

receive a negative answer; and as a matter of course the man of science is, therefore, unable to be dogmatic or to strain a necessity: he cannot clearly recognize, on a "not proven" verdict, the duty of wounding the extremely sensitive feelings of millions of his fellow-men, on a subject that is amongst the most tender of all that pertains to humanity.

Our idea is that in the current state of public opinion, and in the current state of scientific knowledge, it is best to let the public feeling towards cremation work its own way, and to let earth-to-earth burial also have its free course.

Cremation will come partly by necessity, partly by a gradual sentiment in its favour. To force it by conjuring up dangers which do not exist is the very means of arresting it in its progress. We do not say that the work we have had under review is open to too severe criticism on these grounds; on the contrary, it adduces such a number of sound arguments in support of its case, and, on the whole, shows such a just and good weight on its own side, that we commend it as an excellent treatise—we should not improperly say standard treatise—on cremation.

ASSAYING.

Practical Metallurgy and Assaying: a Text-book for the use of Teachers, Students, and Assayers. By Arthur H. Hiorns. Pp. 471, with 91 Illustrations, Appendix, and Index. (London: Macmillan and Co., 1888.)

ASSAYING was a term originally used to denote the estimation, by the agency of heat, of a particular metal in an ore, alloy, or other metallic compound. Since the publication of Agricola's work in 1556, numerous English translations of foreign treatises on the subject have been published. Amongst these may be mentioned the translations of the works of Erker (1629), Barba (1674), and Cramer (1774). Assaying by the dry way has changed so little that the methods and instruments described in these old books might still be successfully used. Since the introduction, however, of the rapid and accurate wet processes, improvements have quickly followed each other, and from a particular ore a larger yield is now obtained than was formerly the case, so that the dry methods are, with a few exceptions, rapidly falling into disuse, as in many cases they do not indicate with sufficient precision the amount of metal actually present in the ore. The modern English literature of assaying is confined to Mitchell's large treatise, and to the chapters given in Percy's works and in Phillips's "Elements of Metallurgy." No small text-book, in which full cognizance is taken of wet processes, has hitherto been published, and a gap in our metallurgical literature has now been well filled by Mr. Hiorns's useful book, which is based on the course of instruction organized at the Royal School of Mines by Prof. W. C. Roberts-Austen, to whom the author, as an old pupil, dedicates his work. In all the Continental Schools of Mines, the instruction is conducted in a most unsatisfactory manner. Large classes rapidly pass through the various assaying processes, all the students working together with military precision at the Professor's word of command. In London, on the other hand, each student works independently, and is not permitted to pass from one metal to another until he can prove that he is able to constantly produce trustworthy

results. As a student of the Royal School of Mines, Mr. Hiorns has thus had an excellent training for the task he has undertaken. Besides this, as Principal of the School of Metallurgy at the Birmingham and Midland Institute, he has had ample opportunity of ascertaining the wants of the average student.

Like so many of the text-books of science now published, Mr. Hiorns's book has been arranged to meet the requirements of the Science and Art Department Syllabus. The first part contains a number of experiments for the student to perform in order to elucidate the principles upon which metallurgy is based; the second part contains an account of the methods of assaying by dry methods; whilst the third deals with assaying by wet methods, and includes volumetric analysis and the analysis of furnace gases. The course is very systematically arranged, and it is certain that any student who has performed the experiments enumerated would be thoroughly well grounded in practical metallurgy. And the fact that such a book is now required by a large number of students in evening classes shows what excellent service the Science and Art Department is doing for practical metallurgy throughout the country.

The author discusses several of the newer methods, such as Turner's method of estimating carbon in iron, and alludes to recent researches, such as those of Beringer on the accuracy of the volumetric estimation of copper. He appears, however, to be unacquainted with the newer methods in use on the Continent, and it is to be regretted that he has not consulted the standard works of Balling and of Bruno Kerl, or the careful abstracts of foreign papers published in the Journals of the Chemical Society and of the Iron and Steel Institute. It is to be regretted, too, that there is a want of uniformity in the weights and measures adopted. Grains and grammes, ounces and cubic centimetres, are used indiscriminately. For industrial purposes, it was perhaps necessary that the "grains" should be retained. But, with regard to the "ounces," many assayers, who are familiar with metric measures, have no idea how many ounces make a pint. In the nomenclature and notation, there is also an unfortunate want of uniformity, as is shown by the indiscriminate use of the terms, oil of vitriol and sulphuric acid, carbonate of soda and sodium carbonate, hæmatite and hematite, OH_2 and H_2O , SO_4H_2 and H_2SO_4 . The book is remarkably free from typographical errors. The name Fresenius is, however, spelt wrong in places (pp. 174, 183) and "oxide of silica" (p. 312) is a compound unknown to the chemist.

On the whole, the work is an excellent one, and will, no doubt, prove of great service to the teachers and students of classes in practical metallurgy. Chemists generally, accustomed to ordinary laboratory manipulation, will be interested to see how many operations there are, which, while differing from those with which they deal, are capable of affording very trustworthy results. The illustrations are of a very effective character, and are well executed from drawings that have been prepared with an amount of care not usual in figures of this class. Mr. Hiorns's literary style is far from faultless, but his instructions are always perfectly clear, and, to use the words of an old metallurgist, "he writes like one who hath black'd his Fingers and sing'd his Beard in metallick Operations."

B. H. B.