

writing of history under the conception of "Deutschland über alles." And not only the writing of history, for it seems that German editions of Cæsar's Commentaries have been subjected to surgical treatment to make them conformable with the axiom. It is not to be supposed that Prof. Duhem has not respect for giants like Leibniz and Gauss; indeed, in the fourth lecture and the appendix, he gives (more philosophically than in the rest of the book) careful appreciation of the geometrical spirit which is at once the strength and the weakness of German science. Of this geometrical spirit English science is all but destitute; its strength is in intuition. The characteristic French qualities are order and clearness, and *l'esprit de finesse*; and each has much to learn from the others.

Mineral Resources of Minas Geraes (Brazil). By A. F. Calvert. Pp. xvi+100+127 plates. (London: E. and F. N. Spon, Ltd.; New York: Spon and Chamberlain, 1915.) Price 6s. net.

This little volume contains a eulogy of the mineral wealth of the famous State of Minas Geraes, the importance and value of which have long been well known to all who have studied, however superficially, the distribution of the world's mineral resources. The author appears to have searched diligently all available records of Brazilian mining and has evidently read widely and extensively; it is only a pity that he did not supplement his want of knowledge of technical matters by getting some competent mining engineer to revise his proof sheets. This would have saved him from repeating such a foolish criticism as that of Sir Richard Burton upon the shortcomings of the Brazilian miner:—"The Davy and the Geordie were equally unknown to him," the mines referred to being gold mines (!); it would have prevented him from persistently writing "phosphorous" instead of "phosphorus"; it would have most certainly corrected his version of the reports of Baron von Eschwege, from which it seems that the author is unaware that the German equivalent of "blast furnace" is "Hochofen," and that "high furnace" is a phrase that conveys no meaning to the British smelter.

Perhaps the most interesting sentence in the book is one in the preface, where the author summarises the causes that have led to the poor results obtained in Brazil, as a rule, from such great natural resources; he enumerates them as follows:—"Liberation of the slave workers, bad legislation and exorbitant taxation, lack of railway communication, political unrest and financial instability, and the incompetence and dishonesty that have attended the exploitation of the mines and the management of the companies that have been formed to work them," and goes on to point out that in his opinion these drawbacks are being steadily removed. Most British capitalists who have had experience of extensive business operations in Brazil would be disposed to add several very significant items to the above list, not the least important of which would be the rapid fluctuations in the rate of exchange.

NO. 2395, VOL. 96]

LETTERS TO THE EDITOR.

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Magnetic Measurements.

WITH reference to the very kindly review in NATURE of July 29 of "Electrical Instruments in Theory and Practice," by Mr. U. A. Oschwald and myself, your reviewer takes exception to the suggestion on p. 32 and elsewhere that "in view of its great simplicity the method of testing by the magnetometer ought to be more used than at present."

The reason urged for the rejection of magnetometer methods is that disturbances from neighbouring current-carrying conductors would render it useless, and presumably ballistic, or other methods should be used instead.

I wish to point out on behalf of Mr. Oschwald and myself that we did not suggest the adoption of magnetometer methods in any haphazard way. Both of us have had considerable experience of magnetic work, and the suggestion was made for the following reasons

(1) In ballistic work, if a Thomson moving needle galvanometer is used, as is frequently the case, the same sources of error are present.

(2) No ballistic galvanometer can be calibrated very accurately at present. The values of the constant as determined by Messrs. Hadfield and Hopkinson (*Journal Inst. Electrical Engineers*, vol. xlv., p. 270) by condenser, standard field, and steady deflection, differ amongst themselves by about 1 per cent.; and there are generally other sources of error in magnetic work.

Now, when electric light wires are laid in a building, the flow and return wires are generally close together in casing, or iron tubing, so that the effect with any reasonable precautions is less than 1 per cent. Hence the method is practically equal to the ballistic one, so far as accuracy is concerned.

Again, for rapidly comparing specimens of iron by the zero method, the objection vanishes, and there is nothing to approach the magnetometer for this purpose.

In my opinion, the ballistic galvanometer is a considerably overrated instrument for this purpose, due possibly to the fact that errors in its constant are conveniently forgotten in the course of research.

Apart altogether from accuracy, there is the outstanding feature of the simple magnetometer, viz. that it measures directly the forces we are dealing with, whereas the ballistic method depends on measuring another quantity altogether. I think I am not wrong in hoping that the magnetometer will be partially restored to its ancient position as the premier magnetic testing instrument.

W. H. F. MURDOCH.

September 3.

WITH reference to Mr. Murdoch's letter on the magnetometer method of testing iron, I described it as an admirable method under suitable conditions. I tried the method about three years ago in my laboratory, which is close to a track return tramway line, and had great trouble with it owing to zero fluctuations. The same difficulty has been found in other laboratories close by, where instruments with very weak magnetic control have been set up. I did not take exception to the suggestion that the