men together as nothing else can, and Graham Bell and David Hughes who gave us the telephone and the microphone deserve to be honoured every day of our lives. It would be too much to suggest that you should think of these benefactors of mankind whenever you use the telephone, but the next time you are rung up for some far-distant friend, and hear his well-known voice speaking to you when you lift the telephone to your ear—give a passing thought to Graham Bell. And then, when you speak into the mouthpiece of the transmitter—knowing that the microphone inside it will respond and that the current ripples which faithfully represent your voice will be carried far away to your friend—remember what you owe to David Hughes."

Obituary.

THE VEN. DR. J. M. WILSON.

JAMES MAURICE WILSON was born in 1836; was senior wrangler in 1859; an assistant master at Rugby from 1860 to 1879; headmaster of Clifton College from 1879 to 1890; vicar of Rochdale and archdeacon of Manchester from 1890 to 1905; canon of Worcester from 1905 to 1926. The last five years of his life he spent in quiet but not idle retirement near Petersfield, Hants, where he died on April 15.

This bare statement does not seem to suggest many opportunities for adventure, yet it was adventure in the very best sense that was the breath of his nostrils. It was typical of Wilson that in extreme old age, when death was beckoning to him, he told one nearest to him that, though he did not know what happens to us after death, he was very keen to find out. Yes, he was always very keen to find out the truth, and always brave to face it with all its consequences. It was not his wont to abide comfortably in the old ways along which habit leads most men to slothful acquiescence. Throughout his long life, in action and in thought, he was continually breaking with his past, and gloriously happy in the difficulties that the new work and the new problems presented. The changes must have often seemed rash to the onlookers. How the wise heads must have shaken when on going up to Cambridge as a classical scholar he turned aside to mathematics, and when as a mathematical master, he allowed himself to be diverted to the teaching of science.

Before his Rugby career was over, Wilson contemplated giving up his comfortable house mastership for parochial work, and would have done so had not the headmastership of Clifton been offered him. After a few years there, he left his successful work as a headmaster to be a northern archdeacon. To many it was a matter of deep regret that no Prime Minister was ever adventurous enough to set him on the bench of bishops. The one offer that was made to him was ludicrous. It is possible that he might have been an admirable diocesan bishop; it is quite certain that he would have been leaven in the episcopal lump. As it was, he had a great influence on religious thought, and must have been a magnet which attracted many to the Church of England and kept many in it. The writer of this notice heard his first as well as his last sermon as a schoolmaster. Only a few years separated the one from the other. Both were instinct with the same buoyant and adventurous but steady faith. In all his sermons there was a certain spiritual liveliness, which kept his congregation awake even on a hot Sunday afternoon. The events of the day were seized upon to help the understanding and to show the importance of spiritual issues. He paid even his youthful congregations the compliment of recognising that they had difficulties in belief, that faith could not be easy to them any more than it had been to him.

Stress has been rightly laid on Wilson's ceaseless efforts to harmonise a spiritual faith with the claims of natural science. As a young schoolmaster it was his task to assert these latter claims. Though the teaching of science had been started in Rugby by Dr. Tait in 1849, it was looked upon as an extra, and Wilson taught it as an extra to about fifty boys from all parts of the school, even as late as 1863. Then came the report of the Royal Commission on the nine public schools, including Rugby. One of the recommendations of the Commission was that every boy should, at some stage or other of his school career, receive some education in science. Dr. Temple introduced it at once into the whole middle school; but how could one master, and that a mathematical master, cope with the work? A second mathematical master—F. E. Kitchener—was enticed to co-operate with Wilson. They insisted on only one subject being taught in all the science classes for the first few terms, so that they might cope with the difficulty. What was the subject to be? Temple suggested botany, and botany it was, even though neither of the teachers knew the subject. Wilson has himself told how the help of Sir J. D. Hooker, the great curator of Kew, was enlisted. He planned out a course of study for the two masters for the summer term. They spent the greater part of the summer holidays at Barmouth with a party headed by Prof. George Henslow and many enthusiastic collectors and diagram makers, and started teaching botany to 350 boys in September 1864. From that day until Wilson left Rugby he was the inspirer of the science teaching, which was, of course, rapidly extended, and no doubt botany was soon elbowed out by its more robust brothers, physics and chemistry. It was not only in the work in school that Wilson was an initiator. He was one of the founders of the Rugby School Natural History Society, which supplemented in almost ideal fashion the work done more formally. It aroused interest in geology, zoology, entomology, and other subjects which were

© 1931 Nature Publishing Group

not taught in the school and yet gave life and unity to the class-room work and a common social bond to teachers and to taught.

When Wilson went to Clifton, his experience of teaching science and his enthusiasm for it were invaluable. He did not himself take a big part in the actual class work, but he collected a band of teachers and gave them the right opportunities. Of these they made splendid use. Their teaching owed a great deal of its inspiration to the way in which their headmaster encouraged them to do original work. Scientific knowledge, the Royal Society itself, would have been poorer had it not been for the opportunities that Clifton gave its masters and its boys during the period of his headmastership.

Of Wilson's work at Clifton as a whole there is much to be said. Percival had laid solid and noble foundations; Wilson gave the school just the touch of inspiration, intellectual and spiritual, that carried it through the difficult second chapter of its life. Men of ability still remember him as a teacher who made Plato a living power in their lives. To all, his versatility and enthusiasm meant much. He cared little for the solemn pomposities of life; he cared a great deal for the mortal things that touch the human mind. When sorrow or shame, success or failure, visited the community—and these are from time to time inevitable visitors in any great school—he never failed in the power to show how he longed to sympathise and restore. Now and then, no doubt, he bewildered his subordinates by improvised devices, or by a hurried change of opinion. But bewilderment is good for all men, especially for schoolmasters. He took a simple and disarming pleasure in his own feats, but was ever the first to proclaim the merits of others. Thanks to this generous quality of appreciation, masters of very different and some of very great talents found happy work at Clifton. In his northern parish these same qualities shone out for the encouragement of many clergymen and for the spiritual benefit of those laymen who, living among the dark satanic mills, are tempted to cease from mental strife.

At Worcester, Wilson mastered a new craft: that of deciphering and editing the archives in the Cathedral Library. But he did not confine himself to the Library; he spoke his mind in sermons and in lectures on the urgent social problems that affected the city's life, and he imparted his own new-won love of the ancient Cathedral to countless groups of visitors, who followed him spellbound on his courteous and enthusiastic pilgrimages from end to end of the building.

It is not fanciful to suppose that in his school-days Wilson heard the two voices that speak to men of liberty. At King William's College the ocean bellowed from his rocky shore; at Sedbergh the mountain floods brought him the same message: and all through life he had this music in his ears and rejoiced in it. To these voices others deep and vibrant were added as life brought him happiness and sorrow and quickened his imagination. So it is for a very rich and venturesome nature that all who knew him are grateful and that all the trumpets surely sounded on the other side. W. W. V.

PROF. A. A. MICHELSON, FOR.MEM.R.S.

IT is just fifty years since Michelson made his first attempt to measure the velocity of the earth through the ether. Shortly before his death he was still at work on the same problem. The memorable result was in 1887 when, in conjunction with Morley, he performed the famous experiment that ultimately led to the theory of relativity and changed our whole conception of the physical world. There was a combination of grandeur and delicacy in the apparatus which strikes the imagination—the massive pier floating in mercury and moving almost imperceptibly in slow revolution, the delicate interferometer capable of detecting a lag of one ten-thousand-billionth of a second in the arrival of the light wave; and, as a climax for the theorist, the subtle escape of Nature from the trap that Michelson had set for her.

I am not sure that Michelson himself was ever really convinced that this epoch-making work was not a 'failure'; for he was disinclined to the new theories. But he must have felt the thrill of success when in more recent times his interferometer, now magnified to colossal dimensions, gave the first measurement of the angular diameter of a star. His last work reverted to one of his earliest problems, the determination of the velocity of light; I think it is not yet known whether it has realised his most cherished ambition, to determine this constant to within one kilometre per second. He stands out as a man who could bring big ideas to fruition.

A. S. EDDINGTON.

IN 1899 I chanced to read in the *Journal de Physique* for that year two articles which provided no small part of my interest in life for several years, and the reading of which perhaps determined my career. They contained Pellin and Broca's description of the constant deviation prism, and Michelson's of his echelon diffraction grating. Michelson's first complete description is in the *Astrophysical Journal* for June 1898.

The resolving power of a diffraction grating is proportional to the product of the total number of lines by the order of spectrum observed. Consideration of how to increase resolving power by increase of the order of spectrum led Michelson to the idea of replacing the closely ruled reflecting lines of the ruled grating (with its spectra of the first, second, and other small orders) by the reflecting surfaces presented by the steps of a number of glass plates of equal thickness laid on each other *en echelon*, and yielding a spectrum of, say, the 20,000th order. He dismissed the idea of a reflection echelon at once as impracticable, saying: "The difficulty, even supposing the optical work to be practically perfect, would be the joining of the separate plates in such a way as to have always the same distance between them". But by using the same arrangement for transmission instead of reflection, he avoided these difficulties (though with some sacrifice of resolving power), and the paper describes the use of a transmission instrument to investigate the Zeeman effect.

© 1931 Nature Publishing Group