LETTERS TO THE EDITOR.

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Zeiss Abbe Refractometer.

IN reply to Mr. Simeon's communication published in NATURE of November 21, we would state that of the many different types of Zeiss Abbe refractometer, including a late pre-war instrument, that have passed through our hands for repair, all have been fitted with an illuminating prism of low refractive index glass (N_D about 1.515). In every case, by substituting an extra dense prism of suitable angle, we have rendered the instrument serviceable for the examination of liquids above 1.52. We discovered this defect some time ago, and later directed the attention of Prof. Cheshire to it, communicating it to NATURE of June 21, 1917 (vol. xcix., p. 331). We have a number of these low-refractive index prisms which have been removed from Zeiss refractometers, and also a complete Zeiss instrument showing the defect mentioned. It would, perhaps, be possible to arrange to bring this instrument and the prisms to the next meeting of the Optical Society, and if Mr. Simeon would bring a Zeiss instrument having a pair of extra dense prisms, a comparison would be interesting. It is just possible that the Zeiss instrument to which Mr. Simeon refers is one in which a dense lower prism has been substituted.

As we have already pointed out, in theory any glass would make a suitable illuminating prism so long as the roughened surface remains unimpaired, but in practice the cleaning of the prism surface tends to polish it, and as a result the illumination quickly falls almost to vanishing-point.

L. BELLINGHAM.

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71 Hornsey Rise, N.19, November 22.

BRITISH IRON-ORE RESOURCES.

ONE of the most marked effects of the war has been the stimulus that it has given to the development of the mineral resources of the British Empire, and particularly of those of Great Britain. For many reasons the more active exploitation of our home iron ores has been one of the most prominent features of this movement. Up to the invention of the Bessemer process the iron industry of this country depended practically exclusively upon domestic ores, the bulk of the ores smelted being the claybands and blackbands of the Coal Measures; in addition to these the red hæmatites of the Mountain Limestone of the West Coast and some of the Jurassic ironstones were also worked, but up to about 1870 the iron-ore deposits of the Palæozoic rocks formed the mainstay of our British iron industry. When the Bessemer process introduced mild steel as an important factor in the industry, the relatively small production of West Coast hæmatite no longer sufficed for our needs, and as many of our centres of iron-smelting are situated within easy access of the coast, Bessemer ores were naturally looked for abroad, and an energetic importation of foreign ores ensued. Bilbao ore was first

imported about 1870, and by 1878, after the Carlist War, this importation had reached 850,000 tons; in 1913 the importation from Spain, to which Almeria and other parts of Spain contributed as well as Bilbao, was $4\frac{1}{2}$ million tons, whilst our total imports from abroad, by far the greater part of which was Bessemer ore, amounted to about $7\frac{1}{2}$ million tons. The domestic ore production was 16 million tons, of which about 12 million tons came from the Jurassic ironstones. The growth in the output of these last-named ores was due in large measure to the increasing adoption of the basic process of steel-making. When the war rendered the importation of foreign ores difficult and expensive, our iron and steel industry had to rely more and more upon basic steel produced from the latter class of ore. This development has been favoured by the grudging recognition that for most purposes basic steel properly made is as good as acid, and furthermore by the abandonment by the Board of Agriculture of the so-called citric acid test for basic slag in favour of its valuation by the total phosphoric acid present; this means that whereas under the former "made in Germany" test thousands of tons of British basic slag had to be dumped out at sea as unsaleable, such slag can now be utilised and its phosphoric acid contents rendered available for the British agriculturist. At the same time, the British steel trade now has a market opened up for what was before a waste product.

One of the signs of the increasing interest taken in domestic ores is the attention that is being devoted to the study of our iron-ore resources. Apart from some earlier descriptions of British iron ores, which have to-day at most only an historical interest, the first attempt at a real estimate of our iron-ore resources was that published by the present writer in the important treatise issued by the Eleventh International Geological Congress at Stockholm in 1910. This showed for the first time the magnitude of Britain's iron-ore reserves, and attracted much attention on the Continent; it would be interesting to speculate how far it may have contributed towards Germany's intention to bring about the war, one of the main motives of which was Germany's desire to obtain possession of the French iron-ore fields and thus to outstrip all competition by commanding far the largest iron-ore supplies of Europe. The principal value of the above-named estimate to-day lies in the fact that it has formed the basis of newer and more accurate estimates. Since the beginning of the war three important contributions to our knowledge of our own iron-ore resources have appeared, each under the auspices of a Government department—it need scarcely be added, having regard to our characteristic British methods, a different department in each case, working independently of the others. Nothing could be more eloquent of the need for a central administration, co-ordinating such efforts and avoiding useless duplication of work. The first was the now well-