

every botanical garden there. A wonderful report was compiled, submitted to Mr. Barkley, but it was never published, and no one to-day knows where it is.

At that time, Professor H. H. Bartlett, of Michigan, represented the botanists in a committee striving to separate the "Botanical Garden" from the Congress, so that it might function as a scientific institution. B. Y. Morrison represented the Department of Agriculture, which also tried to gain control, both futilely.

Mr. Barkley appointed David Lynn, the Capital architect, as acting director. This made Wm. Pagett, the assistant director, the functional director, and the conditions went on in the same unscientific way.

On February 1 Mr. Pagett retired. Through the aid of scientists in states whose senators and representatives were on the library committees, more than a majority of such members were pledged to have a scientist made functional director. None was consulted. Mr. Lynn promoted a German gardener, Mr. Sauberer,

to be assistant director. It still works without scientific guidance.

MARIUS VAN REMLAR

FULL EMPLOYMENT AFTER THE WAR

A CORRESPONDENT has indicated to me privately that my recent discussion regarding achieving full employment after the war¹ carried an implication that government-sponsored research should be frowned upon. This was inadvertent and far from my thought. I did intend to emphasize the desirability "that a substantial amount of investigation should remain in private hands" and that if research were sponsored by the government alone it would be in danger of becoming sterile. There is no doubt that much government-sponsored research has been tremendously valuable.

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SCIENTIFIC BOOKS

SCIENCE IN PROGRESS

Science in Progress. Fourth Series. 1945. Yale University Press. xvi + 331 pp. \$3.00.

THIS book consists of eleven "Sigma Xi lectures" on a great diversity of scientific topics. All but one were delivered before numerous chapters of Sigma Xi by traveling lecturers; the exception is the 1944 "Annual Sigma Xi lecture" of the general meeting at Cleveland in September of that year. Presumably therefore they were designed for audiences consisting in the main of scientists, yet not of specialists in their respective fields. I will try to assess them primarily though not entirely from the standpoint of such an audience, though their great diversity in length suggests that some at least have been rewritten.

As the ideal lecture I commend that of Selig Hecht, called "Energy and Vision" and dealing, as its author says, "with the simple question: How much energy do we need to see light?" As the outcome of very ingenious and very delicate experiments it is found that the astonishingly small number of 5 photons absorbed in the retinal rods is enough to produce the sensation of a flash in the dark-adapted eye. I can not imagine how the presentation could have been bettered, and I congratulate the audiences which heard it. Near the end Hecht inquires: If five photons suffice, why not one? The answer, if I paraphrase it correctly, is: If only one were sufficient the brain would often be fooled by a single nerve impulse arising "fortuitously," so it waits for attestation by five nerves before accepting the testimony. Very clever of the brain!

I. I. Rabi, in what is unfortunately the shortest paper of all, has contributed an extremely condensed and congested account of his method of "radiofrequency spectroscopy" for detecting the precession of molecules in magnetic fields and providing the grounds for inferences about the parts of these molecules. All physicists and many others can guess why the author's time was too scant to permit of more, and I can only assure the non-physicists that it was bad luck for them.

P. Debye treats of the art of "magnetic cooling," which leads to temperatures by far the lowest ever reached, and of which he was one of the two independent inventors. This is a difficult matter to expound, as the reviewer well knows. Debye draws the analogy between isothermal compression and adiabatic expansion of an ideal gas on the one hand, and isothermal magnetization and adiabatic demagnetization of a paramagnetic medium on the other. This has the disadvantage that the "work" which appears in the latter case is far from easy to grasp, and the advantage of avoiding the tricky concepts of entropy and order. But having gained this advantage Debye promptly tosses it away, and the lecture proceeds to a study of the entropy of trivalent iron ion, in which I fear that the non-physicists of the audiences got lost.

H. Eyring speaks of the detailed history of chemical reactions as interpreted by modern statistical theory: his title is "The Drift toward Equilibrium." At the beginning his style is fluent, graceful and witty, and the audiences must have been delighted. The description of a chain-reaction is humorous and vivid,

¹ SCIENCE, 101: 537, 1945.

but it does not soften up the fundamental postulate of statistical mechanics as stated with ruthless rigor three pages further on: and when after another three pages the reader confronts the (undefined) "barrier" I suspect that he will be stopped, and this at least will save him from being burned by the (undefined) "hot molecules" and then going astray in the (undefined) "configuration-space" which he is invited to enter. Forgive me, Professor Eyring! I do not intend to imply that there is anything wrong with your fabric, but just that it is tailored for minds already molded by long study of thermodynamics and statistical physics. For such minds it is well adapted and (to depart from the metaphor) concentrated but instructive.

O. Loewi spoke under the title "Chemical Transmission of Nerve Impulses." This illustrates strikingly how the verbal usages of one science may confuse the practitioners of another. To the physicist or engineer, this title implies the passage of impulses along a nerve; but what Loewi means is what the physicist would call the "coupling" of a nerve to a muscle. This coupling or transmission is managed by a chemical substance which the nerve-ending releases and which stirs the muscle to action. With the biological meaning of "transmission" clear in mind, and with a little more knowledge of the terminology of the nervous system than the reviewer possesses, the reader should find this lecture suitably clear and notably interesting.

D. W. Bronk presents a highly readable account of "The Physical Structure and Biological Action of Nerve Cells." To a small group of physicists and engineers, part of what he says can be condensed into the phrase that the nervous system is a truly wonderful servomechanism. The electrical phenomena in calls have been studied with the aid of physical apparatus of the utmost refinement, and the story ought to stimulate some physicists to dedicate themselves to biophysics. The lecture also treats some of the physiological problems pertaining to aviation; and these in part, but the psychological problems mainly, are the topic of the longest paper in the book: "Psychological Aspects of Military Aviation," by W. R. Miles. This is packed with information about such matters as the tests applied to prospective fliers—too packed, indeed, for easy reading.

K. C. D. Hickman writes, under the title "Adventures in Vacuum Chemistry," on the recent advances in the art of distillation and the application thereof to the Vitamin A industry. The audiences may have been swamped by the flood of information ranging from physics through chemistry to biology, but the material is well presented. I think that it must be a slip (on page 212) which implies that a tea-kettle produces a vacuum of 10^{-3} mm Hg, and I do not fol-

low the explanation (on page 223) of the persistence of the spiral pattern. The "Present Status of the Vitamin B Complex," as described by C. A. Elvehjem, is apparently that the said system is found to consist of a good many things (some of them having chemical formulae so complicated it seems a wonder that they are known) of which the properties are found largely by observing what happens to an animal which does not get them in its diet. Happy the experimental physicist who works with spectroscopes and electronic devices on nice clean inorganic matter!

E. J. Cohn's admirable "Blood and Blood Derivatives" is the 1944 Sigma Xi lecture. It is thrilling to read of the complicated nature of the blood and its exquisite adaptation to so many purposes; thrilling also to hear of the skilful ways of separating and conserving its constituents for the benefit of the injured and the sick, one of the few offsets to the horrible expense and irrevocable waste of war. Osmotic pressure proves, as usual, difficult to present; we find the strangely sounding statement that "molecules by exerting osmotic pressure pull water back into the bloodstream."

The brilliant mathematician, George Birkhoff, whose sudden death is so much deplored, contributed a lecture, "The Mathematical Nature of Physical Theories." I am sorry to be obliged to conclude that he lost his audiences, excepting the mathematicians and a few mathematical physicists, in a very few minutes. Several times he refers too sketchily to little-known work of his own. It is tantalizing, for instance, to read that "the form of relativity of motion appearing in (Einstein's) theory is really that which would be suggested naturally to an astronomer who looked out upon the stellar universe with a completely impartial view" and then be sent elsewhere for the explanation!

KARL K. DARROW

BOOKS RECEIVED

- Annual Review of Physiology.* Vol. VI. Pp. 630. Annual Reviews, Inc. \$5.00. 1945.
- CANNON, WALTER B. *The Way of an Investigator; A Scientist's Experiences in Medical Research.* Pp. 229. \$3.00. 1945.
- CARTER, G. W. *The Simple Calculation of Electrical Transients.* Pp. viii + 120. Illustrated. Cambridge University Press, The Macmillan Company. \$1.75. 1945.
- CLIFFORD, HARRY E., and others. *Transmission Lines, Antennas and Wave Guides.* Illustrated. Pp. xv + 347. McGraw-Hill Book Company. \$3.50. 1945.
- DIEHL, HAROLD S. *Textbook of Healthful Living.* Third edition. Illustrated. Pp. xiii + 707. McGraw-Hill Book Company. \$2.50. 1945.
- KEYS, THOMAS E. *The History of Surgical Anesthesia.* Illustrated. Pp. xxx + 191. Schuman's, New York. \$6.00. 1945.