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.

The most valuable matter to one interested in distribution is the list of one hundred and eleven breeding birds, which concludes the chapter on migration. The work, which was published privately, contains a little over one hundred pages, and is illustrated by six fairly good half-tone plates, representing nests or nesting sites. The text is good and we are glad to recommend the book to the consideration of the public.

A. K. F.

D. LANGE'S little book, 'Our Native Birds and how to protect them and attract them to our homes'* is one of the many popular treatises issued for the commendable purpose of awakening public interest in the protection of birds. To make the matter more available and easy of reference the various subjects are treated in eight sections, some of which are further subdivided into chapters. Among the causes of the decrease of song birds given by the author are lack of proper nesting places, lack of water, the English sparrow, boys, collectors, birds on hats, and the cat (which, in the opinion of the reviewer, destroys more bird life than all the others combined). For the purpose of protecting the birds and encouraging them to come to the door yards he advocates planting trees, shrubs and vines for them to live in, putting up nesting boxes for breeding purposes, providing an abundance of water for drinking and bathing, and regular feeding in winter and during unfavorable weather generally.

He very properly deprecates the killing of predaceous mammals and advocates protection for the birds of prey. We rather wish the chapter on 'Birds before Uncle Sam' had been omitted, but the book as a whole is well got up and should be read by all bird lovers.

A. K. F.

BOOKS RECEIVED.

A Treatise on the Theory of Screws. ROBERT STAWELL BALL. Cambridge, The University Press; New York, The Macmillan Company, 1900. Pp. xix + 544. 18s.

The Contents of the Fifth and Sixth Books of Euclid Arranged and Explained. M. J. M. HILL, Cambridge, The University Press; New York, The Macmillan Company, 1900. Pp. xii + 143.

Aberration and the Electromagnetic Field. GILBERT T. WALKER, Cambridge, The University Press; New York, The Macmillan Company, 1900. Pp. xix + 96. 5s.

Exploitation commerciale des forêts. M. H. VANULBERGHE. Paris, Gauthier-Villars, 1900. Pp. 155.

Les Phénomènes de Dissolution et leurs Application. V. THOMAS. Paris, Gauthier-Villars, 1900. Pp. 196.

Tonometrie. F. M. RAOULT. Paris, G. Carré and C. Naud, 1900. Pp. 116.

L'Élimination. H. LORENT. Paris, G. Carré and C. Naud, 1900. Pp. 75.

An Outline of the Theory of Thermodynamics. EDGAR BUCKINGHAM. New York and London, The Macmillan Company, 1900. Pp xix + 205. $1.90.

SCIENTIFIC JOURNALS AND ARTICLES.

The Journal of Geology for May–June, 1900, opens with an article on 'Methods of Studying Earthquakes,' by Charles Davison. Three methods of determining the epicenter are discussed, depending respectively on the direction of the force, the time of occurrence at successive points, and the intensity of the shock. Double-shock earthquakes are put into two classes: those in which two successive shocks, separated by an interval of fifteen seconds or more, proceed from a single epicenter; and 'twin earthquakes,' having two foci whose impulses are due to the same initial stress. In these the interval between the two shocks varies from zero to a few seconds. E. R. Barbour describes 'Glacial Grooves and Striæ in Nebraska,' giving the geographical distribution of glaciation and the direction of the striæ. Charles E. Monroe notes a 'New Area of Devonian Rocks in Wisconsin.' The area is a small one near the northern boundary of Ozankee county in the vicinity of the village of Lake Church. He gives a list of Devonian fossils from this outcrop. C. R. Keyes contributes an article on 'Kinderhook Stratigraphy.' The data of recent deep well drillings along the Mississippi River are brought to bear upon the perplexing question of the correlation of the Kinderhook beds at Burlington, Ia., with those of Illinois and Missouri. In a paper on the 'Probable occurrence of a larger area of Nepheline-bearing rocks on the northeast coast of Lake Superior,' Frank D. Adams describes thin sections of rocks from a

* Macmillan Co., 66 Fifth avenue, New York City. Price, $1.00.