has attempted, and with real success, to show what manner of man Gilbert was, wherein lay his genius, what were his merits, and what also were his faults and failings. Mr. Benham dwells on the circumstance that, although Gilbert's actual discoveries were few and crude, he must be judged rather by the spirit of his work. "He was not the builder of sciences, but the architect of a truly scientific spirit; and his life-work consisted in the doctrine, new to England, that all scientific knowledge must be founded on practical experiment and observation alone, instead of upon speculations and theories evolved out of inner consciousness." The successive chapters of the book deal with the old magnetic philosophies, magnetic motions and electric force, the magnet's "directive virtue," the variation of the compass, the dip and "orbes of virtue" of the magnet, the life of the Universe (in which Gilbert, although no Manichean, was clearly a believer) and the Copernican theory. The author is particularly happy in his treatment of this last topic; but throughout the analysis of Gilbert's work is accurate and discriminating. The book is illustrated with a picture of Gilbert's terrella, and another of his tombstone in the church of Holy Trinity, Colchester. S. P. T.

The Vocal System based on the Fundamental Laws of Language. By G. Lionel Wright. Pp. 20. (Published by the Author, Upper Belgrave Road, Clifton, Bristol.) Price 1*s.* net.

IT is now recognised that teaching to read is not the simple matter which it was once thought to be. In recent years one system has followed another in rapid succession, and each has claimed in turn that by its introduction the time taken by the child to learn to read the mother tongue was much reduced. There seems to be a chance that these experiments may eventually reduce the difficulty of this first step in human education to a minimum. Mr. Wright proposes to make extensive use of the blackboard and of *vivâ voce* methods of instruction, and to start teaching the child to read by making him learn the five vowels. When this has been accomplished, the learner is introduced, by carefully graduated steps, to certain combinations of vowels and consonants, which are clearly indicated in this brochure, and by following which Mr. Wright claims that children may read at the age of six. A somewhat minute examination of the contents of the pamphlet leads us to think that Mr. Wright would be well advised in making his instructions to the teacher much more detailed and explicit if he is anxious that his system should become widely adopted, for at present the teacher will be, at several points, at a loss to know the next step in the course of work.

The Lake Counties. By W. G. Collingwood. (Dent's County Guides.) Pp. xii + 392; illustrated. (London: J. M. Dent and Co.) Price 4*s.* 6*d.* net.

THIS little volume—the fourth of the series to which it belongs—will be found invaluable to all who visit the Lake District. In addition to being an excellent guide, with a number of itineraries and many maps, it contains four chapters on the natural history of the district, the birds being described by Miss Armitt, the butterflies and moths by Canon Crewdson, the flora by Mr. S. L. Petty, and the geology by Prof. Hull. In the chapters on fox-hunting, angling and shooting, the sportsman will find abundant matter for interest, according to his particular taste. This volume fully maintains the high reputation of its predecessors, and is, in fact, all that a guide should be. Those tourists who wish to go more deeply into the natural history of one of the most interesting and beautiful districts in England will find all they want in the more pretentious volume by the late Mr. Macpherson entitled "Lakeland." R. L.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Symbol for Partial Differentiation.

PROF. PERRY'S difficulty (NATURE, May 15, p. 53) is without doubt a real one, and is deserving of serious consideration. In connection therewith the following extract from a paper at present passing through the press may be found interesting, at least on the historical side. It is in reference to a memoir of Jacobi's published in the year 1841 in the twenty-second volume of *Crelle's Journal*:—

"The subject of the notation of differential-quotients is then entered on at some length (pp. 320-323), and the decision made to use ∂ in the manner which soon afterwards came to be familiar. The insufficiency of this notation is not forgotten, however, although its advantages over the different devices of Euler and Lagrange are recognised, his illustrative example being the case of $\partial z/\partial x$ where z is a function of x and u, and u is a function of x and y. He puts the whole matter in a nutshell when he says that it is not enough to specify the function to be operated on and the particular independent variable with respect to which the differentiation is to be performed, but that it is equally necessary to indicate the involved quantities which are to be viewed as constants during the operation."

To this the following footnote is added:—

"I may state in passing that in 1869 when lecturing on the subject I found it very useful to write

$$\phi\overline{x, y, z} \ , \ f\overline{s, t, u, v} \ , \ \ldots .$$

in place of

$$\phi(x, y, z) \ , \ f(s, t, u, v) \ , \ \ldots .$$

and then indicate the number of times the function had to be differentiated with respect to any one of the variables by writing that number on the opposite side of the vinculum from the said variable; thus

$$\phi\overline{\overset{1}{x}, \overset{3}{y}, \overset{2}{z}}$$

meant the result of differentiating once with respect to x, thrice with respect to y, and twice with respect to z.

"Using this notation to illustrate Jacobi's example, we see that if it were given that

$$z = \phi\overline{x, u}$$

we should have

$$\partial z/\partial x = \overset{1}{\phi}\overline{x, u} \ ;$$

but that if it were given that

$$z = \phi\overline{x, u} \quad \text{and} \quad u = \psi\overline{x, y}$$

then we should not be certain as to the meaning of $\partial z/\partial x$, as it would stand for

$$\overset{1}{\phi}\overline{x, u} \text{ or } \overset{1}{\phi}\overline{x, u} + \overset{1}{\phi}\overline{x, u} \ . \ \overset{1}{\psi}\overline{x, y}$$

according as u or y was to be considered constant."

Cape Town, S.A., June 5. THOMAS MUIR.

I AM glad to think that a pure mathematician sees the difficulty met with by users of mathematics. I wish that men who write to me privately would publish their remarks. One correspondent says: "I think 'the mathematicians' made a rather stupid blunder when they introduced ∂ for partial differentiation. This way: nearly all differential coefficients *are* partial; even a complete one (assumed complete) may become partial by extension of the field of operation. So an old investigation of Kelvin's, for example, using d throughout, is, by 'the mathematicians,' replaced by the same using ∂ throughout, except one or two here and there! What is the use? It gives a lot of trouble, and as printers haven't always ∂'s, or proper sized ∂'s, it makes bad work. It should have been ∂ itself that was introduced for the exceptional use, thus making next to no alteration in the classical investigations." These are, indeed, my own views, but as my pupils go forward to University examinations I