SCIENCE

9 January 1959

Volume 129, Number 3341

Editorial

Putting Heads Together 67

Articles

Ecology, Paleontology, and Stratigraphy: *H. S. Ladd* 69

Understanding of the habits of living organisms aids interpretations of fossiliferous sediments.

IGY Conference in Moscow: *H. E. Newell, Jr.; J. W. Townsend, Jr.* 79

Reports on the organizational setup and on the Soviet presentation of their rocket and satellite work.

News of Science

Federal Council for Science and Technology; other events 85

Book Reviews

L. Thorndike's *A History of Magic and Experimental Science,* reviewed by *R. P. Multhauf*; other reviews 90

Reports

Possible Relation between Marine Fungi and Limnoria Attack on Submerged Wood: *D. L. Ray* and *D. E. Stuntz* 93

Zinc-65 in Foods and People: *R. W. Perkins* and *J. M. Nielsen* 94

Studies on 4-Keto-L-Proline: *C. Mitoma* et al. 95

Direct Observation of Evaporation from Quiescent Water: *K. J. Mysels* 96

Cotton-Flower Visitation and Pollen Distribution by Honey Bees: *S. E. McGregor* .. 97

Phospholipase-Induced Release of Cytochrome *c* from the Electron Transport Particle: *K. S. Ambe* and *F. L. Crane* 98

Multiple *p*H Levels in Chromatograms: *A. A. Bitancourt* and *A. P. Nogueira* 99

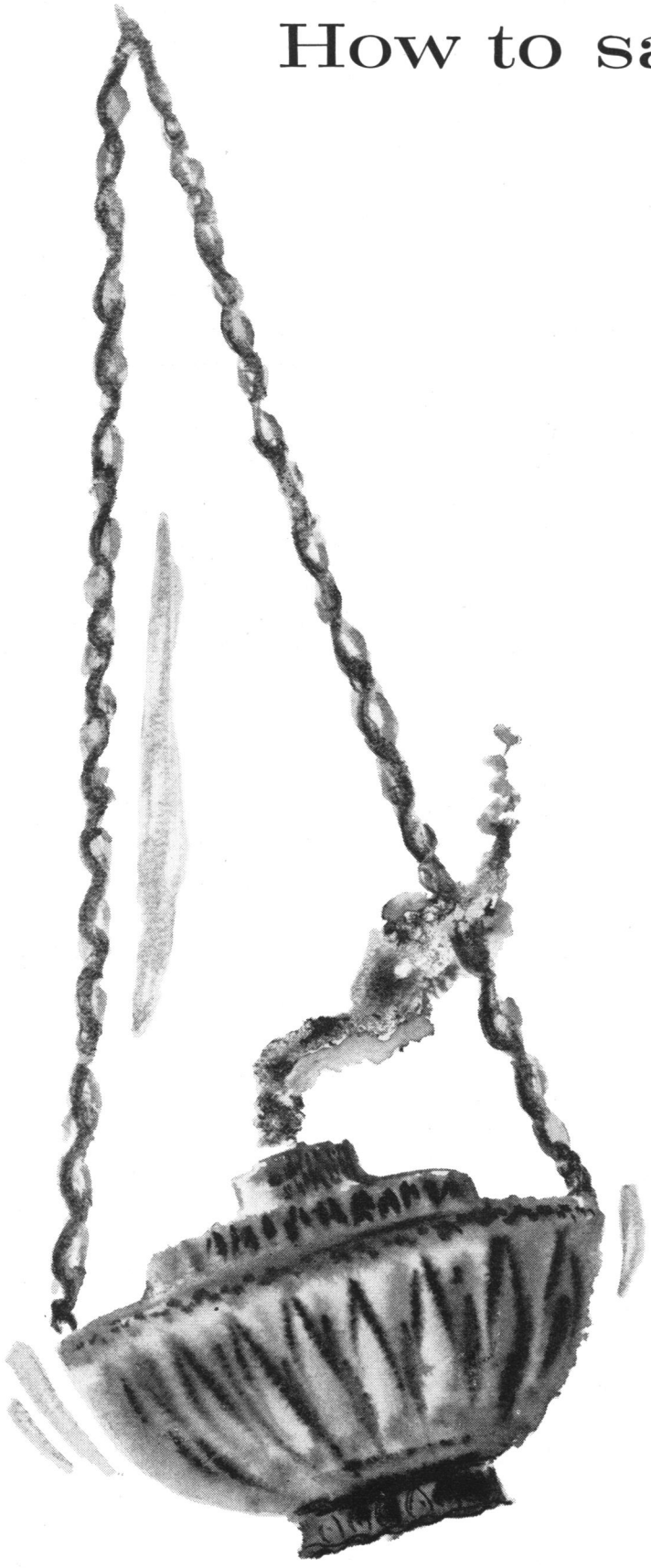
Departments

Letters 60

Subcellular Particles; Forthcoming Events; Equipment 100

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

How to save 77 years



The boy Galileo sat in the sanctuary of Pisa's great cathedral, observing the movement of a lamp which had been set swinging by a sudden gusty draft. The chain by which it was suspended from the high ceiling was of such a length that the arcs decreased but slowly. Strange thing, though. No matter how far the pendulum swung, its movement consumed the same time. Galileo made a note of that. The year was 1581.

The old man sat at his writing desk, sixty years and a thousand disputes later, writing down a new theory. The regularity of a swinging pendulum might be combined with a spring mechanism to improve the unreliable clocks of that day. So Galileo scribbled on, and did nothing more about it. A number of years after his death Huygens took the notes and invented the pendulum clock. *Seventy-seven years had elapsed since the boy made the observation upon which it was based!*

The creative thinker today still need not have a specific use in mind when, by equation or formula, he branches off from the accepted to the hitherto unknown. The classic invention of this decade, the transistor, evolved in the Bell Telephone Laboratories as scientists sought a deeper understanding of semiconductors. On the other hand, another great invention, the feedback amplifier, came from the acutely creative mind of one Bell engineer faced with a specific problem.

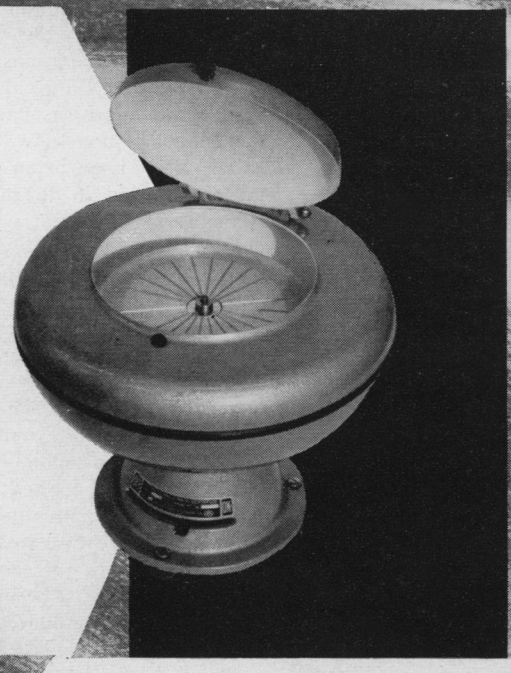
Current Bell Laboratories activities—in such areas as data transmission, radar and submarine cable development—call for the coordinated efforts of all types of thinkers and all types of approaches. One type complements another.

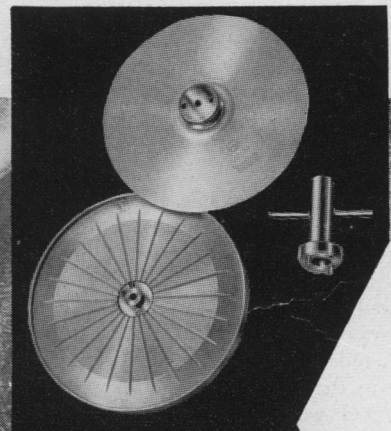
Today, seventy-seven years would not have elapsed between the swinging lamp and the swinging clock pendulum—certainly not at Bell Labs, where ideas, though not rushed, are carefully advanced toward fruitful application in national defense, industry and communications. An important part of this harvest is the efficiency of America's telephone service, unequalled anywhere else in the world.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

Now . . .
for only **$69.50 . . .**
you can adapt any
INTERNATIONAL CLINICAL CENTRIFUGE *to spin micro-hematocrits!*





INTERNATIONAL 930 HEMATO-KIT,

for converting any I.E.C. Clinical Centrifuge into a Micro-Capillary Centrifuge, consists of: 24-Place Head and Cover for capillary tubes, 75 mm long x 1.5 mm diameter; Adapter Hub for attaching head to shaft; and Versatool for quick changes . . . all for $69.50.

New International

HEMATO-KIT

makes the switch in 10 seconds!

More than ever before . . . the International Clinical Centrifuge is the most versatile, most economical unit in the bench-size centrifuge field. With this new kit, you can adapt a clinical model to modern blood cell volume testing techniques . . . at a fraction of the cost of a new micro-capillary hematocrit centrifuge.

For laboratories spinning many micro-hematocrits per day, the International Model MB (Quiet-Test) Centrifuge is recommended.

INTERNATIONAL
your dependable source for centrifugal force.

International Equipment Co.

WRITE FOR DETAILS on IEC Centrifuges . . . sold and serviced the world over by authorized International Dealers.

1219 SOLDIERS FIELD ROAD, BOSTON 35, MASS., STadium 2-7900

☐ *Send me complete details about your new HEMATO-KIT for adapting my International Clinical Centrifuge for hematocrit spinning.*

☐ *Send me data, prices and delivery schedules on International Clinical Centrifuges.*

Name.....Title.....
Institution.....
Street & No.....Zone.....State.....

Covers BIOMATHEMATICS * ASTRONOMY * ADVANCED MATHEMATICS * PHYSICAL CHEMISTRY * THEORETICAL PHYSICS * APPLIED PHYSICS * MATHEMATICAL PHYSICS * HISTORY OF SCIENCE * LOGIC * ELEMENTARY MATHEMATICS * MEDICAL PHYSICS * PROBABILITY * RELATIVITY * STATISTICS * BIBLIOGRAPHIC REFERENCE WORKS * TRANSLATIONS and more than 100 other fields of study!

Parke's GUIDE TO THE LITERATURE OF MATHEMATICS & PHYSICS, only $2.49

This is the second, enlarged edition of Nathan Grier Parke' III's GUIDE TO THE LITERATURE OF MATHEMATICS & PHYSICS. It has been brought up to date to 1957, with some material from 1958, and is now more than twice the size of the 1947 edition. New categories have been added, new entries, and a coverage of Russian material.

The first 70 pages are devoted by Dr. Parke to a consideration of the basic problems of research and study. He provides concrete information on the organization and use of libraries, finding standard reference material, using bibliographic tools, and similar materials. This section is invaluable to every scholar and student, for it contains the essence of library use in the clearest form—material that you might have to spend years locating yourself.

The major portion of Parke's GUIDE, however, is devoted to a 330 page listing of more than 5,500 books, monographs, and periodical articles on almost all aspects of mathematics, physics, and engineering. It is not a haphazard selection, but a carefully weighed choice in which the author has included only the most significant work in each field.

Dr. Parke has divided this material into some 120 different categories, ranging alphabetically from acoustics, actuarial mathematics, abstract algebra to vector and tensor analysis, waves, and technical writing. They cover every conceivable branch of mathematics, physics, mathematical physics, engineering, and miscellaneous fields. Peripheral fields like biochemistry, mathematical recreations, technical writing, dictionaries, language aids, cryptography, history of science, etc. are also included.

For each book, periodical article, monograph, or series Dr. Parke supplies complete information for its identification and location. He gives publisher, date of publication and reprint editions, and whatever else is necessary.

Each of the 120 sections is further divided into subsections. The section on classical algebra, for example, is broken down into introductory texts, matrices, determinants, special matrices and determinants, special algebra, linear forms, characteristic values, elementary divisors, etc. Other articles are divided with equal clarity.

Undergraduate and graduate students, researchers, and even the most advanced scholars will find this book one of the half-dozen most useful reference works on their shelves. It will unify the contents of libraries that do not have detailed classification systems, and will save you hundreds of hours of searching. It will save you money in finding what you want to find, and it will increase your efficiency.

Second revised, enlarged edition. 5,500 entries. Complete name and subject indexes. 454 pp.

X447 Paperbound **$2.49**

BIOLOGICAL SCIENCES

X449–50. **STUDIES ON THE STRUCTURE & DEVELOPMENT OF VERTEBRATES, E. S. Goodrich.** Unabridged reissue of the basic work on comparative anatomy, standard survey of the phylum vertebra, covering morphology, evolution, etc., of spine, lungs, nervous system, etc. "For many a day this will be the standard work on vertebrate morphology," J. OF ANATOMY. "No other book in English so thorough," SCIENCE PROGRESS. 754 illustrations. Bibliography of 1186 references. Total of 906 pp. (When out-of-print, this set has sold for as much as $50). Paperbound, Two vol. set, **$5.00**

X466. **GENETICAL THEORY OF NATURAL SELECTION, Sir Ronald Fisher.** Revised edition of standard work on Mendelian inheritance, evolution, social genetics, etc. 16 illustrations. 305 pp. (When o.p. this book costs up to $15). Paperbound **$1.85**

X488. **A WAY OF LIFE AND OTHER SELECTED WRITINGS, Sir William Osler.** Books & Men, Sir Thomas Browne, Young Laennac, 13 other essays by great doctor, teacher, humanist. 298 pp. Pape.bound **$1.50**

X479. **AUTOBIOGRAPHY OF CHARLES DARWIN,** Edited by F. Darwin. Accounts from the notes, journals, correspondence with great scientists, and the Autobiography show how Darwin achieved his great discoveries. 365 pp. Paperbound **$1.65**

X390. **FROM MAGIC TO SCIENCE, Sir Charles Singer.** Unabridged reprinting (with new intro.) of major work by greatest historian of medicine. Papers on early herbals, physiological origins of visions of Hildegarde of Bingen, other topics of medieval medicine and science. 189 unusual illustrations. (When out-of-print this work has brought $25.00). 273 pp. Paperbound **$2.00**

X389. **SHORT HISTORY OF ANATOMY & PHYSIOLOGY FROM THE GREEKS TO HARVEY, Charles Singer.** Foremost medical historian in thorough easy-to-read coverage. 270 extremely interesting illustrations. 221 pp. Paperbound **$1.75**

X206. **BIOLOGY OF THE AMPHIBIA, G. K. Noble.** Unmatched for comprehensiveness, clarity, detail; all aspects of anatomy, life history, intelligence, environment, classification, etc. "Nothing comparable to it," C. Pope, Curator of Amphibia, Chi. Mus. of Nat. Hist. Bibliography of 1047 items. 174 illustrations. 460 pp. Paperbd. **$2.95**

X213. **THE ORIGIN OF LIFE, A. Oparin.** Now classic account of evolution of life from nitrocarbon compounds. 305 pp. Paperbound **$1.75**

X248. **BIOLOGY OF THE LABORATORY MOUSE, ed. G. Snell.** Prepared by staff of Roscoe B. Jackson Memorial Lab.; all aspects of mice: embryology, reproduction, histology, mutations, cancer research, parasites, anatomy, infectious diseases, etc. Bibliography of 1122 items. 172 illustrations. 508 pp. Clothbound **$6.00**

X410. **BEHAVIOUR & SOCIAL LIFE OF THE HONEY-BEE, R. Ribbands.** Bee anatomy, function, psychology, social life, communications, etc.; extends von Frisch's work. 127 illustrations. Bibliography of 690 items. 352 pp. Clothbound **$4.50**

X346. **ELEMENTS OF MATHEMATICAL BIOLOGY, A. Lotka.** Pioneer attempt to apply math. to biology, biochemistry, ecology, etc. Great importance historically. Formerly titled Elements of Physical Biology. 72 figures. 490 pp. Paperbound **$2.45**

LISTEN & LEARN RUSSIAN now available! Three 10″ 33-1/3 records, manual, only $5.95 per set

LISTEN & LEARN is specially designed to help you in colloquial language. By far the most useful set for travel, wonderful as a refresher, as a supplement to any course, or for self study; excellent as an introduction via the modern phrase method. It presents practical language in a form you can use immediately. Check these unusual features: (1) modern language, no trivia, no technicalities, no deadwood. (2) High fidelity recording. (3) English & foreign language recorded, with a pause for your repetition; you build automatic associations. (4) 128-page (or 196-page) manual with complete record text; only fully indexed set on the market. (5) **GUARANTEED.** Return it within 10 days if you are not satisfied with it. "High quality, practical, inexpensive," N. Y. HERALD TRIBUNE. Wonderful gift for a friend travelling abroad, or for a beginner. Not a closeout or a markdown: simply a remarkable value. Each set contains three 10″ 33-1/3 records, (1½ hours of recording), manual, album.

X875. **LISTEN & LEARN FRENCH,** set, $4.95
X876. **LISTEN & LEARN SPANISH,** set, $4.95
X877. **LISTEN & LEARN GERMAN,** set, $4.95
X878. **LISTEN & LEARN ITALIAN,** set, $4.95
X879. **LISTEN & LEARN RUSSIAN,** set, $5.95

NEW DOVER BOOKS

X481. **FOUNDATIONS OF EUCLIDEAN GEOMETRY, H. Forder.** 1st modern study with connected rigorous acct. of Euclidean geometry in light of modern investigation. Classes, congruence, similarity, etc. 295 pp. Paperbound **$2.00**

X484. **ELLIPTIC INTEGRALS, H. Hancock.** Integration of integrals of 1st, 2nd kind; exposition in accordance with Legendre-Jacobi theory; rigorous, complete, 20 figures. 104 pp. Paperbound **$1.25**

X483. **LECTURES ON THEORY OF ELLIPTIC FUNCTIONS, H. Hancock.** Most extensive coverage in English; full in treatment, excellent for applications; covers classical material. 76 figures. 525 pp. Paperbound **$2.55**

X486. **THEORY OF THE POTENTIAL, W. D. MacMillan.** Comprehensive, thorough approach; no background of integral equations needed; author develops math as proceeds; covers specific problems in magnetostatics, gravitational mechanics, etc. 493 pp. Paperbound **$2.25**

X462. **INTRO. TO BESSEL FUNCTIONS, F. Bowman.** Properties, applications, rigorous treatment. "Very useful," NATURE. 226 problems. 135 pp. Paperbd. **$1.35**

X480. **PHILOSOPHY & THE PHYSICISTS, S. Stebbing.** Critical examination of basic postulates of new physics, particularly Jeans & Eddington. 310 pp. Paperbound **$1.65**

X494. **INTRO. TO GEOMETRY OF N DIMENSIONS, D. M. Y. Sommerville.** Only book in English on higher dimensional geometry; metric & projective properties. 60 diagrams. 196 pp. Paperbound **$1.50**

X489. **ON MATHEMATICS & MATHEMATICIANS, R. E. Moritz.** Formerly Memorabilia Mathematica. A collection of more than 1100 quotations, anecdotes, aphorisms, passages by mathematicians & non-mathematicians on nature of math., specific fields, lives of mathematicians, etc. Delightful, fascinating browsing book. Indexed. 410 pp. Paperbound **$1.95**

X482. **LINEAR GROUPS, WITH AN EXPOSITION OF THE GALOIS FIELD THEORY, L. E. Dickson.** This milestone in modern algebra presents most thorough presentation of theory of Galois fields in literature, then survey of known simple groups of finite composite order. 327 pp. **Paperbound $1.95**

X387–8. **THEORY OF FUNCTIONS OF A REAL VARIABLE, THEORY OF FOURIER SERIES, E. Hobson.** Most thorough introduction to sets, functions, Fourier series, etc. Clear exposition. "A great contribution, best possible guide to anyone who encounters mathematical analysis," NATURE. Total of 1591 pp. Paperbd. Two vol. set, **$6.00**

X372. **FOUNDATIONS OF SCIENCE, PHILOSOPHY OF THEORY & EXPERIMENT, N. Campbell.** Formerly Physics, the Elements. Covers topics like nature of hypothesis & theory, scientific law, arbitrariness of measurements, properties, use of number, etc. "A great feat, to put together a book with so much fresh thought," F. Andrade, NATURE. 578 pp. Paperbound **$2.95**

X367. **101 PUZZLES IN THOUGHT & LOGIC, C. Wylie.** No special knowledge needed for weeks of amusement & mental exercise. 128 pp. Paperbound **$1.00**

X295. **HOW TO CALCULATE QUICKLY, C. Sticker.** Tried true method for development of number sense; not tricks, but 9,000 exercises, (and answers) teaching techniques not taught in schools. 256 pp. Paperbound **$1.00**

X478. **THE POLISH PEASANT IN EUROPE & AMERICA, W. Thomas, F. Znaniecki.** Complete unabridged reprinting of epoch-making social study. Covers original Polish culture, degeneration, immigration, & disintegration of culture & personality in America. Full of primary documents as well as authors' theoretical considerations. (When out-of-print this set has sold for $75) Total of 2265 pp. Clothbound Two vol. set, **$12.50**

Dept. 187 X, Dover Publications, Inc.
180 Varick St., New York 14, N.Y.
Please send me the following books:
☐ **Parke, GUIDE TO LITERATURE** $2.49
Other books: .....
.....
.....
I am enclosing $..... in full payment. Payment must accompany all orders except those from libraries or public institutions, who may be billed. Please add 10¢ per book for postal and handling charges on orders less than $5. Please print
Name .....
Address .....
City ..... Zone .... State .....
GUARANTEE: All Dover books & records unconditionally guaranteed. Return them within 10 days for full cash refund. No questions asked.

ate plus graduate-or-professional type of school). In the case of technical schools, the best translation would be "institute (of technology)." On the other hand, where we speak of a "high school," Europeans usually speak of a "middle" or "secondary" type of school—never "high."

LEO PAP
State University Teachers College, New Paltz, New York

I wish to thank Leo Pap and others who have written correcting my misimpression concerning the government of Portugal.

With regard to his second point, I think it is worth while to point out that the connotation of the term *Hochschule* in German is not the literal translation to "high school." However, I assumed that most scientists realized that the use of this term in European science did imply a school of higher learning on the level of a university or college.

DAVID M. GATES
National Bureau of Standards, Boulder, Colorado

Acetylcholine Metabolism and Behavior of Rats

Before Chow and John submitted their paper (*1*) for publication, they were kind enough to correspond with us at length about their findings. At that time we indicated to them our reasons for believing that their study did not afford an adequate test of our major hypothesis. In their published article no reference is made to the questions we raised, and since Chow and John interpret their data as contradictory to our major hypothesis, we would like to point out publicly why we believe that their experiment does not provide a test of our hypothesis.

In our original *Science* article (*2*) we suggested that a higher rate of cortical acetylcholine metabolism is related to a greater number of spatial responses in the Krech hypothesis apparatus. In our second *Science* article (*3*) it was made explicit that this referred only to the animal's initial problem-solving behavior. Pentobarbital sodium (which retards acetylcholine synthesis) was shown in that article to affect the animal's choices strongly if it was administered at the outset of maze experience; if it was given after four days of maze experience, the drug had little or no effect.

Chow and John gave their animals six days of maze experience. By that time the animals had adopted different response patterns. In subsequent testing Chow and John found that anticholinesterase drugs had little or no effect on the animals' choice behavior. They conclude, "The fact that such injections did not alter the hypotheses displayed by the animals in running a maze seems to indicate that hypothesis behavior is not dependent on cortical levels of acetylcholine." Actually, our results and theirs seem to be similar where they can be compared: When animals have had prior maze experience, drugs that affect acetylcholine metabolism do not appear to affect behavior. We urged Chow and John to test the effects of injections on behavior at the *outset* of maze experience, the condition under which we did obtain drug effects. Unfortunately this has not been done, so no comparison can be made under this critical condition.

Quite aside from this major point, there are a number of additional features about the report of Chow and John that make it difficult to evaluate their results.

1) Their Table 1 indicates that on a random reward schedule animals of the S1 strain made predominantly spatial choices and animals of the S3 strain made predominantly visual choices. Such a large strain difference in behavior—in the same direction but far larger than we have ever obtained—would appear to provide striking corroboration of our hypothesis, since we have shown the two strains to differ significantly in cortical cholinesterase activity. The data of the table cannot, however, be taken at face value. Correspondence revealed that over half the S1 and S3 rats were *trained* to give spatial or visual responses. There is no indication in the table as to which animals were trained to give specific response patterns and which adopted such response patterns spontaneously. Therefore it is impossible to evaluate the apparent strain differences, and we would prefer not to interpret these findings as supporting our hypothesis.

2) It has been our experience that when animals are transferred from a schedule that rewards one type of choice to a random-reward schedule, they tend to give up the previously rewarded choice rather rapidly. This did not occur in the Chow and John experiment. Their "no injection" results were obtained on the fifth and sixth days of a random-reward schedule, but many previously rewarded response patterns still persisted. This testifies to the strength of the prior training and indicates further why it would have been difficult to find a drug effect. It is not stated whether the animals were retrained between successive drug experiments (as many as five 6-day sequences were given to an animal). If response patterns persisted through such a long period, it is indeed interesting, and raises additional questions about the meaning of their data.

3) The legend of their table indicated that the number of times a rat was tested "varied from 4 to 30." No explanation is given as to why some rats were discarded after only four tests whereas their data up to that point were retained. Because of this feature of the experimental design, the subjects are repre-

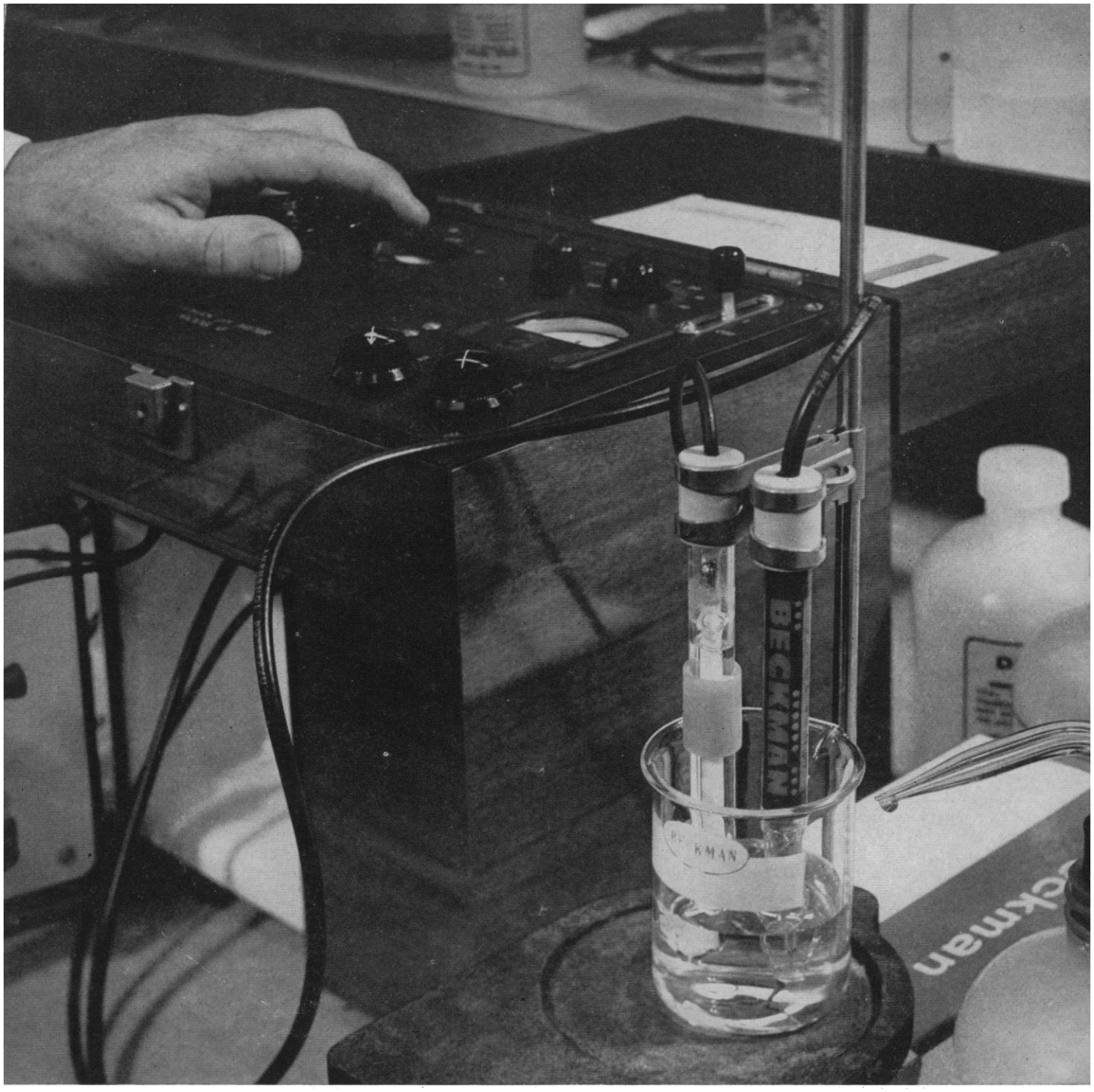


PHOTO BY WILL CONNELL

You'd know them anywhere. Beckman pH electrodes...recognized as the finest... and Beckman's Model G pH Meter...described in the literature as the standard of pH measurement. Beckman pH meters and electrodes are used in thousands of laboratories throughout the world. ⌘ Your laboratory apparatus dealer provides prompt delivery on Beckman pH meters and electrodes, including the newest models. Call him today or write to us for a list of dealers and current pH meter information. Ask for Data File 3L-41-38. **Beckman**

Scientific Instruments Division
2500 Fullerton Road, Fullerton, California
a division of Beckman Instruments, Inc.

ULTRAVIOLET AND INFRARED SPECTROPHOTOMETERS · GAS CHROMATOGRAPHS · pH METERS · ELECTROCHEMICAL INSTRUMENTS
SALES AND SERVICE FACILITIES ARE MAINTAINED BY BECKMAN/INTERNATIONAL DIVISION IN FIFTY COUNTRIES

sented very unequally in the reported data. With such a design, it is difficult to make valid comparisons among the experimental conditions.

4) Diisopropyl fluorophosphate (DFP), unlike eserine, is a persisting anticholinesterase agent; we have found the "half time" of the recovery of cholinesterase after DFP injection to be about 20 days. Therefore the animals that Chow and John tested under "saline" or "no injection" conditions during the six days after the injection of DFP would be poor controls since the effects of DFP would still be strong. There is no way of determining how many of the "control" data of Chow and John were actually obtained under the effects of DFP.

It is clear that our hypothesis relating acetylcholine metabolism and behavior has not yet been adequately confirmed (either by other workers or ourselves). On the other hand, it does not seem that the experiment of Chow and John has rendered it untenable.

MARK R. ROSENZWEIG
DAVID KRECH
EDWARD L. BENNETT
Department of Psychology and Radiation Laboratory, University of California, Berkeley

References

1. K. L. Chow and E. R. John, *Science* 128, 781 (1958).
2. D. Krech, M. R. Rosenzweig, E. L. Bennett, B. Krueckel, *Science* 120, 994 (1954).
3. M. R. Rosenzweig, D. Krech, E. L. Bennett, *Science* 123, 371 (1956).

The disagreement which Rosenzweig, Krech, and Bennett expressed with the conclusions stated in our recent article (*1*) is based primarily upon the fact that we investigated the effects of intracerebral anticholinesterases upon previously established response patterns. They stated that their major hypothesis is that the rate of cortical acetylcholine metabolism is related to the mode of response in the initial problem-solving behavior of rats in their apparatus, but not to the performance of previously established response patterns. Although in various of their publications (*2*) they emphasized the role of acetylcholine levels in "adaptive" behavior in new situations, they did not make explicit the latter part of the hypothesis.

Yet, the data about the effects of pentobarbital sodium to which they referred at first seem compatible with that hypothesis and with our own results. We have difficulty, however, in reconciling the data reported by them on the effects of pentobarbital sodium with the explanations and hypotheses they offered. During the first four days, their drugged group (group II) displayed an extremely marked preponderance of light hypotheses, and a consistent mode of behavior was established. They attributed this effect to depression of cortical acetylcholine metabolism by the drug. They further reported that when the drug was discontinued, light hypotheses diminished, presumably as a consequence of restored acetylcholine levels.

To us, this seems to constitute a paradox: Although cortical acetylcholine levels are presumed not to affect the performance of established response patterns, a pattern established with a cortical acetylcholine level altered by a drug becomes modified when the acetylcholine level is restored after the drug is discontinued. Further, they reported that subsequent administration of the drug after the animals had been run for two days without drug again raised light-going choices. These various considerations, together with the complete failure of intracerebral eserine to alter hypothesis behavior in our experiments, seem incompatible with their major hypothesis.

With respect to the additional questions raised by our colleagues, two comments seem in order. No data were discarded, as suggested in their point 3. Animals were run so long as their physical condition permitted. Finally, while we agree that the effects of diisopropyl fluorophosphate (DFP) persist for some time, the results of DFP experiments were essentially comparable to results obtained with eserine, and certainly the failure of DFP to alter hypothesis behavior cannot be attributed to its subsequent prolonged effects on cholinesterase activity.

We have no explanation to offer for the interesting discrepancy between the effects of pentobarbital sodium before and after appreciable maze experience. Certainly other consequences of this drug besides altered acetylcholine synthesis are well known and might equally well be relevant to these effects, just as factors besides cholinesterase concentrations are relevant to the regulation of acetylcholine metabolism. In view of the inconsistencies outlined above, we doubt that effects on acetylcholine levels play an important role in the phenomenon. We agree that it would be of interest to observe the effects of anticholinesterase injections at the outset of maze experience. Since our current research activities lie in other areas, and since Rosenzweig, Krech, and Bennett are admirably qualified to pursue such problems, we look forward to the publication of further data which will clarify these issues.

K. L. CHOW
E. R. JOHN
Department of Physiology, University of Chicago, Chicago, Illinois

References

1. K. L. Chow and E. R. John, *Science* 128, 781 (1958).
2. D. Krech, M. R. Rosenzweig, E. L. Bennett, B. Krueckel, *Science*, 120, 994 (1954); M. R. Rosenzweig, D. Krech, E. L. Bennett, *Science* 123, 371 (1956); D. Krech, M. R. Rosenzweig, E. L. Bennett, *J. Comp. Physiol. Psychol.* **49**, 261 (1956).

Meetings

Subcellular Particles

The 13th annual meeting of the Society of General Physiologists was held at the Marine Biological Laboratory, Woods Hole, Mass., 9–11 June. Contributed papers were presented, and the annual business meeting was held, 9 June. A symposium organized by Teru Hayashi of Columbia University on the "Function of Subcellular Particles" was held 10–11 June.

The society has, from its birth, brought together animal, plant, and microbial physiologists to discuss functions of cells which are common to all organisms. This policy has resulted in interesting and stimulating symposia, often revealing relations between different fields which had not been appreciated. This year's symposium served to bring to the attention of general physiologists recent developments in the study of functional aspects of subcellular particles, particularly the biochemical activities of these entities. On the other hand, the biochemists had an opportunity to become acquainted with the effects of surface and structural factors in biochemical reactions. Arrangements have been made to publish the 1958 symposium in the monograph series of the American Physiological Society. Four previous symposia sponsored by the Society of General Physiologists have been published in this series.

The tone of the symposium was set in a critical review by the first speaker, A. B. Novikoff (Albert Einstein College of Medicine). His comprehensive examination of the work of various investigators working on the physiology of submicroscopic structures put the problems facing workers in this field in sharp focus. The next two speakers of the initial session dealt with the effects of surfaces as structural factors and their effect on biochemical reactions. A. D. McLaren and K. L. Babcock (University of California) presented striking evidence of localized differences in *p*H at intracellular interfaces and gave examples of the effect of such differences on biochemical reactions. The nonapplicability of classical kinetics for these phenomena was stressed. S. Siegel (Rochester University) then presented experimental evidence for the view that surfaces per se, depending on their nature, may act as "catalytic agents" for such physicochemical reactions as the polymerization of certain substances, such as lignin. He showed clearly that the formation of lignin in the plant and in in vitro systems is dependent on the same surface factors.

In the second session, G. E. Palade (Rockefeller Institute), with a series of technically brilliant electron micrographs, illustrated the morphological changes of subcellular particles correlated with the physiological condition of the cells. Especially noteworthy were the changes in the zymogen granules of the pancreas and changes in the endoplasmic reticulum depending on the secretory activity of the cells. He was followed by E. L. Kuff (National Institutes of Health), who presented work on the isolation and identification of the Golgi apparatus and the biochemical properties of this subcellular entity. D. E. Green (University of Wisconsin) next summarized the work of the Wisconsin group on the fragmentation and analysis of the mitochondrion. He postulated that the mitochondrion is composed of subunits which can be separated by mechanical means, each subunit being composed of enzyme moieties separable only by drastic chemical means. Most interesting was the prominence given to the lipoproteins and their possible function, especially in the electron transport particle. He concluded that the molecular parts of the mitochondrion appeared to be held in a stable structure, and that their reactions did not seem to depend on thermal collisions, as in a free solution.

The final paper of this session, by M.

Kodak reports on:

finding a trivially named organic in a pedantically named list . . . a device with enormous potentialities for inventiveness . . . tocopherol, three years and 1384 papers later

PAN—PAR

We have been counting on a man who needs a reagent for copper and zinc to go unerringly to our catalog and look up *o-{2-[α-(2-Hydroxy-5-sulfophenylazo)benzylidene]hydrazino}benzoic Acid Sodium Salt* (Eastman 7199) in the alphabetical listing. To work like that, a man needs to be very smart in an overspecialized sort of way. By neglecting to list this compound under its trivial name Zincon (*zinc* and *co*pper, get it?) we haven't shown much brilliance ourselves. Our devotion to *Chemical Abstracts* nomenclature is commendable, justifiable, and sometimes fatuously self-sacrificing. We are holier than most chemical houses. Why, we know of some producers of dyestuffs very useful in the laboratory who *refuse* orders written in the systematic nomenclature, much less encourage them!

Between trademarks—which specify only commercial origin for merchandise otherwise named as to kind—and systematic but pedantic chemical names lies the convenient middle ground of trivial names (trivial: three roads, i.e., the fork where the people meet to chat, get that?). Some are trademarks abandoned by their owners, some are pronounceable combinations of letters from the systematic name, some are little slogans concocted by enthusiastic chemists who discovered the uses.

It has suddenly struck us that a few of the names neither cross-referenced in our catalog nor familiar to everybody gabbing at the crossroads, should be put in the hands of every chemist interested enough to ask. Sample entries:

PAN—1-(2-Pyridylazo)-2-naphthol (Eastman 7192)
PAR—4-(2-Pyridylazo)resorcinol (Eastman 7714)
Tiron—4,5-Dihydroxy-m-benzenedisulfonic Acid Disodium Salt (Eastman 7062), reagent for titanium and iron (Also called sodium catecholdisulfonate)
Thoron—o-(2-Hydroxy-3,6-disulfo-1-naphthylazo)benzenearsonic Acid Disodium Salt (Eastman 6748), reagent for thorium
Topo—Tri-n-octylphosphine Oxide (Eastman 7440)
Pyrocatechin Violet—Pyrocatecholsulfonephthalein (Eastman 7589)
Blue Tetrazolium—2,3,5-Triphenyl-2H-tetrazolium Chloride (Eastman 6533)

Handy little reference book when transcribing notes from a cocktail napkin. You get a copy from Distillation Products Industries, Eastman Organic Chemicals Department, Rochester 3, N. Y. (Division of Eastman Kodak Company). To use it the way we want you to, you must *also have a copy of Eastman Organic Chemicals, List No. 41, which gives the prices and package sizes for* all *the 3700 organics we stock.*

The wordy vitamin

In the three years 1955 through 1957, there have appeared to our knowledge 119 papers in the world's scientific literature on the occurrence and distribution of vitamin E, 60 on the determination of vitamin E, 148 on its chemistry, 362 on its relation to physiology and pathology, 85 on its pharmacology, 275 on its role in nutrition and metabolism, and 335 on its medical and therapeutic uses. There has been an international congress on vitamin E in Venice, and the vitamin has been definitely related to the hatchability of turkey eggs, with weighty consequences for turkey economics.

Because we like to think of ourselves as a potent force in the investigation and commercial production of vitamin E, one or the other of us has, with varying degrees of belief, read every one of these papers. We have subsequently prepared an annotated bibliography of them for distribution by the National Vitamin Foundation, 149 East 78th Street, New York 21, N. Y., the fourth such we have done. If you have use for a copy, you can state your case to the Foundation.

Now that it is printed, we have at least one regret. On page 56 we see the word "preventative." Rhetoricians deplore the word "preventative."

Kamen and J. Newton (Brandeis University), dealt with their investigations on photosynthesis phosphorylation in bacterial chromatophores. They compared the activity of their bacterial particle system with the particulates from green plants and found that, despite the anaerobic nature of the bacteria, definite similarities existed. A promising immunochemical technique opening the way to a molecular localization of the active portions of the particulates was also described.

Christian DuDuve (Louvain, Belgium) gave a comprehensive review of the concept of the lysosome as an intracellular particle containing hydrolase enzymes. He first outlined the evidence for the concept and then the evidence pointing to the possible function of lysosomes in the cell in digestion (as related to pinocytosis), autolysis, and necrosis. DuDuve was followed by Mary Stephenson, who, together with J. Littlefield, L. Hecht, R. B. Loftfield, and P. C. Zamecnik (Harvard University), presented a summary of the reactions preceding the advent of the ribonucleoprotein particle in protein synthesis. They envisage a reaction which involves, first, the activation of the amino acid by a specific enzyme, requiring adenosinetriphosphate; second, a soluble ribonucleic acid which incorporates specific nucleotide end groupings and which then can bind the amino acids. This soluble ribonucleic acid can then, presumably, transfer the bound amino acids to microsomal ribonucleic acid and microsomal protein.

Polynucleotide synthesis, studied *in situ* by high-resolution autoradiographic techniques, was presented by J. H. Taylor and P. Woods (Columbia University). They demonstrated that tritiated cytidine appears first in the nucleolus (although with longer incubation periods the label appears in the chromosomes also). They concluded that polynucleotide synthesis, presumably ribonucleic acid, as indicated by ribonuclease digestion, takes place in the nucleolus.

The final paper of the symposium was presented by V. Allfrey (Rockefeller Institute) and dealt with the biochemical properties of the isolated nucleus. Activities including amino acid uptake and turnover of energy-rich phosphate could be demonstrated. A lively discussion of the conditions for centrifugal isolation of the nuclei and retention of these biochemical activities, and of an interesting salt dependence of the isolated nuclei, followed the presentation of the paper.

Results of the mail balloting for officers and council were announced at the business meeting. C. Ladd Prosser became president, and William D. McElroy was elected vice president. A. C. Giese and T. Hayashi were elected to serve 2-year terms as councilors.

The abstracts of the contributed papers are to be published as a supplement in the October issue of the *Journal of Cellular and Comparative Physiology.*

TERU HAYASHI
Department of Zoology, Columbia University, New York, New York
F. G. SHERMAN
Department of Biology, Brown University, Providence, Rhode Island

Forthcoming Events

February

9–11. American Acad. of Allergy, Chicago, Ill. (B. Rose, Royal Victoria Hospital, Montreal, P.Q., Canada.)

9–11. Nature of Coal, symp., Bihar, India. (Director, Central Fuel Research Inst., P. O. Fuel Research Inst., Dhanbad District, Bihar.)

9–24. Pneumoconiosis, intern, conf., Johannesburg, South Africa. (S.A.C.S.I.R., 18 London House, Loveday St., Johannesburg, S.A.)

11–13. American Acad. of Occupational Medicine, Boston, Mass. (L. Blaney, 1608 Walnut St., Philadelphia, Pa.)

12–13. Solid State Circuits Conf., Philadelphia, Pa. (A. B. Stern, General Electric Co., Bldg. 3, Syracuse, N.Y.)

14. Short Range Navigation Aids, Montreal, Canada. (Intern. Civil Avia-

tion Organization, Maison de l'aviation internationale, Montreal.)

14–21. Planned Parenthood, 6th intern. conf., New Delhi, India. (Secretary, 1 Metropolitan House, Dadabhari, Naoroji Rd., Bombay 1, India.)

15–19. American Inst. of Mining, Metallurgical, and Petroleum Engineers, annual, San Francisco, Calif. (E. O. Kirkendall, AIME, 29 W. 39 St., New York 18.)

16–19. Problems in Field Studies in Mental Disorders, intern. work conf., New York, N.Y. (J. Zubin, American Psychopathological Assoc., 722 W. 168 St., New York 32.)

20–21. Epidemiology in Mental Disorders, annual meeting of the American Psychopathological Assoc., New York, N.Y. (J. Zubin, APA, 722 W. 168 St., New York 32.)

23–27. American Concrete Inst., 55th annual, Los Angeles, Calif. (W. A. Maples, A.C.I., 18263 W. McNichols Rd., Detroit 19, Mich.)

25–26. Midwest Industrial Radioisotopes Conf., Manhattan, Kan. (J. Kitchens, Dept. of Continuing Education, Kansas State College, Manhattan.)

25–27. Biophysical Soc., annual, Pittsburgh, Pa. (G. Felsenfeld, Dept. of Biophysics, Univ. of Pittsburgh, 325 Clapp Hall, Pittsburgh 13.)

26–28. American Acad. of Forensic Sciences, annual, Chicago, Ill. (W. J. R. Camp, AAFS, 1853 W. Polk St., Chicago 12.)

26–28. Genetics and Cancer, 13th annual symp. on fundamental cancer research, Houston, Tex. (Editorial Office, Univ. of Texas, M. D. Anderson Hospital and Tumor Inst. Texas Medical Center, Houston 25.)

27–1. National Wildlife Federation, 23rd annual convention, New York, N.Y. (NWF, 232 Carroll St., NW, Washington 12.)

March

1–2. Pennsylvania Acad. of Sciences, Gettysburg. (K. Dearolf, Public Museum and Art Gallery, Reading, Pa.)

1–5. Gas Turbine Power Conf., Cincinnati, Ohio. (O. B. Schier, ASME, 29 W. 39 St., New York, N.Y.)

8–9. American Broncho-Esophagological Assoc., Hot Springs, Va. (F. J. Putney, 1712 Locust St., Philadelphia, Pa.)

8–9. American Laryngological Assoc., Hot Springs, Va. (J. H. Maxwell, University Hospital, Ann Arbor, Mich.)

8–12. Aviation Conf., Los Angeles, Calif. (O. B. Schier, ASME, 29 W. 39 St., New York, N.Y.)

10–12. American Laryngological, Rhinological and Otological Soc., Hot Springs, Va. (C. S. Nash, 708 Medical Arts Bldg., Rochester 7, N.Y.)

13–14. American Otological Soc., Hot Springs, Va. (L. R. Boies, University Hospital, Minneapolis 14, Minn.)

13–15. Alabama Acad. of Sciences, Auburn, (H. M. Kaylor, Dept. of Physics, Birmingham-Southern College, Birmingham, Ala.)

15–20. American College of Allergists, San Francisco, Calif. (M. C. Harris, 450 Sutter St., San Francisco.)