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## BRITISH IRON ORES.

*Special Reports on the Mineral Resources of Great Britain.* Vol. viii., *Iron Ores: Haematites of West Cumberland, Lancashire, and the Lake District.* By Bernard Smith. Vol. ix., *Iron Ores (continued): Sundry Unbedded Ores of Durham, East Cumberland, North Wales, Derbyshire, the Isle of Man, Bristol District and Somerset, Devon and Cornwall.* By T. C. Cantrill, Dr. R. L. Sherlock, and Henry Dewey. Vol. x., *Iron Ores (continued): The Haematites of the Forest of Dean and South Wales.* By Prof. T. Franklin Sibly. (Southampton: Ordnance Survey Office, 1919.) Prices: Vol. viii., 9s. net; vol. ix., 3s. 6d. net; vol. x., 4s. net.

AS is well known, one of the effects of the recent war has been to direct the attention of the British people to the wealth of the mineral resources of their own country, whereupon it soon became apparent that accurate official information as to the nature and extent of these resources was conspicuous only by its absence. Fortunately, the Director of the Geological Survey, Sir Aubrey Strahan, took immediate steps to rectify this deficiency, and a series of volumes on the mineral resources of Great Britain has been issued under his direction; the last three of these have just been published. These are the opening volumes of a set dealing with British iron ores, and Sir Aubrey Strahan has written a short preface to the first of them, in which he indicates the general scheme which it is proposed to follow. He divides the British ores into "three classes, namely, those products, mostly hæmatites, which occur as replacements, in lodes, etc.; the bedded ores of Mesozoic age; and the bedded ores of Palæozoic age."

This classification is a quite satisfactory one, though the use of the word "lodes" in the above description may well be objected to if it is intended to imply that replacements and lodes are equivalent terms. A typical replacement deposit is certainly not a typical lode; the latter term is identical in meaning with vein, and ought to be restricted definitely to mineral deposits filling fissures, which show for the most part well-defined walls, and have a fairly regular form, so much so that authorities like, *e.g.*, Sir Clement Le Neve Foster, have made them a subdivision of the tabular or sheet-like deposits. It is quite true that the walls of a lode generally show more or less alteration due to the same

causes that brought about the filling of the lode itself, and that this alteration may take the form of impregnation or of more or less complete replacement of the country rock, but this fact does not justify calling the lode a replacement deposit. The typical replacement deposit, on the other hand, is, as a rule, quite irregular in outline, and if it does at times assume a tabular form, this is due to accidental conditions, and is certainly not a genetic characteristic.

The three volumes now issued cover the first of Sir Aubrey Strahan's classes, and form geologically the most interesting, but economically the least important, of the three; in fact, it is only the ores described in vol. viii. that possess any economic importance whatever. As regards the economic aspect, it may be considered unfortunate that the authors of the three volumes have put forward statements as to what they consider the probable ore reserves contained in the mineral fields that they have investigated. In the case of irregular deposits, such as are here dealt with, this is a problem of exceptional difficulty, seeing that the data for its solution do not exist, and sound estimates of quantity are impossible; the best that can be done is to make a more or less intelligent guess, and under these conditions the best possible guess is likely to be very wide of the mark. Such speculations are somewhat out of place in an authoritative Government publication, and it is greatly to be feared that heavy money losses may be incurred by adventurers who do not discriminate between the geologist's idea of the quantity of ore that may be supposed to exist and the miner's view of the amount that can be economically extracted.

Apart from his attempt at estimating the probable ore reserves, Mr. Bernard Smith's volume on the West Coast hæmatites is in every respect a very satisfactory one; here the difficulty of forming any opinion as to quantity is peculiarly striking. Owing to the soft nature of the ore and to its highly irregular mode of occurrence, ore reserves cannot be blocked out for any length of time in advance, and there is rarely, if ever, any "ore in sight" in the accepted sense of that phrase, although mines have continued for many years, and will doubtlessly continue in the future, to produce considerable quantities of ore by the hand-to-mouth methods of exploitation which the nature of the deposits renders necessary in the great majority of cases. The volume gives a short but sufficient and very clear description of the geology of the district, and the mode of formation of the ore bodies is described in very convincing terms. It seems impossible to doubt

that the ore was deposited metasomatically, as Mr. Smith asserts; he has, however, avoided the more difficult question, namely, whether the ore was first deposited as a carbonate or as a hydrate, and afterwards metamorphosed to red hæmatite, or whether it was deposited in practically the same form as we now find it. He concurs in the generally received opinion that the iron-bearing solutions were introduced from above, but says nothing as to the theory strongly held by many that these solutions were the result of the leaching out of iron from the New Red Sandstone, which may be presumed at one time to have overlain the whole of the iron-bearing region. The greater part of the book is taken up with a careful, detailed description of the mines, the area being, for the sake of convenience, divided into the Egremont and Whitehaven districts of Cumberland, the Furness district of Lancashire, and the far less important occurrences in the Lake district. Existing mines are fully described under the heads of geological occurrence and mining details, whilst information as to the old and abandoned mines has also been collected. The volume forms a very valuable and welcome addition to our knowledge of this important mineral area.

Vol. x., by Prof. Sibly, is geologically the most important of the three, as it has involved a careful geological study of the Forest of Dean coalfield, with which the iron ores of the Forest are necessarily closely connected. Much new matter has thus been brought to light, and as a result of his work Prof. Sibly has succeeded in proving two important geological facts—one that the Millstone Grit of the Geological Survey is in fact a sandy facies of the dolomitised upper portion of the Carboniferous Limestone, and the other that there is an important unconformity between the Coal Measures and the underlying rocks; it need scarcely be said that there is a close connection between these two facts. This is the first time that a systematic study of the iron ores of the Forest of Dean has been attempted, and Prof. Sibly deserves the highest praise for the manner in which he has unravelled the complex problems that the geology of the district presents. Unfortunately, this field cannot pretend to any economic importance commensurate with its geological interest. The ores, as Prof. Sibly shows, are of relatively shallow occurrence, and have been practically worked out; it is indeed fortunate that the study of this field has not been deferred much longer, for in that case there would probably have been no mines open for the geologist to consider. Prof. Sibly guesses the total amount of ore reserves still existing at about a million tons, but it is very doubtful whether anything approaching

this figure will be produced here, and his conclusion "that the Forest of Dean is not far from exhaustion as a source of iron ore" is fully warranted by the facts. The second part of the volume is taken up with a description of a small group of iron-ore mines in the Carboniferous Limestone that forms the south-eastern margin of the South Wales coalfield, extending between Taffs' Well and Llanharry; out of the five mines that have been active in this area, only one, the Llanharry mine, is now at work, producing 50,000 to 60,000 tons yearly; this mineral occurrence is fully described, and particulars are given of the abandoned mines also. In a concluding chapter Prof. Sibly discusses the genesis of all the ores dealt with, and in agreement with most other authorities he looks upon them as undoubtedly of metasomatic origin, due to descending iron-bearing waters; he seems inclined to seek the source of the iron in the Triassic rocks that once probably covered the Forest of Dean area and in the Conglomerates and Red Marls of the Keuper in the South Wales district. The volume contains a mass of interesting information upon the area studied, and as regards the Forest of Dean must rank high as a piece of first-class geological research.

Vol. ix. includes a number of miscellaneous occurrences in different parts of the country, of very various character. It is greatly to be regretted that it falls very far below the high standard to which the other two volumes have attained. It is not improbable that the time allotted to the investigation of each deposit was insufficient, but, whatever be the cause, there are no signs of the painstaking thoroughness which characterises the work already discussed. This volume leaves the impression that the authors merely accepted what they were told in each case, and did little actual field work, or, at the best, only looked at what was shown them. They have thus in many cases arrived at a wholly exaggerated opinion of the importance of the deposits they describe. For instance, in describing the Sharkham iron-ore mine, the authors state that "the amount of ore in sight is considered to be large," whereas as a matter of fact there is very little ore in sight, and they seem never to have heard of the deep adit driven in below the deposits, which runs wholly in barren limestone, and shows that the occurrence is strictly limited in depth. It would serve no useful purpose to multiply examples of such oversights; it is, however, fortunate that none of the occurrences described in vol. ix. have any real economic importance.

The Geological Survey and the country may both fairly be congratulated on the continuation of Sir

Aubrey Strahan's special reports, and it need scarcely be said that the further volumes dealing with the other two classes of iron-ore occurrences will be eagerly awaited by the large body of workers interested in British iron ores.

H. LOUIS.

### ALCOHOL.

*Alcohol: Its Production, Properties, Chemistry, and Industrial Applications. With Chapters on Methyl Alcohol, Fusel Oil, and Spirituous Beverages.* By Charles Simmonds. Pp. xx+574. (London: Macmillan and Co., Ltd., 1919.) Price 21s. net.

**M**R. SIMMONDS, one of the senior analysts in the Government Laboratory, is well qualified by his position to undertake the compilation of this book, since his duties have rendered him familiar with his subject in all its aspects—its production and industrial applications, its chemistry, and its special relations to the revenue.

The work treats of the early history of alcohol; its origin and composition; its production by fermentation and by synthetic processes; the nature of the materials employed; the biochemical agents involved; and the general operations of distillation and rectification. The author devotes a chapter to the general chemistry of the homologues with which ordinary or ethyl alcohol is associated, either as a product of fermentation, or in industry as methylated spirit. He is, by virtue of his office, naturally concerned with the analytical chemistry of these alcohols, especially of ethyl and methyl alcohol, and with the subject of alcoholometry, in this country and abroad, and he writes with special knowledge and authority. He gives a sufficiently full account of the fiscal relations of ethyl and methyl alcohol and of the different forms of "denatured" alcohol, as used in industry; treats of various spirituous beverages, their origin, nature, and chemical examination, and concludes with a concise statement of what is definitely known concerning the physiological properties of alcohol. It will be seen from this short summary that the book constitutes a comprehensive treatise in which practically everything relating to alcohol finds a place. It is, of course, essentially a compilation from numerous sources, the range and extent of which may be inferred from the excellent bibliography appended to the work. But the compilation was well worth making, and has resulted in a complete and well-arranged monograph; it is eminently readable, and the information is sound, accurate, and up to date.

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Although the practical brewer and distiller will find much in it that will be of use to them at times, the book is not primarily intended for use in the brewery or the distillery. Technical details, such as are to be found in standard treatises on brewing and distilling, and which are the subjects of the trade journals, would be out of place in a work of this kind, where alcohol, as such, is the main consideration.

For the commercial production of alcohol from wood by Classen's process, or some modification of it, there is apparently no future in this country, and it would seem to be doubtful whether any permanent success will be possible even in countries where wood-waste is more plentiful than with us. Alcohol from sulphite-waste liquor in the manufacture of wood-pulp is, however, being produced in considerable quantities in Sweden and elsewhere, and bids fair to become an important industry. Synthetic alcohol from acetylene, derived from calcium carbide, has been made in Germany by methods which were largely developed during the war, mainly in consequence of the shortage of potatoes. It remains to be seen whether the manufacture will become permanently established. The synthetic production of alcohol, if greatly extended, would be certain to produce considerable economic disturbance in Germany, and would also occasion much perturbation in agrarian circles. The danger was foreseen by the late Government, which, by the Spirit Monopoly Act of 1918, placed the manufacture of synthetic alcohol under the control of the State.

In describing the properties of methyl alcohol, the author rightly lays stress on its toxic character. It is far more dangerous than is generally known. It is alleged that the shortage of whisky during the past four years has led to a great increase in the drinking of methylated spirit. Ordinary mineralised methylated spirit, which is the only form to which the public has ready access, contains wood naphtha and a certain amount of mineral naphtha, in addition to ketones and other substances, and is a very noxious beverage; its habitual consumption quickly results in blindness, paralysis, and death. The detection of the presence of methyl alcohol in mixtures containing ethyl alcohol has naturally received much attention in the book. The matter is of fiscal importance, in view of possible illicit attempts to use "denatured" alcohol instead of duty-paid spirit. It has given rise to an abundant literature, a critical synopsis of which is given by the author, to whom the problem has a special professional interest. Many of the methods described are highly sensitive and characteristic, and there is no practical difficulty nowadays in recognising