of the second half of the nineteenth century.

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Heat; Light; Elementary Text-Books, Theoretical and Practical for Schools and Colleges: By R. T. GLAZEBROOK. 12 mo., about 220 pages each. New York, Macmillan & Co. Price $1.00.

These are recent volumes in the series of Cambridge Natural Science Manuals.

All American physicists are familiar with the previous excellent products of Mr. Glazebrook's pen in the line of text-books for laboratory and class-room, and will be interested in this new series which is intended to fill a place quite different from that for which his previous works were prepared. They are less extensive and more elementary. According to the author, they represent what has for some time constituted a practical course for medical students in the Cavendish laboratory. There has been much discussion, and there will continue to be much discussion for some time to come, as to the proper sequence of laboratory, text-book and lecture instruction in elementary physics. In the Cavendish laboratory the system adopted for this course, at least, seems to be that the instructor first presents a portion of the subject in the form of a lecture in which he illustrates, by the use of simple apparatus, and explains the theory of the experiments, deriving principles and numerical results, as far as possible, from the results of experiments actually performed. The members of the class then make the experiments, singly or in pairs, or occasionally in large groups, using the same, or similar, apparatus. The volumes contain descriptions of experiments and also theoretical principles and deductions, so that they constitute at once text-book and laboratory hand-book. At intervals throughout the work there will be found well selected collections of problems and examples, and a good set of examination questions at the end. The apparatus described is usually simple, and most of it could be made with simple materials by one having some technical skill of the right sort.

It is hardly necessary to say that the theoretical discussions and presentation of principles are, for the most part, clear and clean as far as they go.

In the 'Heat,' the first chapter has to do with its nature, and its relation to work or energy is concisely but clearly stated. In the second chapter the treatment of temperature and its measurement is unusually satisfactory, considering the limitations to which the whole work is subjected. It is to be regretted, however, that there is no mention of the hydrogen scale, since so many of the most important temperature measurements now depend upon it. Calorimetry is discussed quite thoroughly, with many practical illustrations, and in the chapters devoted to expansion several neat suggestions as to methods will be found. In the reference to the necessity for 'compensating' the effect of temperature on the balance wheel of a watch, it is erroneously implied that the principal reason for this grows out of the change in the dimensions, and consequently moment of inertia of the wheel due to change in temperature, while, as a matter of fact, it is the temperature change of the modulus of elasticity of the 'hair' or balance spring which makes nearly all the trouble. The volume ends with a brief but good chapter on the mechanical equivalent of heat.

In the volume on 'Light,' the geometrical treatment is used exclusively. There is a single brief reference to the physical nature of light, which is so thoroughly discussed in the author's volume on 'Physical Optics' published some years ago, but in the book under consideration the rectilinear propagation of a 'ray' is assumed and made the basis of the whole discussion. The chapters

devoted to reflection from plane surfaces are excellent, and those in which refraction is treated are particularly thorough and good. The simpler geometrical treatment of lenses is very satisfactory; optical instruments and 'aids to vision' receive rather more attention (especially the latter) than is usual in books of this class. There are also a number of interesting and rather uncommon experiments and exercises combining the eye and lenses of various forms, by means of which many problems relating to vision are made clear. There is a chapter on the spectrum and color, with which the volume ends.

Both of these volumes can confidently be recommended for courses in secondary schools, or in colleges where a limited amount of elementary instruction in physics is required. T. C. M.

Electricity, One Hundred Years Ago and To-day. Edwin J. Houston. New York, W. J. Johnston & Co., Limited. 12mo., pp. 200.

This volume is built around or upon a lecture having the same title which was delivered in 1892. It was a historical discussion of the growth and development of electricity from the beginning (not one hundred years ago) to the present time. In preparing it for publication the author has increased its volume several times, and its interest and value proportionately by the addition of an extensive series of historical foot-notes. Many of these consist of long quotations from original authorities which would have been hardly suitable for a popular address, but which greatly enhance the worth of the address when printed. Some discussions of quite recent date are extensively quoted, and this volume includes, in comparatively small space, the results of much labor expended in the pursuit of exact information by reference to original papers. For this reason, if for no other, it will be welcome to all interested in the science of electricity or the art of its application. T. C. M.

Hygiene. By I. Lane Notter and R. H. Firth. London, Longmans, Green & Co. 1894.

This manual, of 374 pp. 8°, is a very concise and clear summary of what a non-professional, well educated man should know with regard to the general laws of health, the causes of disease, and the best means of combating the latter. Dr. Notter is the Professor of Hygiene in the Army Medical School at Netley, and Examiner in Hygiene in the Science and Art Department at South Kensington, and Dr. Firth is his assistant in each of these positions, hence this manual may be considered as a summary of the latest English teaching on this subject. In such subjects as heating and ventilation, house drainage, construction of buildings, hospitals, etc., its recommendations are adapted especially to the climate and customs of England, and the illustrations are solely of English appliances and methods, and this must be borne in mind by American readers.

Galton's grates, Tobin's tubes, Sheringham valves, Buchan's traps, etc., are not to be found in the market in this country, where other equally satisfactory appliances take their place.

It is not a book to be resorted to for thrilling and sensational quotations, but it will be found to give sound common sense advice upon the subjects of which it treats, and is commended to the readers of Science as a good manual of reference.

An Illustrated Dictionary of Medicine, Biology and Allied Sciences. By George M. Gould, A. B., M. D. Philadelphia, P. Blakiston, Son & Co. 1894. 4°, pp. 1633.

This is a very full and complete dictionary of medicine, printed clearly on good paper, and so bound that it will remain open at any page, a convenience not always