the skin of mice is painted with methylcholanthrene. The large amount of data allows no particular conclusions with the possible exception of the relation of reduced calcium content to decreased cohesiveness of cells. Even the general statement that the findings "are consistent with the hypothesis that malignant transformation is one of probably several mutations" is tenable only if the word "mutation" is used in the sense of any change rather than in the more exact genetic meaning of the term.

Much more promising than these overall studies appear to be the more exact tracings of metabolic pathways and of conversion products with the use of radioisotopes, as presented by C. Heidelberger. This reviewer is still highly impressed by the work of J. A. Miller and E. C. Miller, who first clearly presented evidence through their studies on azo dye carcinogenesis that abnormal protein patterns are formed in the process. With successful extension of these investigations to polycyclic hydrocarbons, generalizations of utmost importance are feasible and susceptible to factual experimentation.

W. U. Gardner gives a résumé of data on hormonal aspects of experimental tumorigenesis. Little new information seems to have been added during the past five years, and the era of steroid hormones appears to be drawing to a close in this field. Reports which have appeared since this review, on the effects of hypophysectomy upon carcinogenesis will undoubtedly revitalize the advances. A. Tannenbaum and H. Silverstone review nutrition in relation to cancer, another chapter in cancer research that is fairly well delineated. Diet plays a definite role, albeit a peripheral one, in the genesis of many tumors in animals, and probably in man. Underfeeding leads to a lower incidence and later appearance of many neoplasms, but the nutritional state has no marked effect upon the growth of established cancer.

W. C. J. Ross contributes a technical chemical paper on the cytotoxic alkylating agents, "radiomimetic" compounds, which have found a small place in the clinical chemotherapy of the lymphomas. His review shows the extensive, detailed investigations that have been performed with these agents and, at the same time, reveals the limitations of this type of approach in experimental chemotherapy of cancer. R. J. Winzler presents the subject of plasma proteins in cancer. Although many abnormalities have been shown, none is specific for neoplastic disease and probably reflects the systemic changes in the host. One wonders whether accentuation upon the analysis of the proteins of neoplastic tissues themselves may not be more profitable than further search for possible specific changes which may reside in the proteins of the blood.

For all investigators in cancer, as well as for laboratories of biochemistry, endocrinology, virology, and radiology, *Advances in Cancer Research* is a must. The index of papers scheduled for Volume II indicates that the quality of the presentations will be maintained.

The editors and the publishers are to be congratulated for the initiation of a valuable series of publications.

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Science and Humanism: Physics in Our Time. Erwin Schrödinger. New York: Cambridge Univ. Press, 1952. 68 pp. $1.75.

> I consider science an integrating part of our endeavour to answer the one great philosophical question which embraces all others, the one that Plotinus expressed by his brief: Who are we? And more than that: I consider this not only one of the tasks, but the task, of science, the only one that really counts (p. 51).

It is customary to say "This is the age of science." And science means to most people radar and atomic energy, jet planes and supersonic flight, miracle cures and wonder drugs. It means all the achievements of modern technology based on science. With this outlook many engaged in industry and technology lose sight of the fact that science is much more—that science has completely changed spiritual values and our whole outlook on the world and its meaning. In the first part of his book, Schrödinger emphasizes this point and strongly urges counteracting the tendency toward technical specialization by a deeper study of the humanistic side of science. He emphasizes the necessity of bringing science to the citizen and he considers lectures, such as these which he gave under the auspices of the Dublin Institute for Advanced Studies, as one of the tasks scientists have to undertake, "for there is always a certain time lag between the views held by learned men and the views held by the general public about the views of those learned men." He also realizes (p. 9) "that the majority of educated persons are not interested in science and are not aware that scientific knowledge forms part of the idealistic background of human life." Thus his introduction is in a sense a summary of the ideas which prompted the development of general education programs not only in this country but also abroad, programs sponsored not only by educators and philosophers but by some of the leading scientists of our time.

The main part of these lectures is devoted to showing how completely physics changed our ideas about the nature of matter, and that, in spite of the fact that modern techniques make it possible to follow a single fast particle and its path, that the nature of this particle and its interaction with matter or radiation is to be described in an entirely different form from what we have been accustomed to.

He discusses the nature of our "models" and brings out the paradoxes of infinity and the difficulty in a continuous description based on causality. This chapter is followed by a lucid and simple discussion of the

meaning of infinity, illustrated by the distribution of numbers in a definite interval—a discussion which will be welcome to teachers who are interested in bringing the meaning of infinity and numbers to the understanding of non-science students.

Schrödinger then discusses the "makeshift of wave mechanics," his own creation, and the idea of complimentarity in the description of particles and waves. While the author speaks whimsically of an "emergency exit" and quotes Eddington as calling it "not a physical theory but a dodge—and a very good dodge, too"—his brief summary is a clear and concise statement of this development, to bring to the attention of the layman the dilemma in the ill-fitting description by words and the perfection of its logical mathematical counterpart in modern physics.

Schrödinger discusses the theory of Bohr and Heisenberg but he, himself, is rather skeptical that this is the last word regarding a theory of nature. "What remains doubtful to me is only just this: Whether it is adequate to term one of the two physically interacting systems the 'subject.' *For the observing mind is not a physical system, it cannot interact with any physical system.* And it might be better to reserve the term 'subject' for the observing mind" (p. 53).

A brief discussion of "atoms or quanta—the counter-spell of old standing, to escape the intricacy of the continuum," follows. Schrödinger closes by discussing: "Would physical indeterminancy give free will a chance?" and considers the problem of predictability in the physical world and in the behavior of a living body. "The net result is that quantum physics has nothing to do with the freewill problem. If there is such a problem, it is not furthered a whit by the latest development in physics. To quote Ernst Cassirer again: 'Thus it is clear . . . that a possible change in the physical concept of causality can have no immediate bearing on ethics.'"

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Record of the Rocks: The Geological Story of Eastern North America. Horace G. Richards. New York: Ronald, 1953. 413 pp. Illus. $6.00.

This is a book on general historical geology in which the emphasis is on the history of a part of eastern North America—the seaboard states from New York to South Carolina. The book is designed for the general student or reader rather than for the specialist and no previous knowledge or study of physical geology or biology is assumed. There are introductory chapters on the principles of physical geology and on the classification of animals and plants.

The treatment of historical geology begins with a short chapter on the origin of the earth. One chapter is devoted to the pre-Cambrian, after which follow chapters on each Paleozoic and Mesozoic period and Cenozoic epoch. A chart of the general section of the rocks for several states is included with each chapter, the physical conditions of the period summarized, paleogeographic maps presented, the prominent life forms described, and the economic resources briefly discussed.

As would be expected from an author who is a well-known specialist on the stratigraphy and paleontology of the Atlantic Coastal Plain, the chapters on the Cretaceous period and on the Tertiary epochs are the most detailed in their discussion of stratigraphic information for the states included.

Extensive reading lists give references to modern literature whereby the serious student can pursue various subjects in any desired detail.

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Scientific Book Register

Human Behavior: Psychology as a Bio-Social Science. Lawrence E. Cole. Yonkers-on-Hudson, N. Y.: World Book, 1953. 884 pp. Illus. $5.50.

The Scientific Adventure: Essays in the History and Philosophy of Science. Herbert Dingle. New York: Philosophical Library, 1953. 372 pp. $6.00.

Pharmaceutical Arithmetic. A complete course in everyday problems in dispensing, manufacturing, and hospital pharmacy. 3rd ed. Ignatius J. Bellafiore. St. Louis: Mosby, 1953. 226 pp. Illus. $4.50.

The Theory of Homogeneous Turbulence. G. K. Batchelor. New York: Cambridge Univ. Press, 1953. 197 pp. Illus. $5.00.

Applied Inorganic Analysis: With Special Reference to the Analysis of Metals, Minerals, and Rocks (Hillebrand and Lundell). 2nd ed. Revised by G. E. F. Lundell, H. A. Bright, and J. I. Hoffman. New York: Wiley; London: Chapman & Hall, 1953. 1034 pp. Illus. $15.00.

Microscopy for Chemists. Harold F. Schaeffer. New York–London: Van Nostrand, 1953. 264 pp. Illus. $4.50.

Television Receiver Design: I. F. Stages, Book VIII-A. A. G. W. Uitjens. Eindhoven: Philips' Technical Library, 1953. U. S. distrib.: Elsevier, Houston. 177 pp. Illus. $4.50.

X-ray Sieve Therapy in Cancer: A Connective Tissue Problem. Benjamin Jolles. Boston: Little, Brown, 1953. 192 pp. Illus. $6.00.

The Primitive City of Timbuctoo. Horace Miner. Princeton, N. J.: Princeton Univ. Press, 1953. (For the American Philosophical Society). 297 pp. Illus. + plates. $5.00.

Clinical Periodontology: Dynamics and Treatment; A Biologic Approach to Practice. Abraham Berliner. New York: Park Press, 1953. 249 pp. Illus.

Physical Chemistry for Colleges. A course of instruction based upon the fundamental laws of chemistry. 7th ed. E. B. Millard. New York–London: McGraw-Hill, 1953. 618 pp. $6.00.

The Universe of Meaning. Samuel Reiss. New York: Philosophical Library, 1953. 227 pp. $3.75.

Engineering Descriptive Geometry. The direct method for students, draftsman, architects, and engineers. 2nd ed. Charles Elmer Rowe and James Dorr McFarland. New York–London: Van Nostrand, 1953. 352 pp. Illus. $5.00; $4.25 college ed.