

ber 10 or November 26, the error appears to have been due to his contemporaries, John Robison, Adam Ferguson, and Thomas Thomson. So far as I am aware at present, the only corrections necessary in the Calendar refer to Hooke, who died March 3, 1703, according to our present reckoning, and not in 1702, and to Spallanzani, February 12, 1799, who held a chair at Pavia, and not Padua.

Devonport.

EDGAR C. SMITH.

### The Electric Telegraph.

IN the issue of NATURE of November 17, p. 381, it is stated that "in 1861 telegraphy, the only practical application of electricity, was in private hands. The earliest telegraph was erected on the London and North-Western Railway between Euston and Chalk Farm so far back as 1837 by Cooke and Wheatstone. . . ."

It is strange that no mention is made of the completely equipped reciprocal working electrical telegraph eight miles long (both above and below ground) erected by Francis Ronalds in his garden at Hammersmith in 1816, and fully described by him in a most interesting book published in 1823 ("Description of an Electrical Telegraph and of some other Electrical Apparatus," R. Hunter, 72 St. Paul's Churchyard).

I thought the story of his treatment by the Admiralty in 1816, when he asked for inspection of his telegraph with a view to its substitution in place of the semaphores then (and for years afterwards) in use between London and Portsmouth, was well known. He was informed that "telegraphs of any kind are now wholly unnecessary, and none but that in use will be adopted."

Although Ronalds operated his telegraph by a small frictional hand machine at each end, there can be no doubt—I know he had none—that even with that light charge the eight miles could have been greatly extended, and by larger charges, and, if necessary, repeating stations, it could easily have done what he claimed for it, and he is well known to have been a most cautious, prudent, and accomplished electrician. Had the Admiralty listened to him a solid base would have been laid for the adoption of all the later improvements which have been made, and electric telegraphy would have been in use many years sooner.

The whole of Ronalds's long life showed that his ambition was entirely scientific and not commercial; he took out no patent for his telegraph, but turned, disappointed, from telegraphy and devoted himself again to other scientific pursuits, in which he attained much success, as is well known to scientific men not in England alone. He was elected a fellow of the Royal Society in 1844, and was knighted in 1870, three years before his death, for his "early and remarkable labours in telegraphic investigations."

Both Cooke and Wheatstone knew of his telegraph, and referred to it in their quarrels.

Ronalds did not claim to be the inventor of the electric telegraph, the possibility of which had been a matter of discussion for some time by men of science, but rightly claimed to have been the first man to erect and equip an effective working telegraph eight miles long, and capable of indefinite extension. His book shows that he clearly foresaw the future of electric telegraphy.

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THE reference in our Note was to the first commercial telegraph. The history of the invention of the telegraph is well known, but importance must be

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attached to inventions on the lines on which it developed. A model of the pith-ball telegraph of Francis Ronalds is in the collection of telegraphic apparatus in the Science Museum, South Kensington. It is interesting to remember that perhaps the first practical suggestion of an electrostatic telegraph was given in an anonymous letter to the *Scots Magazine* (vol. 16, p. 73, 1753). It was suggested that as many insulated wires should be used as there are letters in the alphabet. There is good reason for thinking that the letter was written by Charles Morrison, a surgeon and a native of Greenock.

THE WRITER OF THE NOTE.

### The Hydrogen-ion Concentration of the Soil in Relation to Animal Distribution.

THE striking relationship between the hydrogen-ion concentration of the soil and plant distribution is apparently not without its parallel in animal distribution. A number of facts concerning the relationship of certain forms of animal life to plant-hosts have been brought together by Fr. Dahl ("Grundlagen einer ökologischen Tiergeographie," Jena, 1921). He states that a great many animals are exclusively, or almost exclusively, found on certain plants. The association of the silkworm with the mulberry tree is known to all, and it is only with difficulty that it can be brought to feed on any other leaf than that of the mulberry.

Since this is so, it follows that animals which inhabit or feed on plants found in regions of alkaline soil must be absent, or almost absent, from those in which the soil is acid. Conversely, the parasites of acid-soil flora must be absent from those large tracts where chalk, limestone, or calcareous silt are found.

The distribution of worms with regard to the reaction of the soil offers an interesting field of study. The same holds true for the distribution of fresh-water plankton. Soft water, such as that of Dartmoor, is slightly acid, pH 6.4-6.8, owing to excess of carbon dioxide in solution, whereas running water, in regions containing appreciable amounts of calcium carbonate in the soil, is close to the bicarbonate equilibrium point, pH 8.3-8.4. These differences appear to have considerable biological significance, as is easily appreciated when one recalls that it has been shown by Prof. B. Moore that the relationship of an amphoteric colloid to its ions depends upon the ratio of the hydrogen and hydroxyl ions, namely, upon the square of the hydrogen-ion concentration.

It may be added that in regard to the influence of the hydrogen-ion concentration upon plant distribution the additional factors emphasised by Mr. N. M. Comber (NATURE, September 20, p. 146), and Mr. E. A. Fisher (November 3, p. 306), in criticism of the present writer's letter on the subject (September 15, p. 80), are of undoubted importance and have been discussed elsewhere. They were omitted from the short letter in NATURE to make the main idea clearer.

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### Relativity and Materialism.

DR. N. R. CAMPBELL in his interesting letter in NATURE of November 24 says that the belief that matter is real is quite unaffected by the principle of relativity, if the word "real" is used in the common-sense way, which is the only way in which the notion of reality is ever used in physics. He also says that the principle of relativity may lead us to assert that some things are real which we should otherwise have asserted to be not real. With these assertions I am in cordial agreement.