

may be possible to identify a speaker by his speech pattern. Machines that will synthesize speech are discussed briefly.

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LIFE AND THE PHYSICAL SCIENCES, Harold J. Morowitz, 128 pp., \$1.28, Holt, Rinehart and Winston, Inc., New York, 1963.

The subtitle, *Introduction to Biophysics*, does not do justice to this little paperback—another example of the revolution in publications for science students. First of all, it is really an excellent survey of the physical basis of organisms and life itself. Secondly, biophysics here is used to include some broad concepts of chemistry. The book is well illustrated and the writing clear and lucid. Mathematics is held to a minimum. Highly recommended for all high school and college biology student reading.

COSMIC RAYS, A. W. Wolfendale, 222 pp., \$10.00, Philosophical Library, Inc., New York, 1963.

This book was written at this time because the amount of knowledge relative to cosmic radiation has expanded rapidly in recent years due to the accumulation of new facts and increased understanding of basic phenomena. It is primarily directed to the undergraduate but should be valuable also to the specialist and others who are interested in the subject. The book should be of special interest to the young student interested in physics because there are many problems remaining unsolved due to the limited amount of information available.

Some branches of the subject are treated lightly because at the time of the writing, they were in a state of rapid change. However, background knowledge is given to enable the student to follow the more advanced texts in the subject.

Virgil Heniser
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ELECTRON TUBES AT WORK, James B. Owens and Paul Sanborn, 557 pp., \$6.95, Doubleday, New York, 1964.

The two authors present an unusual approach to programmed instruction in basic electronics which is ideally suited to the biological researcher in need of a basic understanding of electronics. The book is not a typical text but rather a tool with which the reader must show self-discipline in following the discussions of the various electronic circuits. The introductory chapter provides a conventional review of the physical laws of electronics that is clear, uncluttered, and refreshingly to the point.

Starting with Chapter Two, the authors open an entirely new world of information presentation that perhaps might well be used in all academic areas. The reader is immediately confronted with a text that does not read in the conventional manner. The text is so derived that one is given basic information which is then followed with a question and a choice of three answers. The three answers are then examined in a separate section of the text according to one's choice. If a wrong answer is selected by the reader, he is immediately given a short discussion of why he is wrong; if on the other hand the selected answer is correct, a review of why it is correct is presented. The depth of the text is sufficient that the student leaves the book with a body of working knowledge in electronic circuits as they are in today's modern instrumented laboratory.

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ATOMS, CRYSTALS, MOLECULES, Ainslie H. Drummond, Jr., 63 pp., \$1.50, American Education Publications, Columbus, Ohio, 1962.

This small paperback is another in a series developed to give students a more thorough understanding of the areas of science included in the grades seven-twelve curriculum. Its use will contribute much in making future work in chemistry more significant and meaningful. It begins with the discovery of the electron near the end of the Nineteenth Century and traces modern thought about atomic structure and chemical bonding to date. Almost every page contains one or more diagrams illustrating the subject being discussed. Every teacher concerned with presenting the physical sciences to students should be familiar with this book and encourage its use by interested students. Its nominal price makes its use within reach of all students in a given class.

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PHYSICAL CHEMISTRY, George H. Duffey, 527 pp., \$8.75, Mc-Graw-Hill Book Company, Inc., New York, 1962.

One of the good features of the book is the many examples of worked out problems. Although it is written for students who have had calculus, the problems at the ends of the chapters are kept at about the same level of difficulty as the discussion itself. The subject matter is divided into three major areas. The first section is devoted to the fundamental concepts of atomic and molecular theory, the next uses these theories in explaining thermodynamic quantities

and laws, and the final section uses the earlier presentations to find the rate law for an elementary reaction. The two final chapters are studies of catalysis and photochemistry to the extent that they are helpful in understanding kinetics in general. In the body of the text, kinetic studies deal with reactions caused by collisions. Here an introduction is given to those rate processes caused by absorption of radiation and the converse process where radiation is produced in an elementary reaction.

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Earth Sciences

EARTH SCIENCE CURRICULUM PROJECT REFERENCE SERIES, W. H. Matthews III (Editor), RS-1, RS-2, RS-3 — set of three for \$1.00, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1964.

The first three pamphlets in this reference series provide important information on source materials for the biology teacher. Pamphlet RS-1 48 pp., will be extremely useful in locating data on fossils and earth history for local and regional areas. Degree-granting departments, government agencies, and scientific organizations are given for each state in the fields of astronomy, geology, meteorology, oceanography, and physical geography. Astronomical observatories and planetariums are also listed. A separate twelve page section presents coded designations for type of exhibit in United States and Canadian museums. This pamphlet will encourage contact with state surveys and educational institutions for source materials and consultations.

Pamphlet RS-2, 34 pp., have listed 1260 references for earth science, astronomy, geology, meteorology, oceanography, and physical geography. The six major subject areas are further subdivided into sections on introductory textbooks, teaching guides and handbooks, laboratory manuals and workbooks, general, reference works, periodicals, and career booklets. In addition, a section on field trips and field methods is included for geology, and a section on atlases accompanies the physical geography coverage.

Topics for oceanography illustrate a typical grouping of the general section within each subject area. The 210 oceanographic references are found under the headings of introductory reading, geology of sea bottom and coasts, islands and reefs, ocean charts and maps, ocean life, ocean movements, ocean water, oceanographic expeditions, oceanographic techniques and procedures, resources of the sea, and under-sea exploration. Forty-six references comprise

the sub-section on ocean life. The fossil sub-section in the geological subject area contains sixty-six items. Addresses for publishers are given on the last six pages.

The first section of RS-2, 34 pp., lists 239 films by title. Descriptions include a critical summary, coded audience suitability, date, length, sound or silent, black-and-white or color, and primary distributor. A sampling of film titles includes the following: Animals of the Ice Ages, Beaver Dam, Cave Community, Cosmic Rays, The Dinosaur Age, The Fossil Story, In the Beginning, Life Between Tides, Marine Biologist, National Parks — Nature's Last Frontier, Prehistoric Animals of the Tar Pits, Story in the Rocks, What's Under the Ocean, When Air Masses Meet. A second section lists the same films by subject. Areas of special interest to the biology teacher are arctic regions, biology, conservation of natural resources, fossils, historical geology, national parks, oceans and oceanography, water supply, and weather and climate. The third section lists films by primary distributor, and a fourth section lists the addresses at which the films may be obtained.

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GEOLOGY AND EARTH SCIENCES SOURCEBOOK FOR ELEMENTARY AND SECONDARY SCHOOLS, Robert L. Heller, Ed., 496 pp., \$2.96, American Geological Institute, Holt, Rinehart and Winston, Inc., New York, 1962.

This is one of the most complete sourcebooks this reviewer has seen for any subject. It is the result of the consideration given by the Education Committee of the American Geological Institute to the type of program that would be most effective in improving the quality of current teaching. The need for this compilation of resource material is the result of the rapid growth of earth science offerings in schools throughout the country, inadequate teacher training for such courses, and the need for encouraging its incorporation in all science courses.

This sourcebook of materials for elementary and secondary schools is the product of a writing conference organized by an AGI steering committee. The committee consisted of university, secondary school, and industry representatives. The criteria for including material was its overall quality of subject matter, suitability for use in general science for grades 1-9, suitability for an earth science course at the high school level, and suitability as supplemental material for related courses at the high school level.

Twenty-three units, covering the entire field of earth science are presented, including the