The Principles of General Biology. Mary S. Gardiner. New York: Macmillan, 1952. 657 pp. $5.75.

This book impresses the writer as being one of the better general biology texts to appear in the postwar era. Dr. Gardiner has made a wide and general survey of the field of biology, stressing basic concepts, rather than presenting a collection of facts. Unlike so many of the more recent books, which lay great emphasis on man, this book deals with the more general and fundamental concepts of biology. To this reviewer, this seems to be one of the book's most desirable features. The author definitely states that the book is not designed as a day-by-day text, but is intended as a supplement to classroom and laboratory work.

The book is divided into four sections. The first part, "The Organization of the Natural World," is particularly well done. It deals with the cell, protoplasm, and the physicochemical aspects of biology. It is clearly written and can be followed by students with limited training in the fields of physics and chemistry.

A rather unique feature of the section "The Organization of Biological Systems" is the comparative treatment given the organization of living things. For example, plants (Thallophyta) and animals (Protozoa) at the lower levels of organization have been discussed together. The same comparative treatment is given the Metaphyta and Metazoa. This type of comparative treatment seems to have definite advantages in emphasizing the unity of living organisms. This is followed by a rather detailed serial consideration of the Annelida, Arthropoda, and Chordata. The section on the Chordata is quite extensive, both as to form and function.

Although a good portion of Section 2 is devoted to the physiology of plant and animal forms, the third section, "The Operation of Biological Systems," deals in a more general way with such fundamental processes as nutrition, metabolism, growth, reproduction, and inheritance. Here, again, plant and animal forms are discussed comparatively, and the unity of living organisms is further emphasized. "The Evolution of Biological Systems" is well written, with emphasis on the historical development of the doctrine of organic evolution.

This reviewer has been impressed with the emphasis Dr. Gardiner has placed on the historical development of biological concepts and theories. This is best illustrated in the sections dealing with vitamins, hormones, and the doctrine of organic evolution. This type of treatment makes for a deeper appreciation, as well as for a clearer understanding of these topics.

The author writes with a smooth, easy style. The book is very readable and tells a story, rather than being a serialized collection of biological facts. As Dr. Gardiner has kept abreast of the field, the book is written in the light of the most modern discoveries in biology. The illustrations, many of them photographs, are numerous, clear, and good. Simplicity and ease of interpretation characterize most of the illustrations.

All things considered, the book is an excellent one and well suited to a course in biology where the instructor wishes to stress principles, rather than subjecting his students to an encyclopedia of facts.

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The Medical Sciences

Global Epidemiology: A Geography of Disease and Sanitation: Africa and the Adjacent Islands, Vol. II. James Stevens Simmons *et al.* Philadelphia-London: Lippincott, 1951. 652 pp. $15.00.

The advent of World War II emphasized problems of international health and the transmission of disease. Surveys made by the Medical Department of the U. S. Army formed the basis for Volume I of this series, which provided data on India, the Far East, and the Pacific area. The volume has been well received and has provided the only adequate reference on the geographical distribution of diseases of that portion of the world. Volume II, as indicated in the preface, is designed to provide a concise summary, by political units, of current health conditions on the African continent. The success in achieving its objectives is appropriately attributed to the initiative of the Medical Intelligence Division of the Preventive Medicine Service of the Army, grants from the U. S. Public Health Service to the School of Public Health of the University of Minnesota, and to the cooperation of numerous health officials and research and educational institutions of many countries. A great deal of recent data was acquired by Ruth Alida Thomas on a survey trip in the winter of 1950 to Africa and various colonial headquarters in Europe.

The material is organized according to geography and climate, population and socioeconomic conditions (including vital statistics, social economy, food and nutrition, and housing), environment and sanitation (including flora and fauna), health services, and medical facilities, followed by a separate discussion of the more important diseases. Numerous small maps outline the distribution of various diseases or vectors. Section One includes the countries of the Nile Valley, the Ethiopian highlands, East Africa, the islands of the Indian Ocean, South Africa, Equatorial Africa, West Africa, and, in Section Eight, Northern Africa —a total of 45 countries being considered. A bibliography is appended to each section. A useful appendix includes maps of the principal tropical diseases and reprints "Health Hints for the Tropics," prepared by a committee of the American Society of Tropical Medicine. A complete index is provided.

Africa, as one of the great undeveloped regions of the world, is destined for an increasingly important future role. Colonial domination in the past has tended to minimize world interests in this continent, but international trade, travel, and the possibility of

military involvements have radically changed the situation. The authors have rendered a meritorious service in accumulating in a single volume, from widely scattered sources, the current knowledge of geography of diseases of Africa and other data on the health and sanitary conditions of the area. Future volumes in this series will be eagerly awaited by civilian and military public health and tropical medicine experts.

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An Atlas of Normal Radiographic Anatomy. Isadore Meschan with the assistance of R. M. F. Farrer-Meschan. Philadelphia-London: Saunders, 1951. 593 pp. $15.00.

The increase in numbers of x-ray technical personnel in recent years has been such that practically a whole new generation of radiographers requires training. Because equipment has become increasingly automatic, the necessity for acquiring physical information has diminished. As a result, greater emphasis can be placed during training on the other fundamentals of radiography, especially radiographic anatomy and projections.

Because good comprehensive sources of information about radiographic anatomy have been none too plentiful, the publication of Dr. Meschan's excellent book is especially welcome. In it, with the assistance of his brother, R. M. F. Farrer-Meschan, of Melbourne, he has assembled a compendium of radiographic anatomy that includes the following: basic anatomic information as it applies to radiography; the manner in which routine projections employed in radiography are obtained; a concept of the radiograph so obtained; the anatomic parts best visualized by these projections; anatomic changes with growth and development; and some of the more common normal anatomic variations.

The book is divided into 16 chapters, the first of which deals with the fundamentals of radiography, including concise explanations of the physics and geometry involved in the creation of an x-ray image. The second chapter contains a thorough discussion of the development of the skeletal system. The remaining 14 chapters are devoted to the radiographic anatomy of the body as follows: upper extremity; pelvis and lower extremity; skull; detailed consideration of various regions of the skull; brain; vertebral column and subarachnoid space; respiratory system; mediastinum; heart and major blood vessels; upper digestive tract; intestine beyond the duodenum; abdomen and peritoneal space; urinary tract; and genital tract. Each chapter contains introductory material on the basic anatomy of the area under discussion and a brief discussion of the radiographic examination.

In general two pages are devoted to each of the radiographic projections discussed. Each of these sections features a drawing showing the positioning of the patient and a reproduction and a labeled tracing of the radiograph. Practical hints on technique are also included.

The chapters on the skull, brain, vertebral column, and respiratory tract are very thoroughly presented. The author has included valuable material on the use of contrast media in connection with the examination of blood vessels in brain, heart, other viscera, and extremities. Body-section radiographs are occasionally employed to demonstrate certain anatomic features.

The reproduction of radiographs is of good quality. All in all, the book is very readable and is a valuable addition to the literature on the subject.

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Chemistry of Muscular Contraction. 2nd ed. A. Szent-Györgyi. New York: Academic Press, 1951. 162 pp. $4.50.

The chemical reactions involved in, and responsible for, muscular contractions present a fascinating problem to the biochemist and the physiologist, and Dr. Szent-Györgyi has given us in this new book a stimulating discussion of certain aspects of these reactions. Although called a second edition, the book is in reality completely new, as some of the chapter headings are about the only holdovers from the first edition.

Most of the book is concerned with the physical state of the muscle proteins (actin, myosin, and actomyosin) at rest and the changes they undergo during contraction. The ATP-protein and protein-protein interactions are the chemical reactions most thoroughly discussed; very little is said about ultimate energy sources and method of formation of ATP.

The book is written in a modified narrative style that, in the opinion of the reviewer, is occasionally a little too elementary for the subject matter. For example:

> The first question put by any chemist would be: What is or what are the substances in the juice responsible for eliciting this contraction? A little scientific cookery gives the answer, showing that they are ions and ATP.

On the whole, however, the style makes interesting reading. Recent evidence on specific points is presented and discussed, and then the author's theories of what the evidence means. This interpretation is perhaps the most interesting part of the book and will undoubtedly stimulate much discussion.

An intriguing chapter on thermodynamics, which attempts to analyze the mechanism of contraction by use of temperature-activity curves, is included. A number of excellent electron micrographs of various muscle preparations and isolated proteins are used in discussions on muscle structure.

Detailed procedures for the preparation of ATP, glycerol-extracted rabbit psoas muscle, myosin, actin, actomyosin-myosin B, and actomyosin threads are given. Some of these experiments would be excellent for inclusion in a laboratory course in biochemistry or physiology where muscle metabolism is studied.

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A Textbook of General Physiology. Hugh Davson. London: J. & A. Churchill; Philadelphia: Blakiston, 1951. 659 pp. $7.00.

Thirty years ago William M. Bayliss, of University College, London, electrified an older generation of physiologists with his epoch-making *Principles of General Physiology*. Now, from the same laboratory comes a new book in the same field, destined to have a similar influence upon the present physiological generation. This is a very able review and summary of recent advances in many divisions of the subject and shows a remarkably clear and penetrating understanding of vital function in its more basic aspects. It represents an outstanding scholarly achievement in integration and interpretation of a literature that has grown greatly since Bayliss' day.

The text is supported by 1700 citations from the original literature, of which half appeared within the past seven years, and by 288 illustrations, most of which have never previously been used in any textbook. Particularly well done, among the 22 chapters, are the discussions of the structural proteins, of ionic equilibria and bioelectric potentials, of the kidney and osmotic regulation, of excitability and the propagation of the nerve impulse, of muscular contraction, and of photosynthesis.

This book is required reading for every physiologist, general or specialized, and for many others of the fraternity of scholars who come to physiology for fundamental interpretations in their related fields. The graduate student will find it a treasure house of well-organized information. As a class text for more advanced students at the undergraduate level, the book should find wide use.

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The Electrical Activity of the Nervous System: A Textbook for Students. Mary A. B. Brazier. London: Pitman; New York: Macmillan, 1951. 220 pp. $5.00.

Unlike previous monographs on electrophysiology (Biedermann [1895], Schäfer [1940–42]), the present book is confined to the electrophysiology of the peripheral and central nervous system. After a brief introduction to the structure and function of the nervous system, the action potentials of the peripheral nerves are subjected to a detailed analysis, largely based on the work of Gasser, Erlanger, Lorente de No, and the Cambridge group. The application of this work to the physiology of the spinal cord is outlined, and the rival theories of synaptic transmission are sketched. Subsequent chapters deal with transmission of impulses from the sense organs to the central nervous system (Adrian-Bronk law) and illustrate the role that the study of action potentials has played in the exploration of the sensory projection areas of the cerebral cortex. A chapter on the electrical activity of the brain serves as a basis for the study of the electroencephalogram in man, which is briefly discussed in its physiological and some of its pathological aspects. The book is written with great clarity, amply illustrated, and provided with an adequate list of references at the end of each chapter. Print and binding are excellent. Brazier's work can be recommended without reservations to students of physiology and electroencephalography.

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Survey of Compounds Which Have Been Tested for Carcinogenic Activity. Public Health Service Pub. No. 149, 1951. 2nd ed. Jonathan L. Hartwell. Order from Supt. of Documents, GPO, Washington, D. C. 583 pp. $4.25.

One of the most important tasks of cancer research workers is to find the cause of cancer and to devise a method for its prevention. It has long been suspected that prolonged or chronic irritation with certain substances can cause cancer. In 1775, Percival Pott noted that cancer of the scrotum was unusually common among chimney sweeps. He thought that in these people the disease seemed to derive from a lodgment of soot in the rugae of the scrotum. This observation forms the basis for our present knowledge of the possibility of producing cancer with pure chemicals. It was not until 1915, however, that experimental production of cancer was achieved. Yamagiwa and Ichikawa then succeeded in producing cancerous growths in rabbits' ears after long-continued painting with coal tar. Kennaway and Cook, in 1932, first produced skin cancer in mice by a pure chemical, 1,2,5,6-dibenzanthracene. Since then a great number of chemicals have been tested for carcinogenic activity. It became apparent, therefore, that a complete survey on this important subject was imperative, and fortunately Dr. Hartwell has unselfishly undertaken this task and has done it well.

The present book lists 1329 compounds, of which 322 were reported to cause malignant tumors in animals and 35 others to induce only benign tumors. As in the first edition, the present work lists only simple compounds: (*a*) inorganic compounds; (*b*) organic compounds—namely, aliphatic, monocyclic, bicyclic, tricyclic, tetracyclic, pentacyclic, hexacyclic and higher, azo compounds, steroids, heterocyclic, and unclassified compounds. Such complex mixtures as tars, irradiated steroids, and articles of diet are not included.

Hartwell points out the pitfalls in the use of a survey to affirm or deny a proposed theory of carcinogenesis, or a fancied correlation between carcinogenicity and chemical structure. Sometimes it is not realized that lack of carcinogenic potency implies such a lack only under limited experimental conditions. There are pronounced differences in the response of different species to the action of carcinogenic compounds, as in the case of the mouse. There is evidence

that some compounds that are negative in the mouse can induce tumors in other species. Some compounds have given negative results when applied to the skin but have been quite active when injected subcutaneously. Compounds potent for the skin and subcutaneous tissue are found to be inactive when introduced directly into the liver. The susceptibility of the lungs does not necessarily parallel that of the skin or the subcutaneous tissue. Details of the mode of administration may also influence results. Average latent period may affect the expression of carcinogenic potency, and diet, too, may be an important factor. Another pitfall is the attempt to carry over to man conclusions based on animal experiments. We do not know whether man is more or less susceptible than mice to particular carcinogens. Some animal species, such as the rat, rabbit, and dog, are much more resistant to certain chemical carcinogens than is the mouse, and vice versa, and in the monkey none of the powerful pure carcinogens has been shown to produce tumors. (Recently, Sugiura, Smith, and Sunderland succeeded in producing papillomas and squamous cell carcinomas in monkeys by painting with catalytically cracked petroleum (*Cancer Research,* 9, 631 [1949]).

Although no evidence has been found that such cancer-producing chemicals exist in the normal body, it is possible that they may arise under abnormal conditions from some chemically related substances known to be present. Knowledge of the production of cancer with pure chemicals may provide the key to the secret of cancer formation, prevention, and cure.

Jonathan Hartwell deserves praise for this valuable addition to cancer literature, and students of cancer may greatly profit from it. The bibliography includes 2055 papers, written by 1744 scientists, alone or jointly.

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Outline of Fundamental Pharmacology: The Mechanics of the Interaction of Chemicals and Living Things. David Fielding Marsh. Springfield, Ill.: Thomas, 1951. 219 pp. $6.00.

Since the classical monographs of A. J. Clark, published in the thirties, no comprehensive treatise has appeared on the general principles of the mode of action of drugs. Yet, the great advance of pharmacology in the past decade has led to many changes in our general concept and rendered this science much more complex. Marsh's book thus supplies a long-felt want.

This book is ideal for introducing the student to pharmacological research or for showing the interested scientist what pharmacology and bio-assay really are. In the first chapter, pharmacology is defined by its aims, problems, and history, but the book as a whole serves excellently to extend this by demonstrating its methods, its "way of thinking," and its spirit. The succeeding chapters deal with factors influencing drug action (age, sex, weight, environment, pathologic conditions, other drugs, species variation, etc.); the principles of quantitative pharmacology and bio-assay; mode of action of drug antagonism and synergism; experimental aspects of the site of action of drugs; principles of the absorption, distribution, and fate of drugs in the organism; mechanism of action of drugs; and relationship between chemical constitution and biological action. In an appendix, the applications of pharmacology are briefly described. All chapters are masterfully illustrated with specific examples and highlights from the history of pharmacology. The entire structure of the book demonstrates great pedagogic ability. The book serves as a valuable guide into pharmacological bibliography, listing (partly in the text, partly among the references) the most important handbooks, general references, and typical papers dealing with the points under consideration. Ethical and legal aspects of pharmacology and allied sciences are discussed.

To young men interested in the medical sciences, the book of Ramon y Cajal (*Regeln und Ratschläge zur Wissenschaftlichen Forschung* [1933]) on the philosophy of medical research is usually recommended. If they then show specific interest in pharmacology, Marsh's book would be the ideal reading material.

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Psychology

The Study of Instinct. N. Tinbergen. New York: Oxford Univ. Press, 1951. 228 pp. $7.00.

The present volume deals with the scientific study of behavior or, as the author prefers to call it, ethology. The author seeks an answer to the age-old question: Why does the animal behave as it does? The book is a study of the biology of innate behavior. It considers the relationship between specific experimental and observational material and neurophysiology, ecology, taxonomy, psychology, and even sociology.

In discussing psychology, the author distinguishes between what he calls the largely nonobjective psychology of Europe and objective American psychology. He correctly points out that objective American psychology has not emphasized the study of innate behavior. He feels that this failure is due to the fact that many American psychologists do not recognize that learning and the other so-called higher psychological processes must be considered as secondary modifications of innate mechanisms. He contends that a study of the learning process should be preceded by a full knowledge of the innate foundations of behavior, preferably obtained under natural or field conditions.

Care must be exercised by the reader in remembering the way many technical terms are used by the author. The term "sign stimulus," for example, has a