ten, is beautifully illustrated, and not only will hold the interest of students but, I feel confident, will stimulate their desire for more information from specialized courses in biology. This book is a fine contribution; the author and publisher are to be congratulated for the publication of a very useful textbook of zoology.

JOSEPH T. VELARDO
Yale University School of Medicine

Research in the Effects and Influences of the Nuclear Bomb Test Explosions. pts. I and II. Committee for Compilation of Reports on Research in the Effects of Radioactivity. Japan Society for the Promotion of Science, Ueno, Tokyo, 1956 (order from Stechert-Hafner, 31 East 10th St., N.Y.). 1824 pp. Illus. $25.

The test explosion of a thermonuclear weapon at Bikini Atoll in March 1954 resulted in a major effort on the part of Japanese scientists to measure the spread of radioactive fission products and to assess the nature of the effects on man and his environment. The results of this work have been published in a two-volume report containing more than 200 papers. Included among these are also some papers related to the delayed effects of injuries sustained at the time of the Hiroshima and Nagasaki explosions in August 1945. The subjects dealt with are meteorology, physics, chemistry, genetics, agriculture, fisheries science, economics, and medical science.

In addition to a large number of papers dealing with the measurement of activity in rain, snow, and sea water, the meteorology section includes a comparison of the efficiency of the air impinger and electrostatic precipitator as "particulate" collectors. The members of the "Japanese Bikini Expedition" were given the task of surveying the waters around Bikini and near Japan and were able to show that some of the radioactivity was transported by air but that most of it moved in the North Equatorial Current. Included are some interesting observations of pressure waves from the 1952 and 1954 explosions, from which both the total energy release and the time of firing of the weapon are calculated, using the amplitude and the velocity of propagation of the wave.

The physics section is concerned largely with studies of contamination found on the Japanese fishing vessel No. 5 "Fukuryu Maru," though a few papers deal with physical properties of the particles. A complete survey was made of the ship, and from this the integrated dose to crew members was estimated. This is, of course, invaluable information when it is combined with the results of the medical studies. Also included are details of the locations of most of the Japanese fishing vessels during the Bikini trials in relation to the contamination found on them subsequently. Numerous methods were used to investigate the physical properties of the ash, which was shown crystallographically to be calcite granules with a diameter of 0.3 millimeter, presumably recrystallized from the vaporized coral reef.

Much of the chemistry section deals with qualitative radiochemical analyses of this material, together with an investigation of the fission-product content of the organs of the crew member who died. It is of interest that in addition to the fission products, several of the actinide elements were detected in air-borne material by the chemists, who also reported the absence of activities other than those arising directly in the fission process. Some discussion of the physical significance of these findings is included.

The genetics section consists almost entirely of descriptions of the mutations and chromosome abnormalities appearing in the descendants of crop plants and weeds which survived the Hiroshima and Nagasaki explosions. The most conclusive finding was a tenfold increase in genetic abnormalities in rice plants grown from seeds gathered within 600 meters of the hypocenter at Nagasaki. The dose is not estimated, but, from the human mortality data reported elsewhere, it was probably much greater than 500 roentgens.

The agriculture section gives extensive information on the contamination of trees, plants, animals, soil and water, as a result of the Hiroshima, Nagasaki, and Bikini explosions, together with a brief description of the injuries sustained by animals in Hiroshima. Unfortunately, many of the data on contamination are difficult to interpret, because in most cases only the shorter lived nuclides—for example, strontium-89 and barium-140—are measured, and in many instances the results are given in counts per minute.

The fisheries science section is one of the most extensive and is concerned primarily with measurements of the radioactivity found in the fish caught commercially between Japan and Bikini following the 1954 explosion. It is of interest that a radioisotope, zinc-65 (which is not an important fission product and was not reported in the air-borne contamination) was widely distributed in sea life. Most of these reports, however, were written before a full chemical analysis had been carried out. Included also are descriptions of what are probably the most detailed experiments so far reported, on absorption both of mixed fission products and of radioisotopes of strontium, calcium, and zinc by aquatic animals. The serious effects of the publicity associated with the possibility of radioactive contamination of fish is dealt with in the economics section, where the plight of the workers in the industry is vividly described.

The medical science section contains the best and most detailed work in the report. This is probably due to the fact that the Atomic Bomb Injuries Investigation Research Committee had been working since 1953 on systematic investigations of the results of the Hiroshima and Nagasaki explosions, its membership merely being extended following the Bikini accident. The collection of papers presented is a book in itself. It starts with a description of the events which befell the "Fukuryu Maru" before dawn on the morning of 1 March 1954, reviews the early clinical features of the radiation injuries in her 23 crewmen, deals in detail with the later hematological, pathological, histological, and bacteriological observations, and includes the autopsy findings on the one fatality which occurred 6 months later (although it is not certain that the death was caused by the exposure). It is estimated that the crew probably received an accumulated exposure of from 270 to perhaps as much as 440 roentgens of external radiation during the 2 weeks which it took the "Fukuryu Maru" to return to its home port of Yaizu.

In assessing the scientific value of these volumes one should not lose sight of the difficulties which must have been associated with the collection of such a bulk of descriptive material. It is true that the individual contributions show little apparent attempt at integrating the final report into a cohesive whole, that there is sometimes a lack of control observations where one would wish them, and that the measurements of radioactivity can often be translated only very roughly into standard units. It is much more important, however, that this extensive and diverse material did in fact get collected and brought together into a single publication. The task of extracting and coordinating the information into a more readily assimilable form has yet to be carried out, but it might never be undertaken if the descriptions had not been gathered together in the present volumes.

C. A. MAWSON
H. B. NEWCOMBE
W. E. GRUMMITT
Atomic Energy of Canada, Ltd.

Physics. John S. Marshall and Elton R. Pounder. Macmillan, New York, 1957. 906 pp. Illus. $8.50.

A survey of the many introductory physics texts that have appeared recently and a glance at the direction in which established texts have evolved reveals that the emphasis has been upon including a greater number of topics and

applications. To what extent breadth of knowledge can be achieved in an introductory physics course without sacrificing depth of insight into the fundamental physical principles and an appreciation of the logical coherence of the subject is debatable. Certain it is, however, that when, as in this textbook, the emphasis on various topics is not a particularly happy balance, the results are unfortunate. Chapters are devoted to such topics as the special theory of relativity, the wave-particle duality of wave mechanics, and nuclear physics. Yet one finds a very abbreviated section on electrostatics which contains no mention of Gauss' theorem and very little explanation of the behavior of a dielectric. As a result, the text is forced merely to state the capacitance of a parallel plate capacitator, prefaced only with the remark, "It can be shown that . . . ." This is hardly adequate for a text which is described in the preface as containing sufficient material for a 2-year course.

Viewed as a textbook for a 1-year course, the book has many commendable features. The method of presentation is conversational, often humorous, with many clear and simple figures and graphs to illustrate the text material. A few topics are treated in a refreshingly direct and detailed way that is unusual for a textbook at this level. For example, the relationship between torque and angular acceleration is proved for a rigid body by a direct application of Newton's second law, rather than from conservation of energy. The section on heat, similarly, uses detailed yet clearly presented approaches to the kinetic theory of ideal gases, the Carnot cycle, the thermodynamic definition of temperature, irreversibility, and so forth.

The only mathematics required to read the book are algebra and trigonometry, although at the end of each chapter is a section which gives the derivation by calculus of some of the principal results. However, this method of presenting applications of calculus is scarcely likely to impress the reader with the advantages of knowing and using this tool. Vectors are also discussed at the beginning of the book in order to make such concepts as force and velocity clear. Unfortunately, the discussion of a vector is completely at variance with the definition to be found in all other physics and mathematics texts with which I am familiar. Vectors are said to have direction and magnitude, but it is stated that the method of addition for specific vectors can only be determined by experiment.

In my opinion, however, these advantages are more than offset by the superficial treatment of most other basic topics. The use of a very informal but uneconomical style makes it impossible for the authors to provide adequate background for the large number of topics and applications introduced in the book. In the chapter on angular motion, for example, the vector character of angular velocity is introduced without any attempt to give either a logical or an intuitive justification for the choice. The rate of precession of a gyroscope is then "derived," and a section follows on applications of the gyroscope in various aircraft instruments. Again, in the chapter on fluid mechanics, one finds a page on the air-speed indicator for aircraft. Yet Bernoulli's principle merely is given as a statement that "In a streamline flow, the pressure is greatest where the velocity is least." There is no attempt at a derivation, or even an explicit formula. The whole discussion of the principle is limited to a remark on the lift on an aircraft wing and a paragraph on the motion of a golf ball. This approach to introductory physics is likely to encourage the tendency of students to acquire a glib familiarity with the facts rather than an appreciation of their significance and a real understanding of the physical principles.

WILLIAM M. MACDONALD
University of Maryland

New Books

Wind and Solar Energy. Proceedings of the New Delhi Symposium. vol. VII of *Arid Zone Research.* 1956. 238 pp. $8. *Human and Animal Ecology.* Reviews of research. vol. VIII of *Arid Zone Research.* 1957. 244 pp. $5. UNESCO, Paris.

Le Ciel et la Terre. vol. III of *Encyclopédie Francaise.* André Danjon, Pierre Pruvost, Jules Blache, Directeurs. Société Nouvelle de l'Encyclopédie Francaise, Paris, 1956.

The People of Puerto Rico. A study in social anthropology. Julian H. Steward, Robert A. Manners, Eric R. Wolf, Elena P. Seda, Sidney W. Mintz, Raymond L. Scheele. University of Illinois Press, Urbana, 1956. 540 pp. $10.

Principles of Engineering Geology and Geotechnics. Geology, soil and rock mechanics, and other earth sciences as used in civil engineering. Dimitri P. Krynine and William R. Judd. McGraw-Hill, New York, 1957. 730 pp. $10.

Allgemeine Meereskunde. Eine einführung in die ozeanographie. Günter Dietrich. Gebrüder Borntraeger, Berlin, 1957. 492 pp. DM. 56.

The Species Concept in Palaeontology. A symposium. Publ. No. 2. P. C. Sylvester-Bradley, Ed. Systematics Assoc., London, 1956. 145 pp. $2.

How to Know Western Australian Wildflowers. pt. II, *A Key to the Flora of the Temperate Regions of Western Australia.* William E. Blackall and Brian J. Grieve. University of Western Australia Press, Nedlands, 1956. 138 pp. 30s.

Analog Computers, Their Industrial Applications. Proceedings of a Symposium for Management. Midwest Research Institute, Kansas City, Mo. 1957. 210 pp. $5.

Man and Society. The basic teachings of sociology. Samuel Koenig. Barnes & Noble, New York, 1957. 399 pp. Paper, $1.45.

Botany. A laboratory manual. T. E. Weier, C. R. Stocking, J. M. Tucker. Wiley, New York; Chapman & Hall, London, ed. 2, 1957. 175 pp. $2.95.

Heat and Thermodynamics. An intermediate textbook for students of physics, chemistry, and engineering. Mark W. Zemansky. McGraw-Hill, New York, ed. 4, 1957. 484 pp. $7.50.

About Mice and Man. An introduction to mammalian biology. Frederick R. Avis. J. Weston Walch, Box 1075, Portland, Maine, 1957. 194 pp. $3.

Elements of Engineering Thermodynamics. Rolf H. Sabersky, McGraw-Hill, New York, 1957. 318 pp. $7.50.

Dynamic Meteorology and Weather Forecasting. C. L. Godske, T. Bergeron, J. Bjerknes, R. C. Bundgaard. American Meteorological Society, Boston; Carnegie Institution, Washington, 1957. 800 pp.

Die Saftstrome der Pflanzen. Bruno Huber. Springer, Berlin, 1956. 126 pp. DM. 7.80.

Optics. Bruno Rossi. Addison-Wesley, Reading, Mass., 1957. 510 pp. $8.50.

Stress and Strain in Bones. Their relation to fractures and osteogenesis. F. Gaynor Evans. Thomas, Springfield, Ill., 1957. 245 pp. $6.50.

Pica. A survey of the historical literature as well as reports from the fields of veterinary medicine and anthropology, the present study of pica in young children, and a discussion of its pediatric and psychological implications. Marcia Cooper. Thomas, Springfield, Ill., 1957. 114 pp. $3.75.

Experiments with a Microscope. Nelson F. Beeler and Franklyn M. Branley. Crowell, New York, 1957. 154 pp. $2.75.

Directory of Institutions Engaged in Arid Zone Research. UNESCO, Paris, 1953. 110 pp. $1.50.

Discoveries and Opinions of Galileo. Translated by Stillman Drake. Doubleday, Garden City, N.Y., 1957. 302 pp. $1.25.

Communism on the Decline. George C. Guins. Philosophical Library, New York, 1956. 287 pp. $7.50.

Techniques of Organic Chemistry. vol. III, pt. II, *Laboratory Engineering,* Arnold Weissberger, Ed. Interscience, New York, ed. 2, 1957. 391 pp. $8.

Epidemiology. Bull. World Health Organization, vol. 15, No. 1–2. 359 pp. $4.

Malaria. Eradication, insecticide resistance, entomological investigations, epidemiology, control prophylaxis. Bull. World Health Organization, vol. 15, No. 3–5, 502 pp. $6. World Health Organization, Geneva, 1956.

Annotated Bibliography of Works in Latin Alphabet Languages on Biological Microtechnique. Freda Gray and Peter Gray. Brown, Dubuque, Iowa, 1956. 116 pp. $3.

Christian Theology and Natural Science. Some questions on their relations. E. L. Mascall. Ronald Press, New York, 328 pp. $4.50.

The Negro in the United States. E. Franklin Frazier. Macmillan, New York, rev. ed., 1957. 769 pp. $6.40.