

called an emanation. This may be wafted about, or settle on solids and make them appear to be radioactive. The emanation is not permanent, but after a few hours changes into non-radioactive substance.

Rutherford's scientific activity was never greater than when he was at Montreal. In the years between coming to Cambridge and leaving Montreal to be professor of physics at the University of Manchester, he had published between forty and fifty papers; a few of these were joint papers, but the great majority were about researches of his own which had led to results of first-rate importance and which could not have been obtained by anyone who was not an experimentalist of the very first order. In those days, laboratories had no funds to buy instruments as sensitive as those which are now available, and to detect small effects required exceptional skill, patience and self-criticism.

After Rutherford went to Manchester, I did not see much of him until 1915, when Mr. Arthur Balfour, as he was then, created the Board of Invention and Research for the co-ordination and encouragement of scientific effort in connexion with the Great War. Lord Fisher was the president of the Board, and I was a member of the Central Committee. The most pressing need at the moment was some means of detecting submarines. We got Rutherford to draw up a report on the methods which had been used or suggested for this purpose. He reported strongly in favour of a particular method, and we were fortunate enough to secure the services of Prof. W. H. (now Sir William) Bragg as director of a research for this purpose, and provided him with a laboratory and staff. Rutherford also visited the United States to find out what they were doing in this matter and to tell them what we were doing. His help was continually being asked on a great variety of questions and there was no one whose opinion carried greater weight.

The Cavendish Laboratory has made great progress under his direction; the Mond Laboratory for magnetic research and the High-Tension Laboratory have been created. When he came, the supply of instruments for research was too scanty; it is now in this respect one of the best equipped physical laboratories in existence. Lord Rutherford's activities were very wide-spread; he was professor of natural philosophy at the Royal Institution, and also held with conspicuous success the very responsible post of chairman of the Advisory Council of the Department of Scientific and Industrial Research. That he could discharge so many duties was due to his powers of organization and that his claim to know a good man when he saw him was amply justified by results. With this faculty he could delegate some of his work to

others without injury to the efficiency of the Laboratory, and get time to spare for his other activities. His death just on the eve of his having in the High-Tension Laboratory means of research far more powerful than those with which he had already obtained results of profound importance is, I think, one of the greatest tragedies in the history of science.

J. J. THOMSON.

THE splendour of Rutherford's contributions to science excites a wonder as to the means by which he could achieve so much. He made no claim to great mathematical ability, and many an experimenter has had fingers more clever than his. Yet he conceived and carried out a series of researches which have played a leading part in the marvellous advances of modern physics. To begin with, he brought to his work an intense interest, a tireless vitality, a singleness of purpose, a simplicity of conception and a bravery of attempt which carried him straight to the point.

Rutherford had to a remarkable degree the power of seizing on the essentials; and he not only saw what was unimportant but also rode over it and through it remorselessly. This was true indeed of all his dealings: he had a well-earned reputation for speaking plainly. But he was very kind and generous, and a loyal friend. He was tactful, and full of consideration for all who were trying to do the right thing. One of his lovable characteristics was his constant care that all who worked for him, and indeed all workers, should have full credit for what they did. In any company of men he was extraordinarily quick to appraise the value of what each man said, and indeed the worth of the speaker himself, so that his own clearness and honesty of purpose, his force of statement and his shrewd judgment would carry the company with him. Thus he was a great administrator and guide.

In the laboratory his helpers went forward strongly and confidently towards the conclusions which he himself anticipated so clearly. So perhaps we may understand why such fine work came from the laboratories which he successively controlled, and why in these days physical science has been so greatly enriched.

W. H. BRAGG.

WITH the passing away of Lord Rutherford*, the life of one of the greatest men who ever worked in science has come to an end. For us to make comparisons would be far from Rutherford's spirit, but we may say of him, as has been said of Galileo,

*A short tribute given at the Galvani celebrations in Bologna on October 20.

that he left science in quite a different state from that in which he found it. His achievements are indeed so great that, at a gathering of physicists like the one here assembled in honour of Galvani, where recent progress in our science is discussed, they provide the background of almost every word that is spoken. His untiring enthusiasm and unerring zeal led him on from discovery to discovery, and among these the great landmarks of his work, which will for ever bear his name, appear as naturally connected as the links in a chain.

Those of us who had the good fortune to come into contact with Rutherford will always treasure the memory of his noble and generous character. In his life all honours imaginable for a man of science came to him, but yet he remained quite simple in all his ways. When I first had the privilege of working under his personal inspiration, he was already a physicist of the greatest renown, but nevertheless he was then, and always remained, open to listen to what a young man might have on his mind. This, together with the kind interest he took in the welfare of his pupils, was indeed the reason for the spirit of affection he created around him wherever he worked.

Rutherford passed away at the height of his activity, which is the fate his best friends would have wished for him, but just on account of this he will be missed more, perhaps, than any scientific worker has ever been missed before. Still, together with the feeling of irreparable loss, the thought of him will always be to us an invaluable source of encouragement and fortitude. NIELS BOHR.

RUTHERFORD'S death removes from science the most outstanding personality of the age. My most vivid memories naturally date from the autumn of 1900 and the two subsequent years when I worked with him at McGill. A born experimenter, entirely devoted to his work and with few, if any, outside interests, I can see now more clearly than I did then how he neglected no opportunity or preparation the better to advance it. Though the qualities for which in later life he was so publicly beloved were then still undeveloped, yet undoubtedly they existed and they helped to leaven the McGill of those days and to make it the enchanted place it was. The personal familiarity with the man, and his methods of work in the laboratory, that I gained in those years remained, of course, an abiding possession. Yet I do not think it was entirely, if at all, this that later was to make all his scientific communications a unique pleasure to read. True, admiration for some new and striking advances was pretty sure to be evoked, but over and above

this they seemed to radiate an entirely undefinable charm.

In the last phase, since the Great War, this extended from his writings to his public lectures and appearances. The intense absorption in abstruse scientific problems, which in others is a hindrance to wide social intercourse, was in him combined with such vitality and magnetism that others were attracted rather than repelled. As has been well said, he was able to vitalize any public gathering and make it the happier merely for his coming.

In the last letter I had from him, asking me why I had resigned, he told me he did not expect to do so for some years, as he was feeling very fit and well, and able to hold his job down. The Fates have otherwise decreed. He reached, perhaps even did not quite reach, the summit of his powers, but for him there was to be no slow and inevitable decline. F. SODDY.

IT is hard to think of Rutherford as a man whose life is finished, that we shall no more see his steady eyes and hear the familiar voice, now asking placidly about some domestic trifle as any friend might, now growing hurried and excited when ideas about some physical problem were coming almost too fast for his tongue. There can seldom have been a man in whom burning genius was so closely associated with the kindly commonplace, who at any moment might suddenly become inspired, and a little later might be showing a boyish naïvety about some question of another kind. His ability to excite affection was as marked as his power of commanding admiration: his foibles were essentially those of a frank and simple nature, the charm of which remained unspoiled, and was even enhanced, by successes that might well have turned the head of a lesser man.

I like to think of him as he was at Manchester, where I first came to know him. Of this time he might have said, in Newton's words, "for in those days I was in the prime of my age for invention, and minded philosophy more than at any time since." He was free from any grave cares of administration, his duties outside the laboratory were light, and he had leisure himself to experiment with his own hands and eyes, as he loved to do. He organized his students as a team for radioactive research, allotting to each a task within his capacity, and urging him on in energetic fashion if urging was needed. Our belief in him was implicit: if Rutherford said that an experiment could be done, then it could be done, and the sooner it was done the better.

Rutherford was a young man with the rest of us, sharing our jokes and showing us how to overcome our difficulties. His nickname in those days