he must have been present[3]—"Even now indeed telegraphy without wires is possible within a restricted radius of a few hundred yards, and some years ago I assisted at experiments where messages were transmitted from one part of a house to another, without any intervening wire, by almost the identical means here described."

That article appeared in 1892, and was an anticipation of genius. Too little appreciation is felt to-day for the brilliant surmises and careful and conscientious observations of a great experimental worker like William Crookes; and on some of his researches orthodox science still turns its weighty and respectable back.

Other Methods of detecting Waves.

In 1889 I had come across the effect of cohesion under electric impetus, and employed it to ring a bell under the stimulus of the overflow of a Leyden jar, as described in my paper to the Institution of Electrical Engineers in 1890 (vol. xix. pp. 352-4, where D. E. Hughes's comment on it is also recorded). In 1893 I heard—through a demonstration by Dr. Dawson Turner at Edinburgh—of Branly's filings-tube—an independent discovery of M. Branly, which really constituted an improvement on the first rough coherer idea. What I had called a coherer was not this, but a needle-point arrangement, or the end of a spiral spring touching an aluminium plate, which was and is extremely sensitive, but rather unmanageable.

With a Branly's filings-tube I made many more experiments, developing the subject; and on the untimely death of Hertz I determined to raise a monument to his memory by a lecture at the Royal Institution on these experiments (Friday, June 1, 1894), which I styled "The Work of Hertz"—meaning that it was a direct outcome and development inspired by that work. I soon found that the title was misleading, so that in the next edition I changed it into "The Work of Hertz and some of his Successors," and afterwards changed it still further into "Signalling across Space without Wires"; for that, of course, is what was being done in laboratory fashion all the time. The depression of a key in one place produced a perceptible signal in another—usually the deflection of a spot of light—and, as I showed at Oxford, also in 1894, employing a Thomson marine speaking galvanometer lent me by Alexander Muirhead, a momentary depression of the key would produce a short signal, a continued depression a long signal;—thus giving an equivalent for the dots and dashes of the Morse code—if the filings-tube were associated with an automatic tapper-back. One form of such tapper-back was then and there exhibited—a trembler or vibrator being mounted on the stand of a receiving filings-tube. This was afterwards improved, with Mr. E. E. Robinson's help, into a rotating steel wheel dipping into oiled mercury. Our aim was to get signals on tape, with a siphon recorder, and not be satisfied with mere telephonic detection. We succeeded; but more rapid progress would have been made had we stuck to the telephone, as wiser people did.

[3] Colonel Crompton now tells me that the experiments to which Crookes was probably referring were conducted not by Hughes but by Willoughby Smith, who seems to have demonstrated that some sort of communication was possible in this way.

Telegraphy 1894 to 1896.

My Royal Institution (1894) lecture was heard by Dr. Muirhead, who immediately conceived the desire to apply it to practical telegraphy. When my lecture was published—as it was in the *Electrician*, with diagrams roughly depicting the apparatus shown, drawn (some of them) skilfully but not always quite correctly, by the then editor of the *Electrician*, Mr. W. H. Snell—it excited a good deal of interest; stimulating, to the best of my belief, Capt. (now Admiral Sir Henry) Jackson, Prof. Righi, and Admiral Popoff to their various experimental successes which have been elsewhere described.

I was too busy with teaching work to take up telegraphic or any other development; nor had I the foresight to perceive, what has turned out to be, its extraordinary importance to the Navy, the Merchant Service, and indeed Land and War service too. But fortunately in Italy there was a man of sufficient insight to perceive much of this, and with leisure to devote himself to its practical development. In 1896 Signor Marconi came to this country—and the rest is public knowledge.

Man and the Ice Age.[1]

By Prof. W. J. Sollas, F.R.S.

THE great advance recently made in our knowledge of the Quaternary epoch begins with the observations of General de Lamothe on the ancient shore-lines which run along the coast of Algeria at heights of about 100, 60, 30, and 20 metres above the existing sea-level. They maintain their course with such remarkable uniformity that M. de Lamothe was unable to regard them as due to elevation of the land, and consequently attributed them to changes in the level of the sea, and was thus led to predict that similar shore-lines would be discovered on the opposite coast of the Mediterranean and particularly in Provence; a prediction which was subsequently verified by Prof. Depéret.

Next Prof. Gignoux, a friend and former pupil of Prof. Depéret, made a detailed investigation of these shore-lines and their associated deposits in the Western Mediterranean, and embodied his results in a masterly monograph.

Finally, Prof. Depéret himself extended these investigations to the Eastern Mediterranean and the west coast of the North Atlantic Ocean. In a comprehensive review of the whole subject he proposed the following classification of the Quaternary deposits, based on the four marine terraces of de Lamothe.

1. Sicilian (Döderlein). Coast-line at from 90 to 100 m. The most perfect example of this stage is afforded by the Conca d'Oro or basin of Palermo, an ancient bay of the Mediterranean now filled up with Quaternary deposits. They commence with a blue clay containing near its base the famous fauna of Ficarazzo, which points to cold conditions and a depth of 90 metres. Traced towards those localities where the sea was clearer, the clay passes into a Polyzoonal

[1] A lecture delivered to the Geological Society of London on January 10.