash Price:* $7.00.

#72. Spermatozoan Motility.

1962. 322 pages. 113 illustrations.
Edited by: David W. Bishop.
For the first time the details of sperm motility are here presented in monograph form. A wealth of previously unpublished data. A valuable source of reference for the student and investigator, as well as for the practitioner of applied reproductive biology.

Price: $7.50. *AAAS Member's Cash Price:* $6.50.

#71. Great Lakes Basin.

1962. 320 pages. 92 illustrations.
Edited by: Howard J. Pincus.
The reader will find here material on pure and applied science, accounts of new research and reviews of material published elsewhere, historical and social studies, and pleas for action and planning.

Price: $7.50. *AAAS Member's Cash Price:* $6.50.

#70. Fundamentals of Keratinization.

1962. 202 pages. 136 illustrations.
Edited by: E. O. Butcher and R. F. Sognnaes.
The fields of anatomy, dentistry, dermatology, medicine, pathology, and zoology are represented in this volume.

Price: $6.50. *AAAS Member's Cash Price:* $5.75.

#69. Biophysics of Physiological and Pharmacological Actions.

1961. 612 pages. 212 illustrations.
Edited by: Abraham M. Shanes.
A bird's-eye view of a number of principles now considered important. Useful for teaching, as well as for research purposes.

Price: $13.50. *AAAS Member's Cash Price:* $11.75.

#68. Sciences in Communist China.

1961. 884 pages. 23 illustrations.
Edited by: Sidney H. Gould.
". . . strongly recommended to all who are in search of facts and source material on the sciences in China."—*Science*, 22 September 1961

Price: $14.00. *AAAS Member's Cash Price:* $12.00.

#67. Oceanography.

1961. 2nd printing, 1962. 665 pages. 146 illustrations.
Edited by: Mary Sears.
"I know of no other volume that so well defines oceanography, its purpose, opportunities and requirements."—*Science*, 9 June 1961

Price: $14.75. *AAAS Member's Cash Price:* $12.50.

#66. Germ Plasm Resources.

1961. 394 pages. 59 illustrations.
Edited by: Ralph E. Hodgson.
"This book will be of interest to nonplant and animal breeders, for the rather general treatment of various topics . . . allows for rapid perusal."—*Bulletin of the Entomological Society of America*, September 1961

Price: $9.75. *AAAS Member's Cash Price:* $8.50.

#65. Aging . . . Some Social and Biological Aspects.

1960. 436 pages. 65 illustrations.
Edited by: Nathan W. Shock.
"The 26 contributors include many of the most respected names in American gerontology, and the chapters cover a wealth of material."—*Journal of Gerontology*

Price: $8.50. *AAAS Member's Cash Price:* $7.50.

British Agents: Bailey Bros. & Swinfen, Ltd., Hyde House, West Central St., London, W.C.1

Clip out this Form. Fill in and Mail Today

Circle Volumes You Wish To Order . . .

75	74	73
72	71	70
69	68	67
66	65	

$. . . . .

Payment Enclosed

American Association for the Advancement of Science
1515 Massachusetts Avenue, NW
Washington, D.C. 20005
Please send the symposium volumes circled on this form, to:

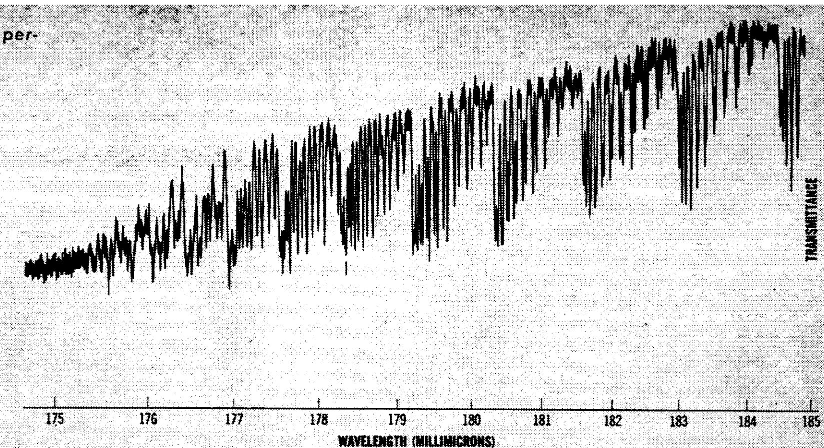
Name . . . .

Address . . . .

City . . . . State . . . . Zip Code . . . .

Please check:
( ) I am a member of AAAS, and enclose payment for the volumes indicated at member prices. ( ) $. . . . . enclosed.
( ) I am not a member of AAAS. ( ) Please bill me.
( ) Please send Membership Application Form.

Far-UV run of oxygen shows high-resolution performance of Model 350.



performance-proved instruments
for SPECTROSCOPY

PERKIN-ELMER MODEL 350—UNMATCHED FOR QUANTITATIVE ACCURACY AND VERSATILITY

The Model 350 Spectrophotometer provides superb quantitative accuracy over its broad range—from the far UV to the near infrared—plus unique versatility.

Its unexcelled quantitative accuracy is due primarily to its inherent instrumental photometric precision, unhampered by interfering stray light (.0002% stray light at 210 mμ). Even at high densities, as occur in differential analysis, the Model 350 presents *no problems due to stray* even in energy-limited spectral regions.

Complementing quantitative accuracy is photometric versatility. Integral ordinate scale expansion means that any weak or recessive band—*on any portion of the ordinate—no matter how dense or dilute*—can be expanded by factors of 5, 10, 20 or 50 X with the turn of a dial. Sample handling with its attendant errors is greatly minimized. Similar ease of photometric mode programming is afforded by switch-controlled change from absorbance to transmittance and back. This switch also converts the instrument from single to double beam operation. Resolution, when it is required, separates bands less than .3 Angstrom apart at 180 mμ.

Extra energy for far UV analyses is provided by a powerful air-cooled deuterium source plus more-highly-efficient optics.

A wide range of accessories broaden the Model 350's applications. With these attachments you can perform, for example, kinetic studies—fluorescence analyses—diffuse reflectance and colorimetric work—temperature sensitive determinations—flame spectra studies of most elements—analyses of micro-samples—optical rotatory dispersion—and many more.

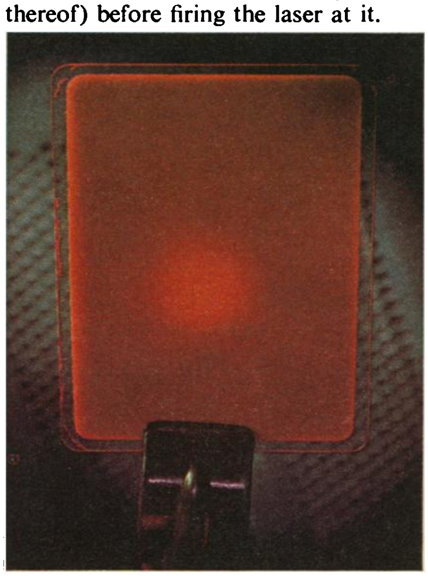
Complete information on the Model 350, including sample spectra, is available **from** Instrument Marketing Division, Perkin-**Elmer** Corp., 910 Main Avenue, Norwalk, Conn.

Kodak reports on: an unsophisticated-looking receptor . . . keeping our weapons off the dinner table

. . . and asks a lot of questions

Infrared goes in, orange comes out

No, it's not raw film. Roomlight or daylight does it no harm. In fact, it is intended to be left lying around exposed to fluorescent-lamp light. That's how you charge it up. That's *all* there is to charging it up. Then you take it to the laser room. Don't rush. The energy won't leak away that fast. If the 5 o'clock bell rings and it's Friday, forget about it until Monday. But do *not* forget to protect your eyes with 7 mm of Pittsburgh No. 2043 glass (or the equivalent thereof) before firing the laser at it.



The whole point of this picture is that this is a far-field pattern not of a visible-light laser but of an infrared one.* Thus we demonstrate what should be the big market for sheets of a product for which purchasing directories will have to establish a new category, a product we choose to call KODAK IR Phosphor, an interesting bit of business from our chemists of the inorganic persuasion.

Except for a technicality, one could say that it converts infrared to orange, replacing more sophisticated-looking receptors that less vividly show the location and approximate distribution of the output from an infrared laser. The technicality is that infrared (0.7μ to 1.3μ) merely stimulates the phosphor to release as orange light (peaking at $640\text{m}\mu$) the energy it has soaked up while lying around in white light.

The pattern can be photographed from the phosphor on any panchromatic or color film but preferably one that comes in a yellow box.

It is very easy to acquire 2" x 3" sheets of KODAK IR *Phosphor. All you do is multiply the number you can use around the place by $25 and dispatch a purchase order valid for the product of these two numbers to Eastman Kodak Company, Apparatus and Optical Division, Rochester, N. Y. 14650.*

* Reason for the goggles: an unlucky reflected jolt of infrared can damage an eye with little immediate awareness. Putting your eye behind the sheet is even less lucky.

Blue dye

USDA Photo

KODACHROME Film can show a plague of locusts against a blue sky. Now please pay attention to a complex message.

Nobody is cheering for the locusts. If it's we or they, we must win. Chemistry has provided effective weapons. Into the mouths of such mighty cannon we must be smart enough not to stick our own heads. In short, let's keep track of these potent pesticides so that we don't eat, drink, or breathe them. A contribution to this endeavor appears in *Science*, *139*, 835 in the form of a paper on Indophenol Blue as a color-fixing agent for halogenated aromatic hydrocarbons on paper chromatograms and spot tests.

Now back to KODACHROME.

The dye that gets cleverly laid down in the blue areas of a KODACHROME picture is—yes, you guessed it—Indophenol Blue, now somewhat modified. Two of us did not guess it—the sales executive who spotted the paper in *Science* and the chemist who was asked in consequence to make Indophenol Blue in happy innocence of its status as one of the company's most successful products for 29 years. Thanks to a mild silver oxidizing agent the chemist applied to the task in ignorance of the established manufacturing procedure for the dye, he wound up with an embarrassingly purer product than ever yielded by the method developed by his boss's boss long ago, which was only as good as it had to be and carried our blue Technical Grade label.

Now N-(p-Dimethylaminophenyl)-1,4-naphthoquinoneimine *bears a harder name to remember than Indophenol Blue, a white label signifying a purity that justifies a price of $7.00 for 5 g., and the designation* EASTMAN *478 that marks it as one of some 4400* EASTMAN *Organic Chemicals that professionals order from List No. 43 of Distillation Products Industries, Rochester, N.Y. 14603 (Division of Eastman Kodak Company).*

Prices subject to change without notice.

2 colors to wiggle in?

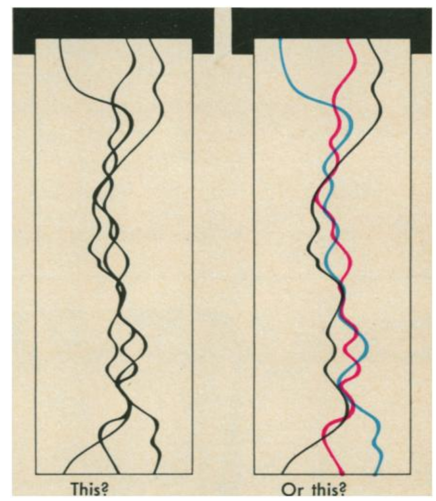
We have made some 2-color oscillograph paper on a thin, quick-drying stock of high dimensional stability.

Should we make some more? Would you buy any of it?

Do you ever have trouble separating superimposed traces?

Would you be willing to modify your conventional oscillographs by insertion of KODAK WRATTEN Light Filters between lamps and galvanometer mirrors? Are you by chance an oscillograph manufacturer instead of a user?

Are you a little more interested than when color oscillograph paper had to be thick and far more expensive than black-and-white paper?



Do science and engineering benefit from this kind of small improvement in the tools of the trade?

Is there an oscillograph-processing machine down the hall? If not, why not? If there is, would anybody mind if you slipped a different set of chemicals into the four tanks once in a while when you felt the need of color?

Do you believe those tales about organizations that seek out the brightest young engineers that money can lure and then put them to work with assorted crayons marking each of 50 separate channels of data on a 400-foot length of oscillogram? Do you believe in the dignity of labor?

Is it enough to say that one seldom has occasion to demand higher trace-writing speed than this new 2-color paper can handle? And that it can be processed at 4 to 6 feet per minute?

Do we pant too hard?

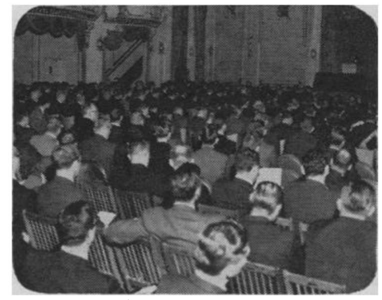
How can we help you unless you ask a few questions of your own from Photorecording Methods Division, Eastman Kodak Company, Rochester, N. Y. (Phone 716-562-6000, Ext. 3257)?

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

CHARGED PARTICLES

COMMUNICATIONS:
how HVEC contributes to research through the dissemination of technical information.

Third International Accelerator Conference



High Voltage Engineering sponsored its Third International Accelerator Conference last November in Boston. The three-day meeting was attended by 480 Scientists from 21 countries. Fifty-five papers were presented.

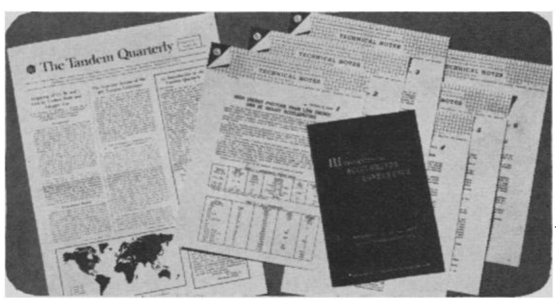
Objective of the Conference: to promote the exchange of information pertaining to accelerators, research program techniques, space physics, electron research, accelerator technology, and experimental techniques. Proceedings are presently being prepared and will be available on request.

Tandem Quarterly

In October 1963, HVEC published the first issue of The Tandem Quarterly — a technical report on tandem accelerator technology for research laboratories and personnel. Its one aim: to supply its recipients — mostly physicists and operating staffs of tandem laboratories — with information not usually covered in existing journals. For instance:

- Machine operating experience
- Particle beams obtained at each installation and their uses
- Experimental techniques and hardware
- Reviews of experimental programs
- Excerpts from proposals (with permission of the institution and funding agency)
- Accelerator installation and shielding information

Service to Science



HVEC disseminates a variety of information on charged particle research, basic and applied, as well as technical developments at HVEC. Available information spans the spectrum of nuclear research and technology . . . physics, chemistry, and industrial and medical applications. As manufacturers of particle accelerators, we provide this service because it reinforces the scientific cause and acquaints a wide audience with the uses and benefits of particle accelerators.

Technical Notes

This series is another recent HVEC program to disseminate information on noteworthy developments in accelerator experimentation and techniques, particularly single-stage machines. Topics to date include:

- High Energy Protons from Low Energy Van de Graff Accelerators
- Heavy Ion Acceleration
- Carbon Determinations Via Charged Particle Activation
- Energy Spectra of Energetic Particles in Space Micrometeroid Simulation
- High Energy Photons from Low Energy Van de Graff Accelerators
- Copies of these and futureTechnical Notes are available upon request

---

New Single Stage ICT Accelerators

HVEC recently introduced its ICT Accelerator systems. These high-current machines offer the same high-purity particle beam, low energy spread and polarity-conversion features which are characteristic of Van de Graaff accelerators. Several models are available:

- An 8-MeV Tandem Ion Accelerator convertible to electron operation.
- A 4-MeV Single Stage, Positive Ion Accelerator convertible to Electron or Tandem Operation.

All models incorporate an Insulating Core Transformer power source rated at 12 milliamperes. A 60 kilowatt 3 MeV electron machine is also available. Sufficient power is provided to capitalize on future developments in high-current particle source and target technologies.

For more detailed information, please write to Technical Sales, High Voltage Engineering Corporation, Burlington, Massachusetts.

HIGH VOLTAGE ENGINEERING

20 March 1964, Volume 143, Number 3612

SCIENCE

American Association for the Advancement of Science

BOARD OF DIRECTORS

Alan T. Waterman, *Retiring President, Chairman*
Laurence M. Gould, *President*
Henry Eyring, *President Elect*

John W. Gardner
H. Bentley Glass
David R. Goddard
Don K. Price
Mina Rees
Walter Orr Roberts
Athelstan F. Spilhaus
H. Burr Steinbach

Paul E. Klopsteg, *Treasurer*
Dael Wolfle, *Executive Officer*

VICE PRESIDENTS AND SECRETARIES OF SECTIONS

Section	Vice President	Secretary
Mathematics (A)	R. W. Hamming	Wallace Givens
Physics (B)	Ralph A. Sawyer	Stanley S. Ballard
Chemistry (C)	Roland Rivest	S. L. Meisel
Astronomy (D)	Walter Orr Roberts	Frank Bradshaw Wood
Geology and Geography (E)	Trevor Lloyd	Richard H. Mahard
Zoological Sciences (F)	Arthur D. Hasler	David W. Bishop
Botanical Sciences (G)	Harriet B. Creighton	Warren H. Wagner
Anthropology (H)	Anthony F. C. Wallace	Eleanor Leacock
Psychology (I)	Lorrin A. Riggs	Frank W. Finger
Social and Economic Sciences (K)	Harold D. Lasswell	Ithiel de Sola Pool
History and Philosophy of Science (L)	John Murdoch	N. Russell Hanson
Engineering (M)	Charles F. Savage	Leroy K. Wheelock
Medical Sciences (N)	James Ebert	Oscar Touster
Dentistry (Nd)	James A. English	S. J. Kreshover
Pharmaceutical Sciences (Np)	Lee H. MacDonald	Joseph P. Buckley
Agriculture (O)	Edward F. Knipling	Howard B. Sprague
Industrial Science (P)		Allen T. Bonnell
Education (Q)	Herbert S. Conrad	Frederic B. Dutton
Information and Communication (T)	Wallace R. Brode	Phyllis V. Parkins
Statistics (U)	Samuel S. Wilks	Morris B. Ullman

PACIFIC DIVISION

Phil E. Church, *President*
Robert C. Miller, *Secretary*

SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION

Edwin R. Helwig, *President*
Marlowe G. Anderson, *Executive Secretary*

ALASKA DIVISION

Charles J. Eagan, *President*
George Dahlgren, *Executive Secretary*

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.

Needs of the Humanities

The improvement of scholarship in the humanities has been the focus of the Ford Humanities Project at Princeton University. Richard Schlatter, provost of Rutgers University and director of the Humanities Project, has recently summarized the findings in a list of eight needs for improved scholarship in the humanities.

1) Better libraries, particularly in the younger and poorer universities. There is also need for improved methods of reproducing manuscripts and rare or out-of-print items.

2) Financial help in printing some works that will not pay for themselves, especially such expensive books as those in art history or musicology.

3) A good weekly magazine of critical reviews.

4) Grants to provide free time for intensive work.

5) Small grants for travel to special libraries or other resources, purchase of books, secretarial help, or whatever else will enable the scholar to make better use of his knowledge and talents.

6) More graduate fellowships.

7) One or more new centers of humanistic learning, comparable to the Institute for Advanced Study at Princeton or the Center for the Study of the Behavioral Sciences at Palo Alto.

8) Better coordination and organization within a university to foster humanistic learning.

This is indeed a modest list. There are several reasons why scientists should step forward and offer to help see that the needs are met. One is the matter of balance. It has sometimes been comforting, but is usually erroneous, to believe that government grants for science have enabled universities to use a larger fraction of their general funds in support of the humanities. We cannot believe this and also believe that the overhead on government grants fails to meet true costs. In many a university the rapid expansion of science has been partly at the expense of other areas of university responsibility.

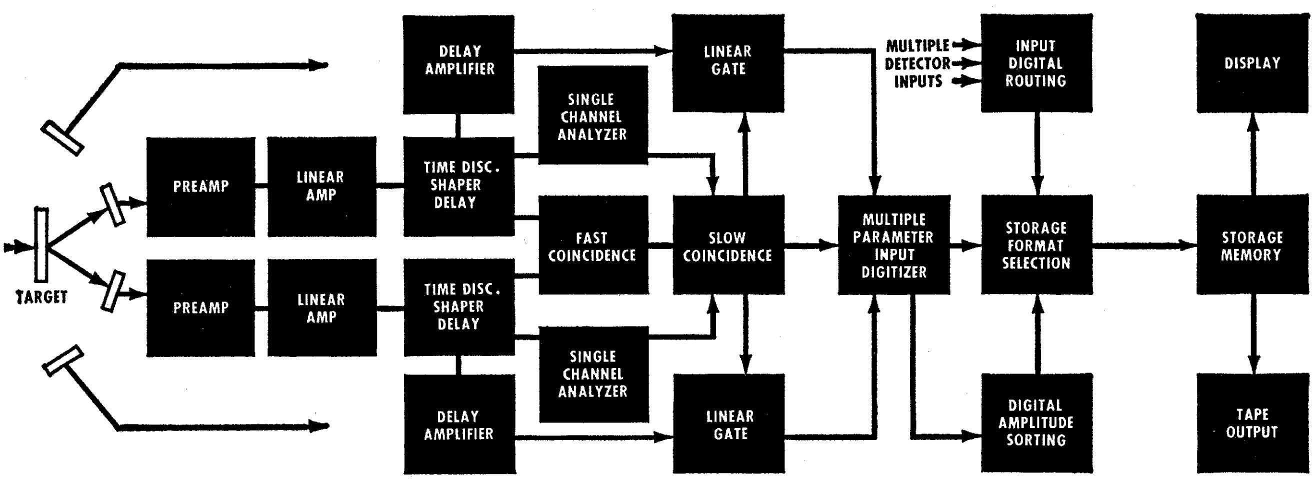
The better education of future scientists is also involved. There is good reason for having some scientists broadly acquainted with areas of scholarship other than science, and for giving those who later become most highly specialized a more general education in their earlier years. We cannot expect either group to be educated in the best way possible if scholarship in the humanities is starved out of existence.

Of national import are the facts that only a few universities support much high-quality work in the arts and humanities and that they draw their students largely from a rather narrow geographic region and social base. The Ivy League colleges and universities have become the prime breeding ground for humanists, and the higher the quality (as measured by fellowships and other awards) the more concentrated the base from which they come. This dangerous narrowness leaves large numbers of future scientists, teachers, and leaders in all fields of national endeavor without stimulation by humanistic scholarship, which, like scientific scholarship, must be spread widely among universities and colleges if its purposes are to the maximally achieved.

It is for the humanists to take the lead in seeking to meet the needs they have identified. As they do so, scientists can join ranks with them, lending encouragement and support. The improvement of scholarship in all its branches is our common cause.—D.W.

All the elements of a complete nuclear analysis system now available from TMC

Whether for simple analysis or for complex, multiple detector experiments as shown in the block diagram, TMC can provide a totally integrated system that assures compatibility of all the required units. As sole supplier, we assume full responsibility for the performance of the entire system, cover it under one guarantee and back it with a single organization that is fully qualified to service all elements of the instrumentation. The TMC modular instrumentation concept prevents premature obsolescence often experienced with changing nuclear requirements by offering new units that are fully compatible with previously existing systems.



DETECTORS AND AMPLIFIERS

TMC makes a wide selection of solid state lithium drift and quartz passivated detectors, scintillation detectors, and a series of fast amplifiers and preamplifiers designed for general laboratory applications. Both amplifiers and preamplifiers may be used with scintillation and solid state detectors or ion chambers.

ANALOG DECISION UNITS

TMC fast analog decision making units have a minimum resolving time of 10 nanoseconds. The circuits were developed by Goulding and Landis at the Radiation Laboratory of The University of California. The logic modules in a single system can be arranged in any combination to meet specific experimental requirements.

DIGITAL DECISION UNITS

Digital decision making units are available for multiplexing . . . multiple detector inputs . . . pulse routing to pre-assigned memory locations . . . pulse sorting by digital amplitude level . . . storage format selection. They are compatible with TMC magnetic core data storage memories having up to 65,536 channels.

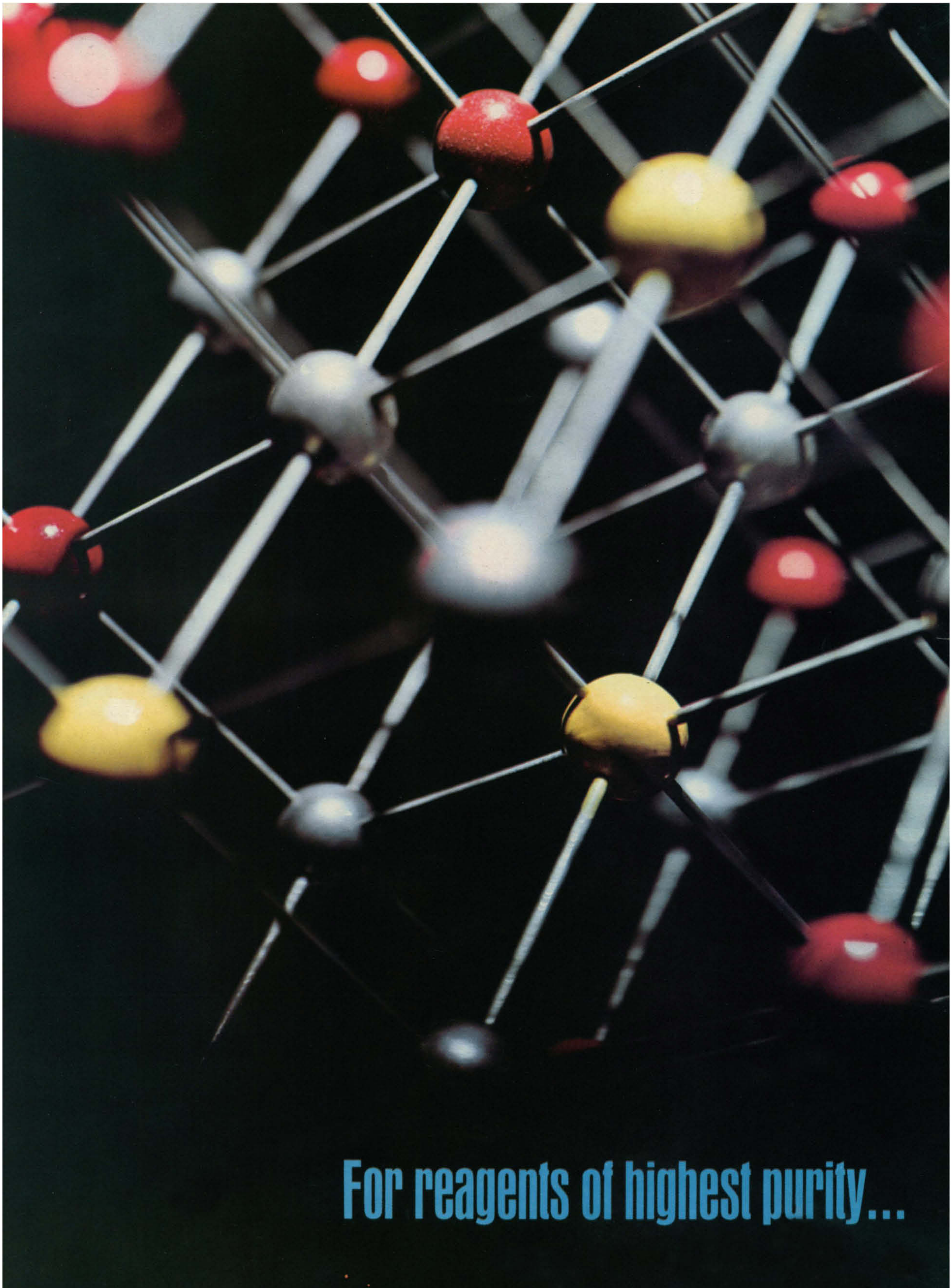
DATA HANDLING UNITS

TMC systems store data in either magnetic core memories or magnetic tape systems and may be equipped with control units for mega-channel display as well as slice, contour and isometric modes. Data readouts include paper tape . . . magnetic tape . . . typewriter . . . printer . . . plotter. Tape buffer systems are also available.

You can get complete details of all units of TMC integrated systems from any TMC office or from Technical Measurement Corporation, 441 Washington Avenue, North Haven, Connecticut.

TMC

TECHNICAL MEASUREMENT CORPORATION

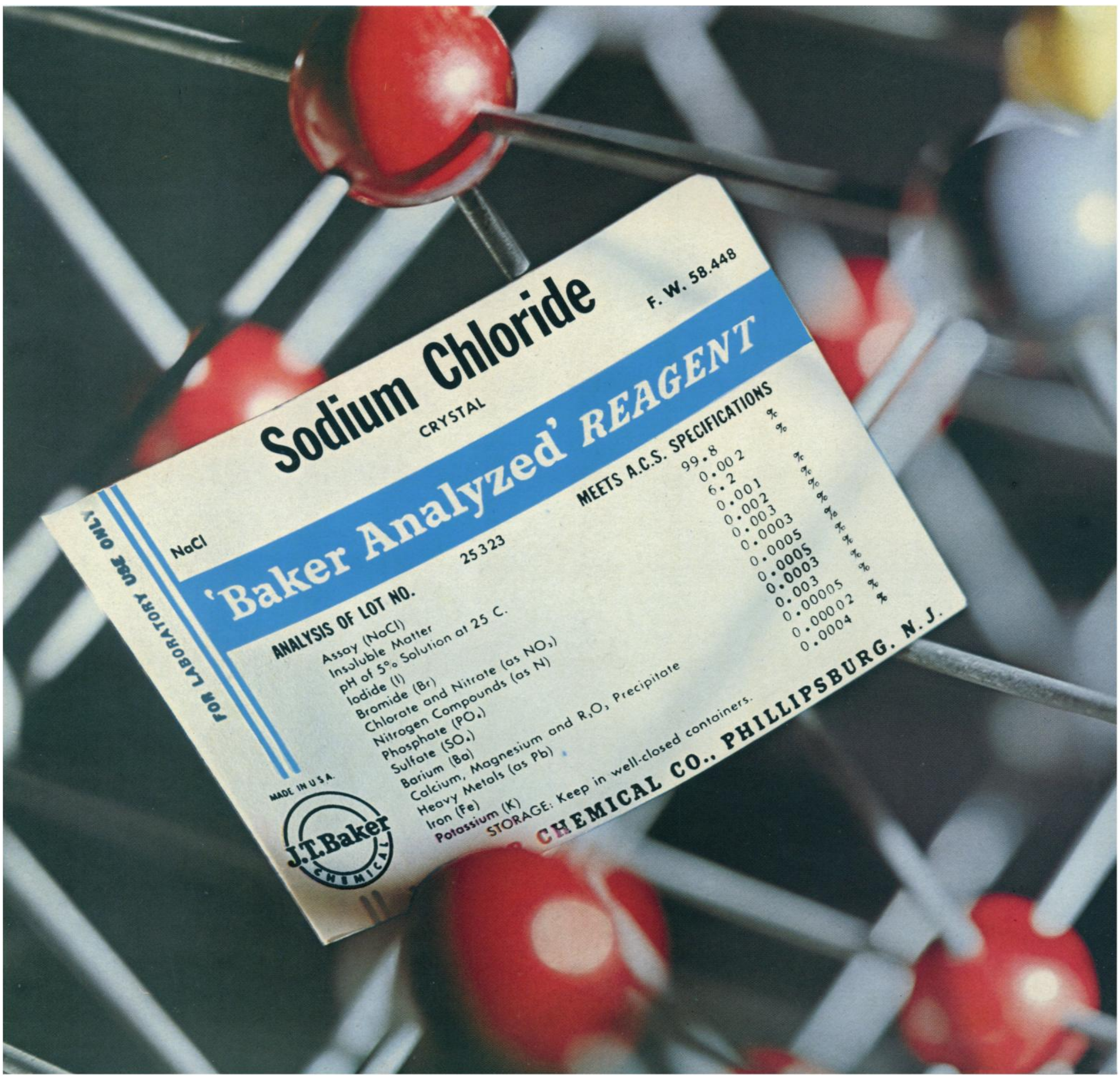

For reagents of highest purity...

Specify 'Baker Analyzed' -labeled with integrity!

Specify 'Baker Analyzed' reagents on your next order for laboratory chemicals. When you do, you're assured of reagents manufactured competently to the highest specifications of purity. We confirm the purity of every lot of reagent chemical we prepare and then put the actual analytical data on the label.

Check and compare the low level of impurities. Satisfy yourself that every 'Baker Analyzed' reagent is the finest available for your laboratory needs. Benefit from the latest innovations in safe

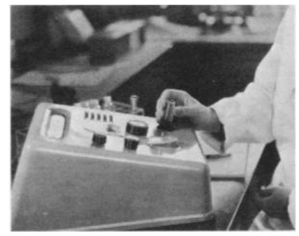
Impurities often become a part of the crystal lattice of the dominant material. The yellow spheres in the representation of the structure of crystalline sodium chloride denote bromide as the impurity.



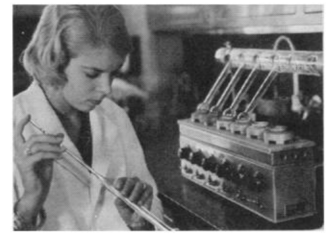
and convenient packaging, too.

You get delivery of 'Baker Analyzed' reagents on the date you specify from a near-by source of supply. Check the last page of this folder for a list of distributors in your area. Ask one of them for a copy of our latest "Specification Catalog and Price List." Or you can obtain a copy by mailing the coupon on the last page to us.

J.T.Baker Chemical Co. Phillipsburg, N.J.

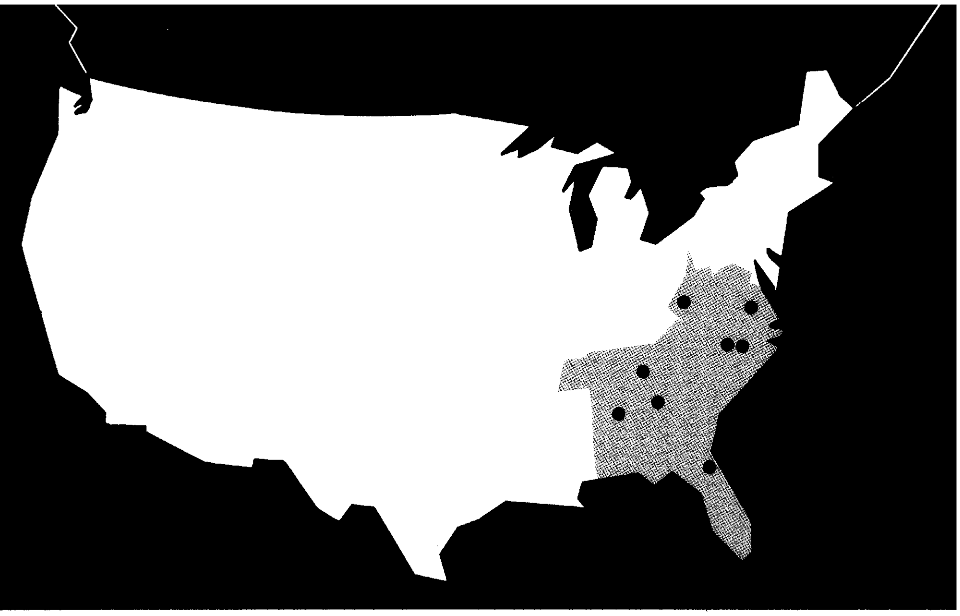


In the spectrophotometric method for iron, the low level of iron impurities in such 'Baker Analyzed' reagents as hydrochloric and nitric acids, ammonium hydroxide, and acetone instantly mark them as suitable for use.



'Baker Analyzed' sodium hydroxide, sodium sulfate, and sulfuric acid are widely used in Kjeldahl digestions for the determination of nitrogen. These J. T. Baker chemicals are produced and controlled for low content of nitrogen compounds and the actual analytical value—to the decimal—is on the Baker label.

One call speeds Baker laboratory chemicals to you



Well-balanced inventories of 'Baker Analyzed' reagents, laboratory equipment and apparatus are available in your local area. You're assured of fast delivery and on the exact date you specify. You also benefit from the personalized service of a laboratory supply representative . . . he's a good source of information on the latest laboratory chemicals and equipment, and he's experienced in solving difficult or unusual problems.

J.T. Baker Chemical Co. Phillipsburg, N.J.

ALABAMA

E. H. Sargent & Co.
3125 7th Avenue North
Birmingham 4
ALpine 1-5125

FLORIDA

W. H. Curtin & Co.
P. O. Box 606
Jacksonville
ELgin 5-5426

GEORGIA

W. H. Curtin & Co.
1782 Marietta Blvd., N.W.
Atlanta
799-7444

Will Scientific Inc. (Ga.)
P. O. Box 20155, Sta. N
Atlanta 25
TRinity 4-3872

Estes Surgical Supply Co.
410 W. Peachtree St. N.W.
Atlanta 8
JA 1-1700

NORTH CAROLINA

Cardinal Products, Inc.
P. O. Box 1611
Durham
681-2017

Carolina Biological Supply Co.
Burlington
584-8801

TENNESSEE

Fillauer Surgical Supplies Inc.
930 East Third St.
Chattanooga 1
267-1161

VIRGINIA

Phipps & Bird, Inc.
P. O. Box 2V
Richmond 5
MIlton 4-5401

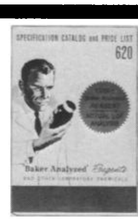
WEST VIRGINIA

Preiser Scientific, Inc.
900 MacCorkle Ave., S.W.
Charleston 22
343-5515

Will Scientific Inc. (W. Va.)
6318 MacCorkle Ave.
S. Charleston 9
POplar 8-1281

J. T. Baker Chemical Co.
Phillipsburg, N.J.

Please send me a copy of "620 Specification Catalog and Price List."



NAME____________________
POSITION____________________
COMPANY____________________
ADDRESS____________________
CITY__________ STATE__________ ZIP__________

Oxford University Press

Heredity and Development

By JOHN A. MOORE, Columbia University and Barnard College

Along with portions reprinted from Dr. Moore's distinguished text, *Principles of Zoology*, this book includes two new chapters on genetics and a new chapter on embryology. In addition to presenting the important modern developments in both fields, the text describes the early research work upon which these new discoveries are based.

1963 256 pp. 77 illus. paperbound $1.95

Foundations of Thermodynamics

By PETER FONG, Utica College of Syracuse University

Departing from the approach used in conventional textbooks, Professor Fong expounds a new formulation that gives a physical insight into thermodynamics without the use of elaborate mathematics. Basic concepts are carefully defined, especially those which are pivotal in theory, such as the concept of reversible process.

1963 110 pp. $2.50

An Introduction to Human Physiology

By J. H. GREEN, University of London at the Middlesex Hospital Medical School

The basic concepts of human physiology are presented as a framework to which additional knowledge may be added by attendance at systematic lectures or through study of larger textbooks, reviews and original papers. The book is designed for use by medical, dental, and nursing students.

1963 176 pp. 214 illus. paperbound $4.85
clothbound $8.00

Foundations of Psychopathology

By JOHN C. NEMIAH, M.D., Harvard Medical School and Massachusetts General Hospital

This excellent introduction to the basic principles of psychopathology focuses on clinical phenomena. Such fundamental topics as the dynamic unconscious, psychological conflict, repression, the childhood roots of emotional disorders, defenses, and symptom formation receive thorough coverage.

1961 352 pp. $6.50

Oxford University Press

417 Fifth Avenue
New York, N.Y. 10016

to beyond the midline on alternate faces, thus producing the rhomboidal cross section. There is little or no evidence of fine retouch on the lateral edges, although basal edges are usually thinned by the removal of small flakes longitudinally from the base toward the tip.

A third distinct type, the Frederick Point, newly discovered in a habitation location at the Hell Gap Site in eastern Wyoming, was discussed by Cynthia Irwin-Williams. This type, showing some affinities to the Angostura point, may represent regional variance of the Angostura type or a chronological development involving the Angostura, the Frederick, and the Jimmy Allen types. Since the Frederick Point, though distinct, bears more similarities to the Angostura than even the Agate Basin type, the diagnostic features of the Frederick point were carefully outlined.

The Frederick-type form is defined as large, wide, unstemmed, and lanceolate with a long slender tip and a wide concave base. Characteristically, the lateral edges run parallel at or above the midpoint. The blade is flat-lenticular in longitudinal section with a laterally asymmetrical "diamond" shape in cross section. The bifacial flaking is typically wide, shallow, oblique, and parallel, but with significant variation which includes both horizontal and oblique collateral orientation. The flaking runs from the lateral edges commonly beyond the midline from the same side and produces the common asymmetrical diamond cross section. There is frequent evidence of fine retouch on the lateral edges; basal edges are usually thinned by the removal of small flakes longitudinally from the base toward the tip. The base and proximal portions of the blade are commonly heavily ground.

Over 100 students and scientists attended the Paleo-Indian sessions, which consisted of 14 30-minute papers and three panel discussion periods. The panels were limited to discussion of the topics of Paleo-Indian problems in typology, terminology, and chronology. For the first time there seemed to be widespread agreement on most of the basic problems confronting early man research in the New World.

GEORGE A. AGOGINO
IRWIN ROVNER
Paleo-Indian Institute, Eastern New Mexico University, Portales
CYNTHIA IRWIN-WILLIAMS
American Museum of Natural History

Radiation Accidents and Emergencies

Local emergencies, small accidents, and major catastrophes involving ionizing radiation were the main topics of discussion at a symposium on radiation accidents and emergencies in medicine, research, and industry held in Chicago, 19–20 December 1963.

All pertinent aspects of a pure emergency situation were covered—accident dosimetry, handling of spills, medical aspects, mass survey problems, control of post-accident exposures, psychological and legal considerations, public relations, and others.

In most accident or emergency situations (that is, incidents resulting from accidents where prompt action is necessary), the intelligent attention and full capacity of the emergency worker should be directed to the following sequence of action: (i) The saving of lives (rescue operations, protection from further injury, and directing the victims back to active, useful lives); (ii) containment measures and prevention of further injury or threat of injury; (iii) salvage of equipment and materials; and (iv) turning the disaster site over to persons interested in or responsible for restoration.

The type of emergency action taken in an area where radiation has been released will depend on whether or not there is a reasonable expectation that anyone is present and alive. In either case, the course of action to be pursued should be determined by the person designated as responsible for the emergency action (E. Vallario and R. Catlin, U.S. Atomic Energy Commission). The risk to the rescue workers should be weighed against the probable success of the rescue action. Attempts to rescue victims should be regarded in the same context as any other emergency action involving the rescue of victims, regardless of the type of hazard involved. Any rescue activity that may involve substantial personal risk should be performed by volunteers, and all emergency workers should be advised of such risks prior to their participation.

From the legal point of view, Forgotson (Walter E. Meyer Research Institute of Law, Washington, D.C.) pointed out that a particularly complicated situation is presented when, for the purpose of attempting or effecting a rescue of persons involved in a disaster, or of preventing a disaster, it becomes necessary to expose individuals to doses of radiation in excess of 3 rem per quarter of a year and 25 rem for a single accidental exposure. He discussed the effect of these dose limitations and concluded that, on the basis of Federal Radiation Council publications, exceeding these doses does not constitute negligence per se and, in certain situations, even might not constitute evidence of negligence. (He further discussed a number of liability questions, including the potential liability of a manufacturer or seller of a source. In this connection, he called special attention to the recent product liability case of Goldberg versus Kallsman Instrument Corporation, a case which marked a departure from the way the New York Court of Appeals or any other court has previously handled one of these decisions. In this case, the majority of the court held that someone, namely, the ultimate manufacturer, is left in the role of a virtual insurer for the defective designs.)

The screening of persons exposed to radioactivity for medical attention, decontamination, or release is only a passing phase of the emergency situation although a most important one. Some controversy exists in the case of a contaminated person who requires medical treatment—which should come first, medical aid or decontamination? This question, of course, does not have a simple answer.

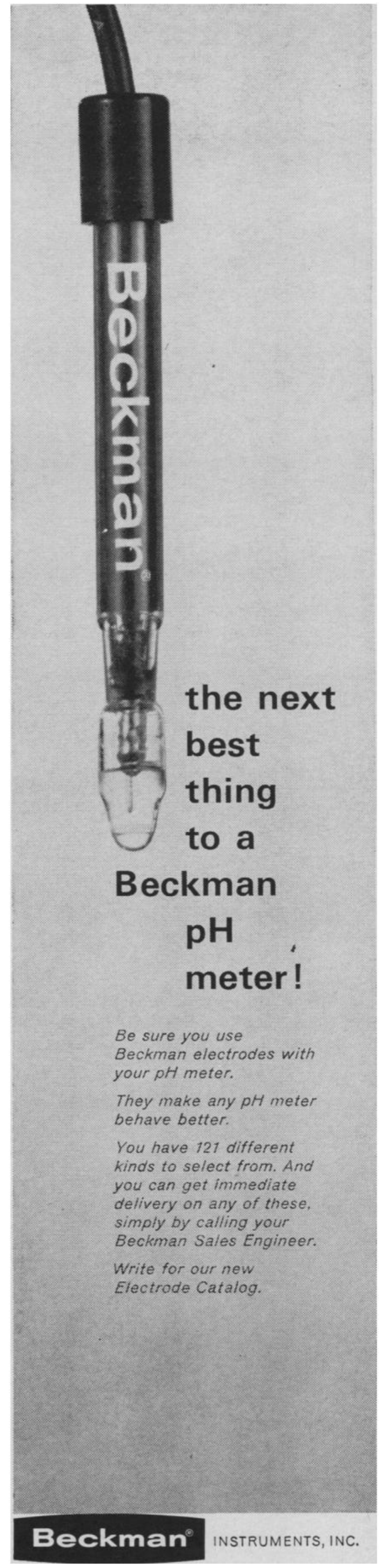
Speaking on medical effects, G. Voelz (U.S. Atomic Energy Commission, Idaho) stated that "The atomic energy industries to date have not experienced acute accidental exposures from internal emitters (any radioactive chemical entering the body either through the skin, pulmonary, or gastrointestinal tract) resulting in an acute or dramatic radiation injury similar to the direct external radiation exposures which produce the dramatic acute radiation syndrome." The concern regarding internal emitters is related more to the continuing radiation dose which may produce late pathological effects.

Inhalation of radioactive particulates or aerosols by workers has been the most common and important source of internal deposition in atomic energy installations. In the case of contaminated wounds, excision has been practiced most frequently when plutonium-239 was the contaminant. To evaluate the nature and amount of internally deposited radioactive material, G. V. LeRoy (University of Chicago) remarked that, at the outset, it is most important to collect all urine passed by each person from the time he escapes—or is removed—from the site of the accident. Depending on the circumstances, radioassay of the first urine voided may be of great value in estimating the accidental burden of radioactive material.

The art and science of methods for decontaminating equipment and materials have been vigorously pursued for the last two decades. L. Gemmell (Brookhaven) reviewed older as well as some new techniques, such as shot blasting. Speaking on maximum permissible levels of surface contamination, W. R. Bush (Chalk River, Canada) pointed out that these levels varied by a factor of 1000 for alphas and 100 for betas among the various countries that use radioactive isotopes. He also developed data showing that, for a given surface contamination of a material, the inhalation hazard varied by a factor of 1,000,000, with carbon-14 at the lowest limit and plutonium-239 at the upper limit. J. Maloney (Edgewood Arsenal, Edgewood, Maryland) reported on new effective procedures of major outdoor decontamination under cold weather and winter conditions. (Many portable radiation measuring instruments fail to operate while at low temperatures.)

The spread of alpha contamination, which is caused by a nonnuclear explosion (chemical part) of atomic weapons, has been a subject of concern for many years. The most extensive measurements ever made in this field were reported on for the first time by W. Johnson, Sr. (Eberline Instrument Company). The detonations were designed to simulate conditions of storage, transportation, and handling of plutonium-bearing weapons. Surveys were performed with both alpha and gamma instruments at distances up to 16 kilometers. As one might expect, drastic changes in the contamination patterns were observed from one test shot to another.

The generation and disposal of waste in emergency decontamination is of little consequence in most accidents involving radioactivity (R. O'Brien, General Electric Company, Idaho). This is due in part to the well-established waste disposal channels. In unusual situations such as the



SCIENTIFIC AND PROCESS INSTRUMENTS DIVISION
FULLERTON, CALIFORNIA

INTERNATIONAL SUBSIDIARIES: GENEVA, SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND; PARIS, FRANCE; TOKYO, JAPAN; CAPETOWN, SOUTH AFRICA

The abc's of Lab Safety

TSI

(Time Sterile Indicator)

Begin and end with T S I

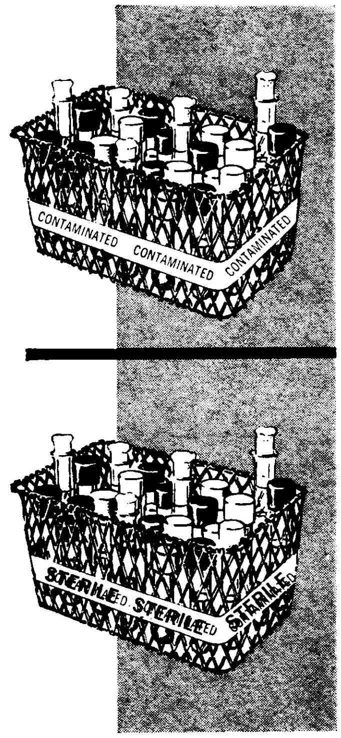
Conversion Label

a In all biological functions, preparation of glassware should start with a TSI Conversion Label that shows the word "CONTAMINATED" to identify its condition.

b When glassware is sterilized, the term "CONTAMINATED" is converted to the word "STERILE," thus eliminating human errors and articulating service product has had.

c All specimens are considered "CONTAMINATED" and sterilizing should be repeated before dangerous material is disposed of.

The TSI Conversion Label is the only label showing a color change at 250° F. after 15 minutes in the autoclave.



See your nearest hospital or laboratory supplier for service.

Leading laboratories now use this system to safeguard the health of their personnel.

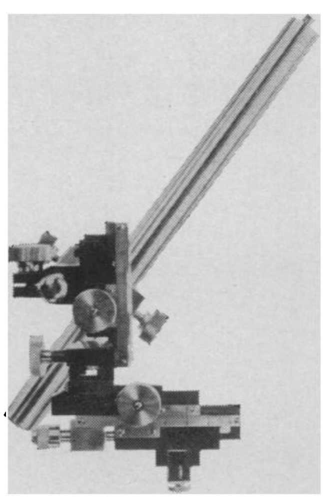
TIME LABELS

Write today for samples and complete description.

PROFESSIONAL TAPE CO., INC.

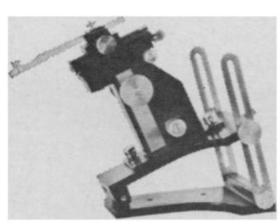
365H BURLINGTON RIVERSIDE, ILLINOIS

MICRO MANIPULATORS



Miniature Micro Manipulator

$125



MK-2

XYZ Horizontal & Tilting Movements

$290

Singer Microdissector

$350

ERIC SOBOTKA *Company, Inc.*

112 West 40th Street, New York, N.Y. 10018 .. 212, WI. 7-9216

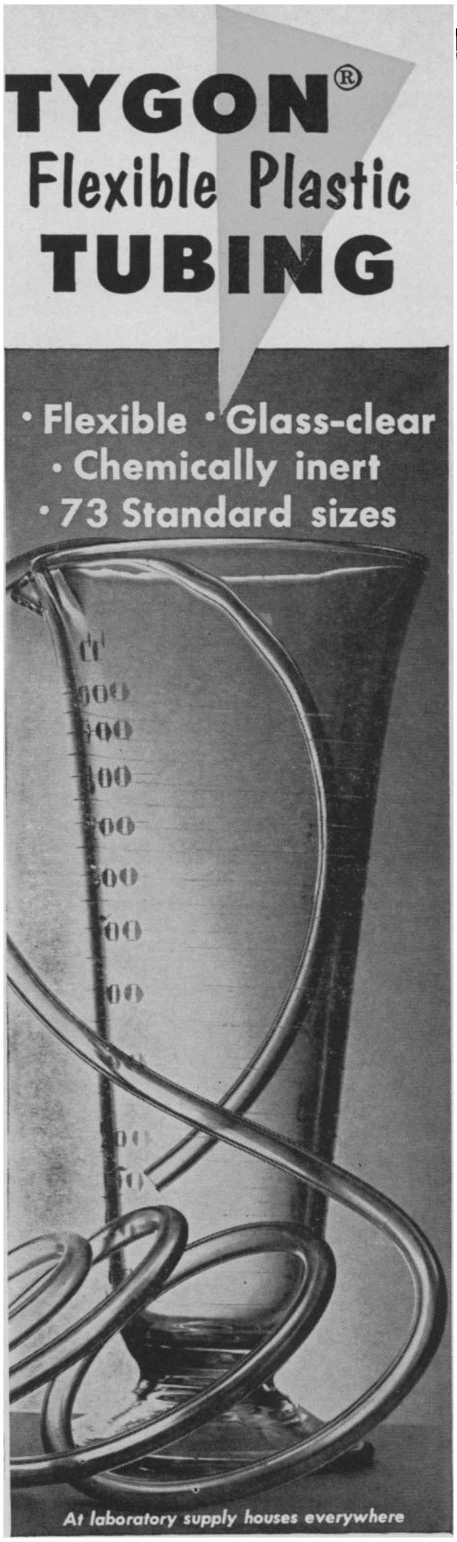
SL-1 reactor incident where, after 5 months' decay, about 3500 curies of fission products were distributed as contamination throughout the reactor building and its environs, the use of a local waste disposal site saved more than 300 man-rem of exposure. It is estimated that the cumulative total whole-body dose of 1000 rem was received by those who were involved in the cleanup. The cost of cleanup was $1 million, not counting the cost of volunteer and Army workers.

R. Gallaghar (Applied Health Physics, Pittsburgh) reported a wide range of restoration effort for the decontamination of radium spills in medical situations. In one situation an entire building had to be demolished. There is on the average one radium contamination incident a week in the United States.

Unlike many types of accidents, those involving radiation can go undetected for an extended period of time. Such delays can lead to considerable spread of the contamination.

The topic of public relations was assigned to the well-known science reporter, Robert S. Kleckner (*Sun-Times*, Chicago), rather than to an institutional public relations person. Kleckner stated that the first step in reporting an accident is to avoid any type of censorship and to get the facts to the people as quickly and simply as possible. If there is a hazard beyond the confines of an installation, it should be stated that this is so and how great it is. The public should be informed about the precautions to be taken. There should be a steady flow of information to the news media until the story has been covered from all angles. There are reassurances even in bad radiation mishaps; the good as well as the bad should be brought out. The American public has never panicked when it knew the truth immediately.

Preplanning and preparedness are the keys to reducing the deleterious effects of accidents. R. Landauer (Cook County Hospital, Chicago) and G. V. LeRoy (University of Chicago) spoke on hospital preparedness but differed greatly on the approach. LeRoy stressed preplanning between a given radiation installation and a nearby hospital for the care of injuries that may occur. Landauer, on the other hand, stressed the need for a simple plan for all hospitals because accidents, especially transport accidents, may occur anywhere.



There is only one Tygon Tubing, a product of The United States Stoneware Company. For your protection, every foot is branded with the Tygon name and formulation number.

Plastic & Synthetics Division

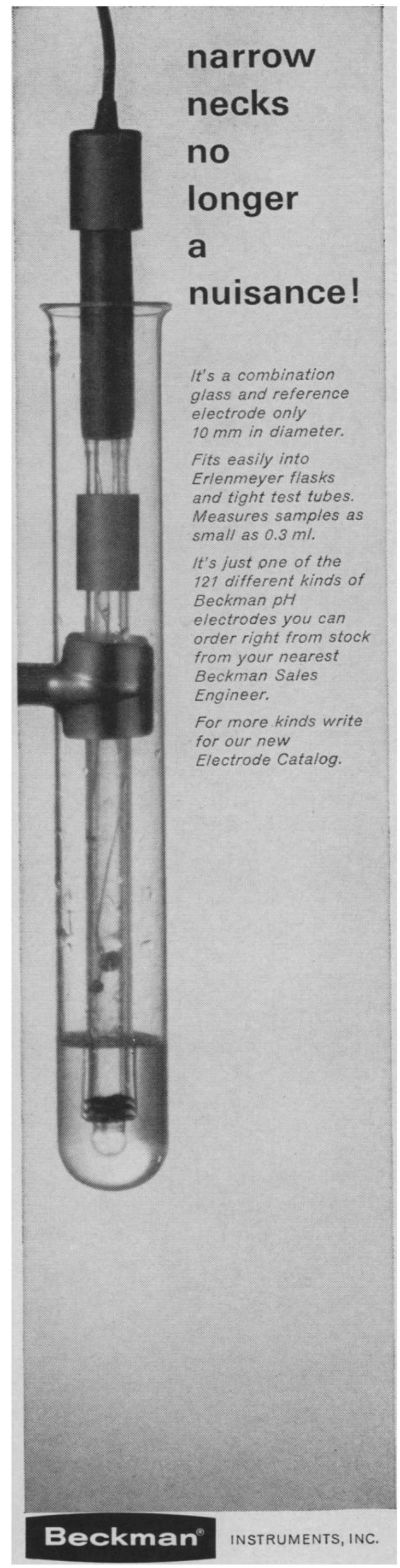
254-J

U. S. STONEWARE
Akron, Ohio 44309

Emergency situations produce anxieties in those who are directly involved. D. Oken (Chicago), a psychiatrist, talked on mental preparedness of emergency personnel, both as individuals and as groups. Emergency teams must be suffused with a strong *esprit de corps*; members of a group with high morale become capable of carrying out tasks that are personally unappealing or even severely stressful. The group may admit to a certain degree of internal fear, but disparagement of the group itself or self-protective avoidance of responsibilities to one's co-workers is intolerable. Individuals who transgress these limits must be excluded. Panic, however, is rare. Little was seen at Hiroshima or Nagasaki. Emergency teams should be supplied with a maximum of correct information and be trained in the most helpful methods of communicating this to victims. The antidote to scare stories and rumors is information. Even if the news is bad, it is always reassuring to know that you know the worst. On the question of prevention, Oken pointed out that accidents tend to occur in clusters during periods in which other signs of psychological stress are evident—the accident syndrome. Subtle changes in the behavior pattern of an individual may be precursors to a major accident.

In the event of a radiation accident that cannot be handled by the organization in which it occurs, there are some private organizations that might be called in. In addition to these, the U.S. Atomic Energy Commission has a Radiological Assistance Program. Zintz (U.S. Atomic Energy Commission, Washington) and Brobst (U.S. Atomic Energy Commission, Chicago) reported on the program which is capable of responding to a radiological emergency upon request 24 hours a day anywhere in the United States. During the last 3 years 223 responses to requests for radiological assistance were made. Most of these (40 percent) involved transportation incidents.

The Radiological Health Division, U.S. Public Health Service, has a somewhat broader program, although it too has Radiological Assistance Teams. R. Moore (U.S. Public Health Service, Dallas) and L. Thomas (U.S. Public Health Service, Chicago) outlined the role of the U.S. Public Health Service in the radiation area along with its traditional role of pro-



SCIENTIFIC AND PROCESS INSTRUMENTS DIVISION
FULLERTON, CALIFORNIA

INTERNATIONAL SUBSIDIARIES: GENEVA, SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND; PARIS, FRANCE; TOKYO, JAPAN; CAPETOWN, SOUTH AFRICA

book news from

W & W

new for all who work in laboratory investigation

König & Klippel:
THE RAT BRAIN

A Stereotaxic Atlas of the Forebrain and Lower Parts of the Brainstem

The atlas presents the details of a rat's functional neuroanatomy by a series of photographs of frontal and saggital sections, placed side by side with line drawings of the same structures. These line drawings enable the investigator to a) orient himself by means of an easy-to-follow 3-dimensional coordinate system, b) determine the precise location of specific structures, and c) determine the specific functions associated with these structures. Since the rat is the most frequently used animal in current bio-medical research, Drs. Konig & Klippel perform here a vital and lasting service to modern researchers in many fields.

1963 170 pp., 129 figs. $15.00

THE WILLIAMS & WILKINS COMPANY

428 E. PRESTON STREET
BALTIMORE, MARYLAND 21202

Publishers of Books and Periodicals in Medicine and the Allied Sciences.

tection of public health. An Interagency Radiological Assistance Plan involving 12 federal agencies has been formed. The members of the symposium were gratified to learn of the wide interest shown by the federal government.

The 350 individuals who attended the symposium came mainly from the midwestern states. The geographical location of the visitors included 28 continental states, Hawaii, Puerto Rico, Canada, and Austria. The percentage of institutional representation was 28 percent industrial or commercial, 17 percent U.S. Atomic Energy Commission or contractors, 14 percent public health, 12 percent space and defense, 11 percent university, and 7 percent hospital. The remainder included attendance from insurance companies, labor unions, research institutions, and private individuals.

The symposium was sponsored by the Midwest Chapter of the Health Physics Society, the Radiation and Medical Physics Society of Illinois, and the Chicago Section of the American Industrial Hygiene Association. Robert V. Wheeler (Argonne National Laboratory) served as chairman. The symposium was supported in part by the Division of Radiological Health, U.S. Public Health Service.

LAWRENCE H. LANZL
Department of Radiology and Argonne Cancer Research Hospital, University of Chicago, Chicago, Illinois

JOHN H. PINGEL
Argonne National Laboratory, Argonne, Illinois

Forthcoming Events

March

27–28. **Seismological** Soc. of America, annual, Seattle, Wash. (K. V. Steinbrugge, SSA, 465 California St., San Francisco 4, Calif.)

27–28. **Pennsylvania Acad. of Science**, University Park, Pa. (P. C. Martin, Point Park Junior College, Pittsburgh, Pa.)

27–29. Society for the Study of **Evolution**, annual, Chapel Hill, N.C. (H. H. Ross, Illinois Natural History Survey, Urbana)

28–30. American Assoc. of Colleges of **Pharmacy**, Detroit, Mich. (C. W. Bliven, 1507 M St., NW, Washington, D.C. 20005)

29–2. Association of American **Geographers**, annual, Syracuse, N.Y. (AAG 1201 16th St., NW, Washington, D.C.)

30–2. American Assoc. of **Junior Colleges**, Bal Harbour, Fla. (W. G. Shannon, AAJC, 1777 Massachusetts Ave., NW, Washington, D.C. 20036)

30–4. **Estuaries** Conf., Sapelo Island, Ga. (G. H. Lauff, Sapelo Island Research Foundation, Sapelo Island)

31–3. American Assoc. of **Anatomists**, Denver, Colo. (L. B. Flexner, Dept. of Anatomy, Univ. of Pennsylvania, Philadelphia 4)

April

1. **Thermoplastic Materials**, conf., Soc. of Plastics Engineers, Akron, Ohio. (W. H. Nicol, RETEC, Goodyear Tire and Rubber Co., Akron 16)

1–2. **Engineering Aspects of Magnetohydrodynamics**, symp., Cambridge, Mass. (G. S. Janes, Avco Everett Research Laboratories, Everett 49, Mass.)

1–2. Methods for Measurement of **Weak Beta-Emitters**, Karlsruhe-Leopoldshaven, Germany. (Gesellschaft Deutscher Chimiker, Gesellschaftsstelle, Postfach 9075, Frankfurt/Main, Germany)

1–3. **Structures and Materials**, American Inst. of Aeronautics and Astronautics, 5th annual conf., Palm Springs, Calif. (R. R. Dexter, AIAA, 2 E. 64 St., New York.

1–3. **Optical** Soc. of America, spring meeting, Washington, D.C. (M. E. Warga, OSA, 1155 16th St., NW, Washington, D.C. 20036)

1–4. National Soc. for **Programmed Instruction**, annual, San Antonio, Tex. (NSPI Program Committee, Trinity Univ., 715 Stadium Dr., San Antonio, Tex.)

1–5. Latin **Oto-Rhino-Laryngology** Soc., 15th congr., Bologna, Italy. (G. Motta, Via Modica 6, Milan, Italy)

2–3. American Soc. of **Civil Engineers**, Engineering Mechanics Div., spring conf., Boston, Mass. (ASCE, 33 W. 39 St., New York 18)

2–3. Alexander Graham Bell Assoc. for the **Deaf**, southeastern meeting, New Orleans, La. (R. Tegeder, Utah School for the Deaf, 846 20th St., Ogden)

2–3. **Obstetrics and Gynecology**, seminar, Gainesville, Fla. (Mrs. D. Miller, Div. of Postgraduate Education, College of Medicine, Univ. of Florida, Gainesville)

2–3. Industrial Applications of New **Technology**, conf., Atlanta, Ga. (Director, Short Courses and Conferences, Georgia Inst. of Technology, Atlanta, Ga. 30332)

2–4. American Acad. of **Oral Pathology**, Bethesda, Md. (R. J. Gorlin, Univ. of Minnesota, Minneapolis)

2–4. Association of **Surgeons** of Great Britain and Ireland, annual, St. Andrews, Scotland (Secretariat, 47 Lincoln's Inn Fields, London, W.C.2, England)

2–5. British **Medical** Assoc., clinical meeting, Northampton, England. (D. Gullick, Tavistock Sq., London, W.C.1)

3–4. **Biology** colloquium, Corvallis, Ore. (C. M. Gilmour, School of Science, Oregon State Univ., Corvallis)

3–4. Society for **Industrial and Applied Mathematics**, midwest regional meeting, Cedar Rapids, Iowa. (W. J. Jameson, Collins Radio Co., 120–11, Cedar Rapids)

3–5. **Fleming's Lysozyme**, 3rd intern. symp., Milan, Italy. (G. Podio, Museo della Scienza e della Tecnica, Via Modica, 6, Milan)

3–5. American Soc. of **Internal Medicine**, annual, Atlantic City, N.J. (A. V.

Whitehall, 3410 Geary Blvd., San Francisco, Calif.)

3–5. American Assoc. of **Pathologists and Bacteriologists**, annual, Chicago, Ill. (E. A. Gall, Dept. of Pathology, Cincinnati General Hospital, Cincinnati 29, Ohio)

4. **Arizona Acad. of Science**, Tempe. (H. B. Whitehurst, Dept. of Chemistry, Arizona State Univ., Tempe)

4–5. American **Psychosomatic** Soc., San Francisco, Calif. (C. Binger, 265 Nassau Rd., Roosevelt, N.Y.)

4–6. **Neurobiology**, 2nd symp. (by invitation), Phoenix, Ariz. (E. Eidelberg, Barrow Neurological Inst., St. Joseph's Hospital, 350 W. Thomas Rd., Phoenix)

5–8. International Acad. of **Pathology**, annual, Chicago, Ill. (F. K. Mostofi, Armed Forces Inst. of Pathology, Washington, D.C. 20012)

5–10. American **Chemical Soc.**, 147th natl., Philadelphia, Pa. (A. T. Winstead, 1155 16th St. NW, Washington, D.C.)

5–10. Asia-Pacific Acad. of **Opthalmology**, 2nd congr., Melbourne, Australia. (R. N. Mellor, 82 Collins St., Melbourne C1)

6–8. **Nonlinear Magnetics** Conf., Washington, D.C. (R. C. Barker, Dept. of Engineering and Applied Science, Yale Univ., New Haven, Conn.)

6–8. Association of Schools of **Public Health**, annual, Toronto, Ont., Canada. (R. E. Coker, Jr., Drawer 229, Chapel Hill, N.C. 27515)

6–9. French Soc. of **Biological Chemistry**, 50th, Paris. (P. Malangeau, 4 Avenue de l'Observatoire, Paris 6^e)

7–9. **Atomic Energy** Soc. of Japan, Tokyo. (Atomic Energy Research Inst., 1-1, Shiba-tamura-cho, Minato-ku, Tokyo)

7–9. **Chemical Soc.**, Birmingham, England. (General Secretary, Burlington House, London, W.1, England)

7–11. Applied **Mathematics and Mechanics**, Giessen, Germany, (K. Maruhn, Mathematisches Institut, Justus Liebig Univ., Giessen)

8–10. **Textile Research** Inst., 34th, New York, N.Y. (TRI, Princeton, N.J.)

9. **British Cardiac** Soc., annual, London, England. (J. Shillingford, Postgraduate Medical School, Ducane Rd., London, W. 12)

9–11. American Assoc. for **Cancer Research**, annual, Chicago, Ill. (H. J. Creech, AACR, Institute for Cancer Research, Fox Chase, Philadelphia 11, Pa.)

9–11. Association of **Clinical Pathologists**, spring meeting, London, England. (G. Cunningham, Dept. of Pathology, 47 Lincoln's Inn Fields, London, W.C.2)

9–11. **Geological** Soc. of America, southeastern section, Baton Rouge, La. (R. J. Martin, 1426 Harvard Rd., NE, Atlanta, Ga.)

9–11. Southwestern **Psychological** Assoc., annual, San Antonio, Tex. (C. C. Cleland, 2104 Meadowbrook Dr., Austin, Tex. 78703)

9–13. **Roentgen** Congr., German, Wiesbaden, Germany. (H. Lossen, Deutscher Röntgenkongress, Fichterplatz 20 III, Mainz, Germany)

10. **Natural Phenolic Compounds**, symp., Tokyo, Japan. (M. Shimokoriyama, Dept. of Botany, Univ. of Tokyo, Hongo, Tokyo)

10–11. American **Laryngological** Assoc., San Francisco, Calif. (L. G. Richards, 12 Clovelly Rd., Wellesley Hills 82, Mass.)

10–11. Association of **Physicians** of Great Britain and Ireland, annual, Oxford, England. (G. de J. Lee, Dept. of Medicine, Radcliffe Infirmary, Oxford)

11. **Paleontological Research** Inst., Ithaca, N.Y. (R. S. Harris, 109 Dearborn Place, Ithaca)

11–12. **Histochemical Soc.**, 15th annual, Chicago, Ill. (A. D. Deitch, Dept. of Microbiology, Columbia Univ., 630 W. 168 St., New York 32)

12. **Industrial Fibers**, European inst., Milan, Italy. (F. Tommy-Martin, 40 rue du Stand, Geneva, Switzerland)

12–13. American Soc. for **Artificial Internal Organs**, Chicago, Ill. (B. K. Kusserow, Dept. of Pathology, Univ. of Vermont College of Medicine, Burlington)

12–17. Federation of American Societies for **Experimental Biology**, Chicago, Ill. (H. B. Lemp, The Federation, 9650 Wisconsin Ave., NW, Washington, D.C. 20014)

12–17. Society of **Motion Picture and Television Engineers**, semiannual technical conf., Los Angeles, Calif. (J. M. Waner, Eastman Kodak Co., 6706 Santa Monica Blvd., Hollywood 38, Calif.)

12–18. Chemistry of **Natural Products**, intern. symp., Kyoto, Japan. (Science Council of Japan, Ueno Park, Tokyo, Japan)

13–15. Institute of **Environmental Sciences**, annual, Philadelphia, Pa. (J. Breen, RCA Bldg., 10-1-2, Camden 2, N.J.)

13–15. **Microelectronics**, 3rd annual symp., St. Louis, Mo. (T. F. Murtha, P.O. Box 4104, St. Louis, Mo. 63136)

13–16. American Acad. of **General Practice**, Atlantic City, N.J. (M. F. Cahal, Volker Blvd. at Brookside, Kansas City 12, Mo.)

13–16. **Industrial Health**, conf., Pittsburgh, Pa. (American Industrial Health Conf., 55 E. Washington St., Chicago, Ill. 60602)

13–16. **Industrial Medical** Assoc. and American Assoc. of **Industrial Nurses**, Pittsburgh, Pa. (C. D. Bridges, 55 E. Washington St., Chicago, Ill. 60602)

13–16. American **Radium** Soc., White Sulphur Springs, W. Va. (J. J. Stein, U.C.L.A. Medical Center, Los Angeles 24, Calif.)

13–17. **Fluid Power**, intern. conf. and exhibition, London, England. (Secretary of the Conference, The Tower, 229-243 Shepherds Bush Rd., Hammersmith, London, W.6)

14–16. **Power** Conf., Chicago, Ill. (W. A. Lewis, Illinois Inst. of Technology, Chicago)

14–18. Primary Disorders of **Heart Muscle** (by invitation), CIBA Foundation symp., London, England (CIBA, 41 Portland Pl., London, W.1)

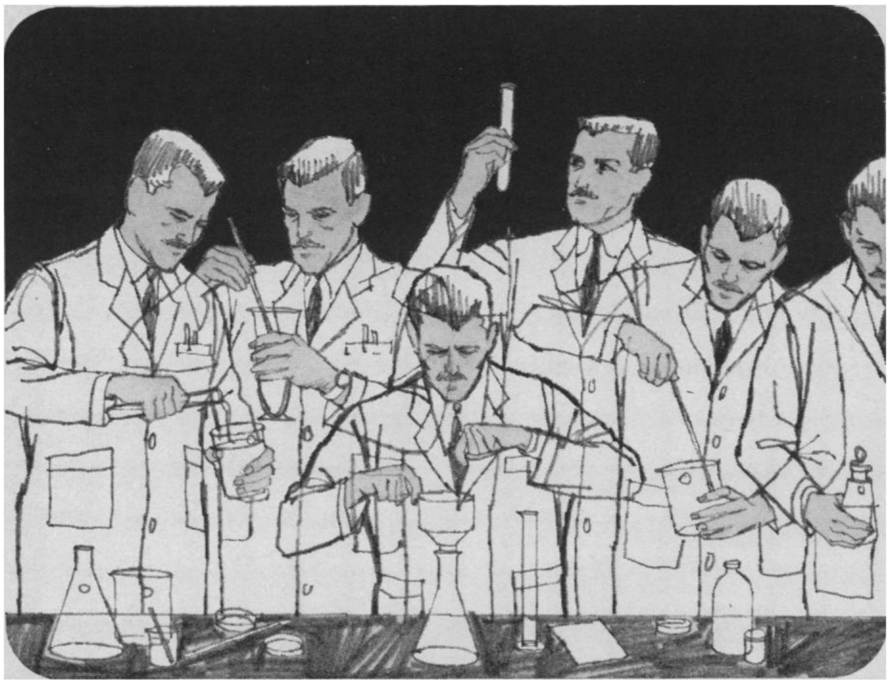
14–18. **Mathematical Logic**, conf., Oberwolfach, Germany. (M. Barner, Mathematisches Forschungs-institut, Hebelstr. 29, 78 Freiburg im Breisgau, Germany)

15–17. **High Energy Physics**, conf., Chilton, England. (Inst. of Physics and the Physical Soc., 47 Belgrave Sq., London S.W.1, England)

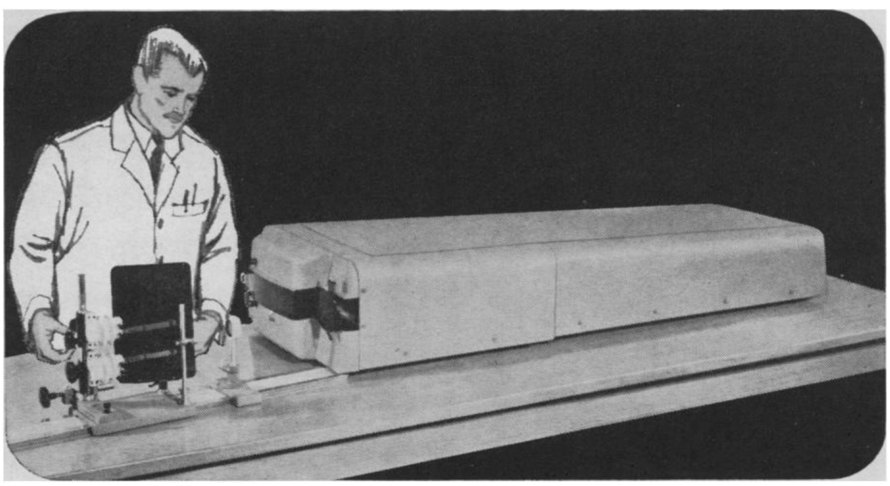
15–17. **Ophthalmological** Soc. of the United Kingdom, annual, Dublin, Ireland. (Secretariat, 47 Lincoln's Inn Fields, London, W.C.2, England)

SCIENTIFIC AND PROCESS INSTRUMENTS DIVISION
FULLERTON, CALIFORNIA

INTERNATIONAL SUBSIDIARIES: GENEVA, SWITZERLAND; MUNICH, GERMANY; GLENROTHES, SCOTLAND; PARIS, FRANCE; TOKYO, JAPAN; CAPETOWN, SOUTH AFRICA



"Wet Method" analyses
take five-and-a-half times longer...



than the accurate, low-cost
Bausch & Lomb Spectrograph way

Let our Consultation Service help you evaluate the need for spectro-analytical methods in your own industrial, research or academic program. No cost or obligation, of course. Just mail the coupon.

BAUSCH & LOMB

BAUSCH & LOMB
INCORPORATED
75903 Bausch Street
Rochester 2, N. Y.

☐ Schedule free Consultation at my convenience.
☐ Send me B&L Spectrograph Catalog D-277.

Name ....

Company ....

Address ....

City ....

15–18. British **Paediatric** Assoc., annual, Scarborough, England. (E. W. Hart, Inst. of Child Health, Hospital for Sick Children, Great Ormond St., London, W.C.1)

15–18. American Soc. for **Public Administration**, natl. conf., New York, N.Y. (ASPA, 6042 Kimbark Ave., Chicago, Ill.

15–18. **International Scientific Radio Union** (URSI), spring meeting, Washington, D.C. (M. G. Morgan, U.S. Natl. Committee, URSI, Dartmouth College, Hanover, N.H.)

16–17. **Fiber Soc.**, spring meeting, Charlotte, N.C. (I. Rebenfeld, P.O. Box 625, Princeton, N.J.)

16–17. **Textile** Inst., annual conf., Leeds, England (D. B. Moore, 10 Blackfriars St., Manchester 3, England)

16–18. Eastern **Psychological** Assoc., Philadelphia, Pa. (M. A. Iverson, Queens College, Flushing 67, N.Y.)

16–18. Teaching of **Foreign Languages**, 1964 northeastern conf., Washington, D.C. (S. Isaacs, 1110 Patterson Plank Rd., North Bergen, N.J.)

16–18. Western **Psychological** Assoc., annual, Portland, Ore. (J. Matarazzo, Univ. of Oregon Medical School, Portland)

16–19. Cooper **Ornithological** Soc., annual, San Diego, Calif. (C. V. Duff, 2911 Antelo View Dr., Los Angeles 24, Calif.)

17–18. **Arkansas Acad. of Science**, Conway. (R. R. Corey, Dept. of Botany and Bacteriology, Univ. of Arkansas, Fayetteville)

17–18. **Iowa Acad. of Science**, Decorah. (D. C. Foley, Iowa State Univ., Ames)

17–18. **Resonance Physics**, New York State section, American Physical Soc., Corning, N.Y. (J. T. Kerr, Corning Glass Works, Corning)

17–19. Association of Southeastern **Biologists**, 25th annual, Atlanta, Ga. (W. D. Burbanck, Dept. of Biology, Emory Univ., Atlanta)

18–23. American **Ceramic** Soc., 66th annual, Chicago, Ill. (ACeS, 4055 N. High St., Columbus 14, Ohio)

19–22. Association for **Educational Data Systems**, natl. conv., Santa Barbara, Calif. (J. Caffrey, System Development Corp., Santa Monica)

19–22. American **Oil Chemists'** Soc., 55th spring meeting, New Orleans, La. (AOCS, 35 E. Wacker Dr., Chicago 1, Ill.)

19–25. **Aerospace Electrotechnology**, intern. conf., Phoenix, Ariz. (A. A. Sorensen, Mail 3016, The Martin Co., Baltimore 3, Md.)

20–21. **Solar-Terrestrial Relationships**, symp. of Intern. Scientific Radio Union, American Geophysical Union, American Astronomical Soc., Washington, D.C. (M. G. Morgan, U.S. Natl. Committee, URSI, Dartmouth College, Hanover, N.H.)

20–22. **Radioisotope** Conf., 2nd annual, Gatlinburg, Tenn. (R. T. Overman, Special Traning Div., Oak Ridge Inst. of Nuclear Studies, P.O. Box 117, Oak Ridge, Tenn.)

20–23. American **Mathematical** Soc., New York, N.Y. (G. L. Walker AMS, 190 Hope St., Providence, R.I.)

20–24. **Medical Radioisotope Scanning**, symp., Athens, Greece. (E. H. Belcher, Div. of Isotopes, IAEA, Kärntnerring 11, Vienna 1, Austria)