TREATMENT OF WATER FOR STEAM BOILERS AND MANUFACTURES.

Water Softening and Treatment. By W. H. Booth. Pp. xvi+308. (London: Archibald Constable and Co., Ltd., 1906.) Price 7*s.* 6*d.* net.

THE primary object of this book is the softening of hard water for use in steam boilers and for manufacturing purposes, but, in fact, it deals largely with other matters relating to the supply of water to the boilers of steam engines. Thus it is divided into five sections, the first only of which relates to the treatment of water by softening, together with the separation of oil and filtration, and occupies about half the book; whereas the four other sections, constituting the second half of the book, consist of "Section II., Air Pumps, Condensers, and Circulating Pumps"; "Section III., Feed Heating and Stage Heating"; "Section IV., Water Cooling"; and "Section V., Feed Pumps and Injectors." Accordingly, the volume ranges over the whole subject of the treatment of water supplied to steam boilers, though dealing more expressly with the all-important point of securing, so far as practicable, the purity of the water employed for raising steam.

Comparatively few towns are able to obtain a pure water-supply by storing up the flow of rain off primitive rocks in an uninhabited mountain valley, and conveying it at considerable expense to a distance, as has been accomplished for Liverpool, Manchester, Glasgow, Birmingham, and New York. Waters derived from underground sources, such as springs, rivers fed by springs, or wells, are impregnated more or less with the soluble salts contained in the strata through which they have passed; and when steam is driven off from a boiler fed with such water, these soluble impurities are deposited as scale on the sides of the boiler. This incrustation, being a bad conductor of heat, reduces the efficiency of the boiler, and when very thick may lead to an injurious heating of the metal; whilst the necessary periodical removal of the deposit is tedious and costly, and is liable to damage the inner surface of the boiler. Accordingly, in selecting a site for a factory, the available water-supply should be carefully considered; and where a bored tube well proves the most economical, and an adequate source of supply, the geology of the district should be studied to secure the best site, and ascertain the requisite depth for the well. In such cases some softening process is generally expedient—and often even when water from a river or stream is available—to avoid incrustation of boilers, to prevent a great waste of soap in laundries, and manufactories where washing is resorted to, and to obtain the soft water which is essential in dye works, paper mills, and tanneries.

The author deals successively with the sources and impurities of water, the salts contained in it, the reagents used for softening and their reactions, water-softening apparatus of various kinds, filters, compounds added to the feed-water for preventing or removing scale from boilers, corrosion of boilers, incrustation of pipes, and the chemical and mechanical removal of oil from condensed steam. The contents of the second half of the book have been sufficiently indicated by the headings of the four sections given above; and the descriptions of apparatus are elucidated by one hundred figures in the text. Altogether, the book contains complete information with respect to the purification and supply of water to steam boilers, which will be valuable to users of steam; whilst the first portion, on water softening, will be very useful in indicating the methods by which hard water may be rendered available for various manufactures requiring pure water.

OUR BOOK SHELF.

Studies in Anatomy from the Anatomical Department of the University of Manchester. Vol. iii. Edited by Prof. Alfred H. Young. Pp. 289; 23 plates. (Manchester: University Press, 1906.) Price 10*s.* net.

IN the struggle to build and equip laboratories for research, the provision of means to secure the full publication of the fruits of discovery has been too often left out of sight. If the best work is to be obtained from those who devote themselves to investigation, and progress made by collective effort, the means of publication become almost as important as those of investigation. The University of Manchester has recognised this fact. The present collection of studies in anatomy—the third issued since Prof. Young occupied the chair in the Owens College—appears as the first volume of the anatomical series of the publications now being issued by the University of Manchester. In this volume there are ten papers by men who work or have worked in the anatomical department under Prof. Young.

A number of the papers in this volume, such as those by Profs. Robinson and Thompson, are reprinted from the *Journal of Anatomy and Physiology*, but all of them, old and new alike, are real additions to the knowledge of the subject with which they deal. Dr. J. Cameron's observations on the development of the optic nerves in amphibians deal with a subject which has been keenly discussed during the last thirty years, viz. the manner in which nerve fibres are developed. From a study of the appearances presented by the developing fibres in the optic nerve of amphibians, Dr. Cameron concludes that the fibres begin as outgrowths from the ganglion cells of the retina, but that their further growth towards the brain is obtained by the cooperation of the cells of the optic stalk, the growing point of the nerve fibre being formed from substance derived from the optic stalk cells.

The longest paper in the collection is Dr. C. W. S. Saberton's study of the nerve plexuses of four chimpanzees, an accurate and very useful contribution to the data which must be collected before we can finally settle the problem of man's origin. Everyone who has worked at this problem is fully aware that it cannot be settled by the examination of single specimens of each species, but by dissection of large numbers; the difficulty in obtaining anthropoids, the degree of individual variation, the great labour entailed by dissection, and the expense entailed by publication, have kept us from reaching a definite conception of the exact relationship of man and the higher primates to one another. Hence Dr. Saberton's contribution to available data is very welcome. In his paper on the development and morphology of the sternum, Dr. Lickley has reverted to the older