made, and for the first time we will have data subject to common scrutiny and evaluation. "In the home" studies of children can also be made, and the exact terms of their emotional and social growth can be described. The trouble with this field is that it is, as one astute friend described it, a "night-school science"—that is, a body of facts and concepts created in practice by hard-worked clinicians who wrote their papers in the evening. This history has its great merits but also its flaws. The field of psychoanalytic researches should be adopted by the university and the research institute, but we had better hurry while the subject matter is still in the public domain of science. What was it that someone said about a fabulous foundation?

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Surgical Procedures on the Gastrointestinal Tract of Animals in Preparation for Chronic Experiments. E. N. Speranskaya. Academy of Medical Sciences, U.S.S.R., Moscow, 1952. 64 pp. (in Russian). Illus.

Pavlov's research on gastrointestinal physiology that earned him the Nobel prize in 1904 was based on the concept of the organism as one indivisible homeostatic unit. In order to study normal functions of various digestive glands, Pavlov devised a number of surgical procedures on dogs that made it possible for him to conduct investigations under chronic conditions.

"Acute experiments," wrote Pavlov in 1902, "give a satisfactory answer to a very limited number of problems; in most cases the operated animals differ so markedly from the normal—often in respect to the very function that forms the subject of the investigation—that the latter loses its meaning and becomes fruitless." He therefore devised surgical methods "by means of which one can prepare the animal in such a manner that, after recovering from the after-effects of surgery, it could serve for observations, as faultless as possible, on this or that gland." [Physiological surgery on the digestive tract I. General methodology." *Ergeb. Physiol.* **1**, 1 (1902). Reprinted in Russian in I. P. Pavlov, *Studies on the Physiology of Digestion.* Acad. Med. Sciences, Moscow, U.S.S.R. (1952), pp. 315–316.]

Moreover, Pavlov was convinced that "animals operated according to these methods represent excellent instructional material. For this reason we think that college physiological laboratories need such animals as much as they do the most important physiological equipment."

The booklet contains detailed and succinct descriptions of the surgical techniques devised by Pavlov for his chronic experiments. The numerous line drawings are excellent and should enable any competent physiologist or surgeon to perform the same operations successfully. The author includes instructions on pre- and post-operative care of the animals as well as on the special instruments and equipment required for the procedures.

Among the techniques described are those related to establishing chronic fistulas of the salivary glands, esophagus, stomach, gall bladder, pancreas, and intestine as well as procedures for isolating Pavlov and Savich-Brestkin gastric pouches.

The use of such animal preparations for chronic experiments and observations by students in medical and veterinary courses in physiology and pharmacology might represent a significant step toward the integrative approach to medical education and practice. One can hardly expect students to gain a realistic knowledge of normal physiological processes and of physiological homeostasis by limiting their observations to the reactions of organs isolated from integrative nervous and endocrine influences or by recording responses of animals subjected to anesthetic agents and acute surgical trauma. Observations on unanesthetized animals prepared for chronic experiments may help to bridge the gap between cell and organ physiology and the physiology of the organism as a biological unit.

Such chronic animal preparations should also find useful applications in connection with the screening of drugs used to influence secretions of various digestive glands.

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Reports on Progress in Physics. vol. XVIII. A. C. Stickland, Ed. The Physical Society, London, 1955. £2 10s, nonfellows; 27s. 6d, fellows.

Research results in physics are now being published at a rate of about 1000 papers a month. (*Physics Abstracts* contained 11,693 entries in 1954.) The contributions of the Physical Society toward organization and synthesis of the many discoveries of physicists are continued in this volume. Like its predecessors, volume XVIII contains a group of papers, each one of which is a careful survey of experimental and theoretical findings during the past few years with respect to some aspect of physics.

The opening article, "The displacement of atoms in solids by radiation," by G. H. Kinchin and R. S. Pease, is a discussion of effects of radiation on structure and composition of solids. Quoting from the paper's introductory section, "Much of the current interest in these irradiation effects has been aroused by the need to understand and mitigate them in materials used in nuclear reactors. . . . However, with the increased understanding of the role of defects in crystalline solids, considerable interest has also been aroused by the possibility of the controlled introduction of defects by irradiation, which can have valuable application." Readers will be interested in finding the late H. G. Wells, in the novel *Tono-Bungay* (1909), among the early writers cited on irradiation effects in solids.

In the second article, B. T. Price discusses, in "Ionization by relativistic particles," the theories of "the relativistic increase of energy-loss by ionization and of the density effect" and also the relevant experimental evidence and its comparison with theory. J. L. Symonds contributes a paper on "Methods of measuring strong magnetic fields." In a paper on "Theory of radiation," J. C. Gunn gives a survey discussion of quantum electrodynamics, with some attention also to meson field theory. E. W. Lee writes on "Magnetostriction and magnetomechanical effects." This paper is followed by one on "Electrostriction," by H. F. Kay, in which "Single crystals are . . . discussed . . . in detail. . . . Similarly the more complicated ceramic materials are dealt with."

A survey of "Magnetic cooling" is contributed by E. Ambler and R. P. Hudson. Experimental methods and the properties below 1°K of paramagnetic salts and of other materials are discussed. Also, cascade demagnetizations and continuous cooling cycles and the achievement of spatial orientation of atomic nuclei by magnetic cooling are described. The paper, "Paramagnetic resonance II," by K. D. Bowers and J. Owen, is complementary to one in volume XVI by B. Bleaney and K. W. H. Stevens. Paramagnetic resonance data are collected in the paper for "crystalline solids containing ions of the transition groups, and those parts of the theory necessary for an understanding of the results are presented in a fairly simple way." J. D. Craggs and C. A. McDowell write on "The ionization and dissociation of complex molecules by electron impact."

In the final paper of the volume, entitled "A survey of field theory," a group of lectures given at the University of Birmingham in December 1954 are now published. The names of the lecturers, R. E. Peierls, A. Salam, P. T. Matthews, and G. Feldman, speak for the authoritativeness of the paper. The survey is intended for the "non-specialist," and although it therefore is not as detailed in

treatment of its subject topic as papers usually are in this series of volumes, it should be of interest and value to a wide group of experimental and theoretical physicists.

Individual articles in this volume of reports may be purchased from the Physical Society, London.

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Fifth Symposium (International) on Combustion. Combustion in engines and combustion kinetics. Standing Committee on Combustion Symposia of the Combustion Institute. Reinhold, New York; Chapman & Hall, London, 1955. xxvi + 802 pp. Illus. $15.

The fifth symposium, held at the University of Pittsburgh, primarily emphasized the chemical aspects of combustion, especially combustion kinetics. By means of a series of invited papers, it did take cognizance of the role of combustion in the development and design of engines. Six invited papers were on the unsolved problems of engine combustion in internal-combustion engines, diesel engines, liquid-fuel rocket engines, ramjets, turbojets and solid-propellant engines. This series of six papers is a reminder that there are still objectionable odors from diesel engines, combustion instability in rockets, extremely poor combustion efficiency in ramjets, and other serious unsolved problems. Five invited papers were on combustion kinetics. These included a thought-provoking paper on high-temperature reaction systems, two papers on kinetics of hydrocarbon combustion, and two papers on space requirements for combustion.

In addition to the 11 invited papers, this volume contains the text and discussions of 90 papers delivered at the symposium. Six of the papers are on the combustion of fuel droplets. The preheat and vaporization stages, the effect of turbulence, ignition lag, fuel droplet size, mass burning rate, flame velocity, flammability limits, and flame stability, from the theoretical and experimental viewpoint, are contained in this set of papers. Nine of the papers discuss the various aspects of propellant burning such as monopropellant and bipropellant systems, ignition lags and hyperbolic fluid burning rates. Six papers treat the combustion of solids, such as carbon particles, pulverized coal, magnesium ribbon, and pyrotechnics. The experimental techniques used for the study of the kinetics of solid-phase reactions are interesting. Diffusion flames and carbon formation are discussed in five of the papers. Studies of cool flames, auto ignition, and high-turbulence combustion chambers are reported on in eight of the papers on combustion in engines.

Especially interesting are five papers on special techniques that include a new shock tube for studying high-temperature gas phase reactions, use of Langmuir probes for ionization studies of flames, polarographic studies of cool flames, microwave studies of ionization, and the use of iodine absorption spectrum for temperature measurements.

The many facets of the kinetics of combustion reactions are discussed in a total of 45 papers. Of these approximately half are concerned with the combustion of hydrocarbons. Progress is being made in correlating the reactivity of complex hydrocarbon molecules with the process of energy transfer among the bonds within the molecule. Of the final set of papers, five are concerned with flame spectra and one with the dissociation energy of the OH radical. The volume is completed with résumés of two panel discussions, one on heterogeneous burning and the other on the status of the theory of the kinetics of combustion reactions.

This book should be stimulating to research workers, engineers, and scientists who are active in the combustion field. Although much experimental work is being done, new experimental techniques seem to be required to provide the information needed to confirm the present theoretically developed concepts of the kinetics of combustion processes.

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Miscellaneous Publications

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

Survey on Vibration and Shock Isolation. National Standards Laboratory Tech. Paper No. 7. J. A. Macinante. Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia, 1955. 42 pp.

The Use of Nuclides in the Determination of Organic Reaction Mechanisms. Peter C. Reilly Lectures in Chemistry, vol. XI. Lars C. S. Melander. University of Notre Dame Press, Notre Dame, Ind., 1955. 96 pp. $3.

Hospitals Served by the Red Cross Blood Program and Usage of Blood and Derivatives Distributed 1954–55. American National Red Cross, Washington, D.C., 1955. 56 pp.

Centrale Organisatie T.N.O. Jaarverslag 1954. Central Organization for Applied Scientific Research, Koningskade 12, The Hague, Netherlands, 1955. 353 pp.

Social Science Research Council, Annual Report 1954–1955. The Council, New York 17. 86 pp.

The Safety of Artificial Sweeteners for Use in Foods. A report by the Food Protection Committee of the Food and Nutrition Board. National Academy of Sciences–National Research Council, Washington, 1955. 10 pp.

Clearing the Main Channels. Thirty-fifth annual report of the American Civil Liberties Union. 1 July 1954 to 30 June 1955. American Civil Liberties Union, New York 10, 144 pp. $0.50.

The Papyrus Swamps of Uganda. G. S. Carter. Heffer, Cambridge, England, 1955. 25 pp.

Joint FAO/WHO Expert Committee on Meat Hygiene, First Report. WHO Technical Rept. Ser., No. 99. World Health Organization, Geneva, 1955. 52 pp. $0.60.

The Economics of Feed Materials and Fuel Processing Problems. J. Carlton Ward, Jr. Vitro Corp. of America, New York 16, 1955. 22 pp. Free.

Nuclear Level Schemes. A = 40 – A = 92 (Covering the Elements Ca – Zr). A collection of diagrams showing positions and properties of nuclear energy levels, characteristics of radioactive decay and nuclear reactions, together with a tabular compilation of the experimental data and bibliographic references to the original papers. K. Way, R. W. King, C. L. McGinnis, and R. van Lieshout. Nuclear Data Project, National Academy of Sciences–National Research Council, Washington, 1955 (Order from Supt. of Documents, GPO, Washington 25). 221 pp. $1.75.

Proceedings of the Conference on Effects of Radiation on Dielectric Materials. ONR Symposium Report ACR-2. Held at Naval Research Laboratory, Washington, D.C., 14–15 December 1954, under the joint sponsorship of Naval Research Laboratory and Office of Scientific Research, Air Research and Development Command. Office of Naval Research, Washington, 1955 (Order from Office of Technical Services, Dept. of Commerce, Washington). 169 pp. $4.25.

A Check-List of the Fossil and Prehistoric Birds of North America and the West Indies. Misc. Collections, vol. 131, No. 5. Alexander Wetmore. Smithsonian Institution, Washington, 1956. 105 pp.

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Recherches sur les Concomitants Electrencéphalographiques Eventuels du Papillotement et de la Fusion en Lumière Intermittente. J. Rutchmann. *Archives de Psychologie,* Geneva, 1955. 100 pp.

Our Natural Resources–and Their Conservation. Pamphlet No. 230. Richard L. Neuberger. Public Affairs Committee, New York, 1956. 28 pp. $0.25.

How to Write Technical Reports and Still Maintain Your Sanity. A. D. Ehrenfried. Technical Marketing Associates, Concord, Mass. 8 pp. $0.25.

Precooked Frozen Foods, a Symposium. Advisory Board on Quartermaster Research and Development. Quartermaster Food and Container Institute for the Armed Forces, Chicago 9, 1955. 76 pp.