ciable shift was seen, in the Miller case a partial shift (cause unknown) was detected.

The decrease in frequency, the increase in wavelength, of a spectral line sent out from an atom in a very strong gravitational field as compared with the radiation in a weak field is set forth, but again the author's knowledge of physics is greatly at fault. According to him "the number of vibrations of the light emitted by a *circulating electron* is a measure of the number of revolutions of the electron about the nucleus." That point of view, briefly held, was exploded thirty years ago. The author believes that the confirmation of this result of the relativity theory —the red shift of spectral lines due to strong gravitational fields—depends on the completion of the "Einstein tower" in Potsdam, "a structure combining to perfection every astronomical and physical contrivance," designed by E. Freundlich (who according to the translator was forced to leave Germany in 1933), who was to measure with high accuracy the dark lines of the solar spectrum. But the shift for radiations coming from dense stars has been found. It is several times greater than the computed solar shift and is in accord with the theory.

The book is intended to acquaint philosophers with some of the new aspects of matter and motion. But the author does not feel that it is necessary, perhaps not even advisable, to point out that some of these new properties, such as the increase of mass on account of motion, have an experimental basis entirely apart from the theory of relativity. It may be that the author desires to avoid, for himself and his probable readers, the difficulties involved in the elucidation of these experiments.

GORDON FERRIE HULL

RADIOLOGY IN INDUSTRY

Industrial Radiology. By ANCEL ST. JOHN and HERBERT R. ISENBURGER. Second edition. New York: John Wiley and Sons, Inc. 1942.

THE first edition of this book, entitled "Industrial Radiography," was published in 1934. The chief subjects of the first edition and of the present revised edition are the examinations by means of x-rays and gamma-rays of castings, forgings, welded joints, packaged materials, assemblies such as vacuum tubes and other industrial products. The authors are pioneers in this field of investigation. During the last five years, the use of the methods which they discuss has increased tremendously. Thus, they have an admirable background for describing the radiographic and fluoroscopic methods which are used for examining a great variety of the products of industry.

The new second edition contains in slightly revised form the material of the first edition. The discussions of gamma-ray radiography and fluoroscopy have been expanded in the new book.

The most important new material in the second edition is the expansion of the list of references in the field of industrial radiography. In the first edition, the bibliography at the end of the book lists 426 books and articles in technical journals. In the new edition, there are 1,314 items listed in the bibliography; some of these are as recent as October, 1942. The index is very usefully arranged. After each item of the index, page numbers appear, as in the conventional index; in addition, there are numbers in italics and these refer to the numbered references in the bibliography. Thus, if the book is used as a reference work, an item in the index will refer the reader not only to the material in the book on this particular subject, but also to the work of one or more writers who have presented their work in the technical literature.

No material is included in this book on the use of x-ray spectroscopy in industry. One might be led to believe that such material would form a part of "industrial radiology." Apparently, the use of x-ray spectroscopy in industry and the use of x-rays and gamma-rays for making fluoroscopic or radiographic examinations are two distinct fields; the authors of this book confine their attention to radiography and fluoroscopy, except for a brief note on the diffraction of x-rays in Chapter IV.

S. REID WARREN, JR.
MOORE SCHOOL OF ELECTRICAL ENGINEERING,
UNIVERSITY OF PENNSYLVANIA

ENZYMES

Chemistry and Methods of Enzymes. By JAMES B. SUMNER and G. FRED SOMERS. 365 pp. New York: Academic Press, Inc. 1943.

AN author of a book on enzymes, unless he writes an all-inclusive one such as Oppenheimer's Handbuch, faces the same problem as an anthologist. His choice and emphasis will follow his personal predilection or some definite plan. The authors of this book on enzymes appear to have followed the former method.

The enzymes are classified in the usual way into esterases, proteases, oxidases, etc. With the exception of urease, which is discussed as a possible important factor in the nitrogen cycle, no attempt is made to assess the functions of the enzymes in the cell. Perhaps as a consequence of this, the amount of space allotted to an enzyme is not commensurate with its known importance. For instance, under the esterases the cholinesterase is discussed in one and a half pages and no description of the methods of isolation is given, whereas chlorophyllase, the function of which is still unknown, is allotted more than two pages which include a detailed description of its preparation. Under the proteases, the methods for the crystallization of

trypsin, pepsin, and various peptidases are described in detail almost as great as that found in Northrup's book on Crystalline Enzymes, but the methods for the crystallization of papain and ficin are not included.

The discussion of each enzyme begins with a short historical note followed by a list of organs or organisms where the enzyme has been found. With the exception of urease no data are given to indicate the relative concentration of the enzyme in the cells where it occurs. The action and specificity are then discussed and excellent formulae and equations are presented. This is usually followed by a description of the preparation and purification of the enzyme and a very useful outline of the methods for the estimation of its activity. The compounds which inhibit the enzyme are listed but the value of this is limited by the fact that neither the concentration of inhibitor, the conditions under which it acts nor the references are usually given. Moreover, the lists are generally far from complete. Eserine is the only inhibitor mentioned for the cholinesterase and 3 M urea the only one for the monamine oxidase.

The book begins with a simple and clear account of the general characteristics and properties of enzymes and ends with a chapter on carbohydrate metabolism and the Szent-Györgyi and Krebs cycles. This chapter includes the facts and theories made familiar by the numerous reviews that have recently appeared on the subject. The book on the whole is clearly and tersely written, well printed, and has only a small number of misprints. Enzyme chemists should find it useful particularly because of the formulae and methods of estimation which are given. Since, as the title implies, chemistry and methods are the main concern of the authors, the book may be considered to have achieved its purpose.

FREDERICK BERNHEIM

WILDLIFE REFUGES

Wildlife Refuges. By IRA N. GABRIELSON. New York: The Macmillan Company. 257 pp. 32 plates. 17 figs. 1943. $4.00.

FOR so many years it has been the fate of one who wrote of the wild life of the country to approach the subject with a feeling of despair, that it is quite a relief to find a book which is openly and frankly optimistic, a book which speaks of attainments rather than of defeats and losses. Instead of recording increasing additions to lost causes it contains references to 17,643,915 acres added to the national wildlife refuges and many other acres under private and public ownership. It is indeed heartening to read that "All together they are approaching adequacy," especially as it appears under the name of the director of the Fish and Wildlife Service. Here one may read the history of the movement from the early action by the California legislation in 1870, through a succession of similar events in a series of actions until finally in 1939 332,438 acres were added by the Resettlement Administration. These are all national efforts, to which must be added many more state refuges and numerous private grounds.

The book covers so much ground that it is impossible to note every phase of the treatment, but possibly a brief review of one topic, the Okefenokee swamp area, will serve to present the treatment. It is noted here that this area is impossible to classify, having inhabitants that would permit it to be designated as a migratory wild-fowl area, a big game refuge or a general wildlife refuge. The condition of the forest is much regretted, but it is pointed out that before many years have passed, it will be back in good form again, because of what still remains and because of the rapid growth of vegetation. The prairies are described and also the peculiar methods of travel. Only when he comes to a description of the animal life in the morning and evening of the day does the author's statement that "Okefenokee is marvelous" find justification. A brief general description of the swamp, in which the occurrence of the fabulous "sink holes" is vigorously denied, is followed by an account of the fishing, which is described as "locally famous." It is believed that this is a permanent condition, although the habit of going dry and burning is recognized as a handicap. Finally the author takes up the subject of the future of the swamp, pointing out the desire to restore it to its former state, but also indicating that some animal form such as the panther and ivory-billed woodpecker seem to be entirely absent now. Altogether the account ends most hopefully. Each topic in the book is taken up in a similar way, and the final picture is one of great hope and expectation.

C. E. MCCLUNG

SWARTHMORE COLLEGE

SPECIAL ARTICLES

INTERFERENCE OF INACTIVE VIRUS WITH THE PROPAGATION OF VIRUS OF INFLUENZA

NOT much is known as to the optimal conditions for the propagation of the influenza A and B virus in the allantoic cavity of the chick embryo. In an attempt to gain this information it was found that the active virus as shown by titration in mice may reach maximal titer (50 per cent. mortality end point) in the allantoic fluid as early as 12 to 18 hours after