differs from the German plan in the arrangement of the symbols, being much simpler. The method will be explained in print before long.

It is gratifying to note the increasing and continued interest in bibliography on all sides, and the Committee stands ready to encourage the movement in chemistry by practical assistance to those desirous of contributing to the now considerable list of indexes. Address correspondence to the Chairman, at the Cosmos Club, Washington, D. C.

Committee:

H. CARRINGTON BOLTON, Chairman.
F. W. CLARKE (in Europe),
A. R. LEEDS,
A. B. PRESCOTT,
ALFRED TUCKERMAN,
H. W. WILEY.

SCIENTIFIC BOOKS.

A Text-book of Physics. By W. WATSON, A.R.C.S., B.Sc. (London), Assistant Professor of Physics at the Royal College of Science, London. London, Longmans Green & Co.; New York, The Macmillan Company, 66 Fifth Avenue. Price, $3.00.

This book deserves the careful attention of those teachers who are allowed with their students sufficient time to develop an elaborate course in general physics. It will be especially suited to their needs if their students are able to take an interest in the more abstract parts of the science. For those who are limited in time, or who are not in position to do rather advanced work, it will not be so useful. The book is almost as long as Atkinson's 'Ganot,' and contains a much larger amount of matter that requires thought and study than that well-known work. In order to condense it as much as possible the author has excluded elaborate illustrations and descriptions of apparatus. The space thus gained is used for the discussion of elementary points of theory or for the mention of modern theories and results. The book is consequently not one which can be read hastily or with large omissions, and to go through it thoroughly with a class will require at least four hours a week for a year. As a book of reference, both for students and teachers, it will be found to be of considerable value.

The order in which the various subjects should be presented which are comprised under the general title of physics has always offered difficulties to the writers of text-books. Mr. Watson has used an order which to some extent is new, and which is designed to avoid anticipating principles or theorems which have not been established. He has succeeded perhaps as well as anyone can in an effort in which complete success is impossible. The principal features of his arrangement, which are not of the conventional form, are: the development of the kinetic theory of gases under the head of Properties of Matter, before the subject of Heat has been introduced; the treatment of wave motion on the surface of liquids in immediate anticipation of the subject of Sound, the subject of Wave Motion and Sound following Heat instead of preceding it in immediate dependence on Mechanics; the division of the Electromagnetic Relations of the Electric Current into two parts, separated by a considerable interval; and a similar division of Magnetism by the omission of Magnetic Induction from the chapters where it usually is given and its insertion later, just before the presentation of Electromagnetic Induction.

The most serious defect in the book is the inadequate treatment of the subjects of moment of force and of the properties of the center of mass. Judging from what the author says in connection with his description of the properties of the physical pendulum, his treatment of these subjects and of others allied to them was determined because of the mathematics involved in a fuller presentation. It has, however, been demonstrated by experience that a method such as that used in Selby's 'Mechanics' furnishes a satisfactory foundation for the study of moments of force and of the uniplanar motion of rigid bodies, and that this method is easily comprehended by students. The mathematics involved in it are no more difficult than those used throughout this book.

We have noticed a few errors of statement, some of which may be mentioned, as they would embarrass a student. Thus (p. 27) the

measurement of a velocity does *not* require the determination of the change in the direction of motion; the discussion of Avogadro's law (p. 171) contains a deduction of the Maxwell-Boltzmann theorem which is certainly illogical, the deduction being based on the constant relation between the temperature and the kinetic energy of the molecules of all gases which was established by that theorem; electricity is *not* energy (p. 673), although its manifestation requires the expenditure of energy; electromotive force is *not* equivalent to difference of potential (p. 674), the former term including cases which cannot be described in terms of the latter; the formula for the velocity of electric waves is given incorrectly on p. 858, and the mistake is repeated on p. 861, where Maxwell's relation between the index of refraction and the specific inductive capacity is deduced from it by a series of algebraic errors.

One other matter needs to be noticed more particularly. In the section on the Liquefaction of Gases (p. 286), after giving an account of the method of Wroblewski, so efficiently employed by Olszewski, the author describes Dewar's method, attributing its operation to the principle that when a gas expands against pressure it does work and hence becomes cooled. This principle was the one employed by Cailletet and by Pictet in their successful attempts to liquefy gases. In their experiments the liquid product was obtained in the tube in which the gas was compressed, the gas emitted when the stopcock was opened acting as a piston pushed out by the pressure of the gas left in the tube, and the cooling effect was, at least partially, due to the work done by this remaining gas and was experienced by it. When we examine the description of the Dewar method it appears that the expansion is so gradual that it cannot be considered even approximately adiabatic and that the gas which is cooled is that which has passed out of the chamber in which it is compressed. A comparison of this description with that of the Linde method (p. 320), shows that the methods are alike in every essential particular, including the important feature of 'the regenerative process,' and that the principle which applies to both of them is that which is so well explained by the author on page 318. Surely it cannot be contended that different principles apply in the two cases because in the Dewar method the gas to be cooled is contained in a vessel in which the pressure gradually falls, while in the Linde method the supply of gas is renewed by a pump so that the pressure is kept approximately constant. In view of the claims made by Linde (*Wied. Ann.* 57, p. 332), which have never been successfully controverted, such an account of the Dewar method should never have been given, or if given it should have been accompanied with some adequate justification for it. It is incumbent on the writer of a text-book to be unusually careful in making statements on disputed points, and particularly on questions of priority, since his opinions are naturally adopted by his readers as those of an impartial umpire.

The book is well printed, its diagrams and illustrations are excellent, and it contains much new matter, and old matter put in a new way. It deserves to take a high place among the text-books of physics.

W. F. Magie.

Princeton University.

ORNITHOLOGY.

In 'The Birds of Rhode Island' by Howe and Sturtevant, we have a very acceptable addition to the excellent lists already published of the birds of several of the States. Lists of this character are useful in bringing together the scattered notes pertaining to a given region, thereby saving the reader the time and trouble of hunting through many volumes. The authors have arranged their book in two parts: The first reviews the former publications on the birds of Rhode Island as well as the State collections, gives some details on migration, and a full account of the historic 'Cormorant Rock'; the second part includes an annotated list of three hundred and three species, and a bibliography of one hundred and eighty-five titles. Of the three hundred and three birds accredited to the State, two hundred and ninety are based on positive records, three have been exterminated through the agency of man, and ten are placed in a hypothetical list as the evidence of their occurrence is not absolutely conclusive.