

carbon dioxide by the quantitative methods of modern chemistry. He discovered it in the sense of identifying it, although he did not venture to give it any other name than "fixed air". The classical paper was entitled "Experiments upon Magnesia alba, Quick Lime and some other alkaline substances", and was read in June, 1755, before that Society which not long afterwards became the Royal Society of Edinburgh. The paper was published the following year. But Joseph Black made another momentous contribution to natural knowledge in his Doctrine of the Latency of Heat. Between the years 1759 and 1763 while in the chair of chemistry at Glasgow, Black worked at this subject; and it is now known that it was from Black that James Watt learned those principles concerning the physics of steam which he applied with such success to the invention of the steam-engine. It is not realized as widely as it should be that the gigantic world activities depending on the utilization of the properties of steam are really due to the hard thinking and the careful experiments of a Scottish Doctor of Medicine, Joseph Black, and a Glasgow instrument-maker, James Watt. We are not concerned with what might have been. Watt might have invented the steam-engine had Black never existed, but it is a matter of history that Black taught Watt the theory of heat, and that Watt's application of it has been one of the greatest factors in the economic development of the world.

The next person we meet in this wonderful old Edinburgh society is James Hutton, a name as full of meaning in the history of geology as is that of Black in the history of Chemistry. James Hutton was the originator of the theory of the igneous origin of those rocks which compose by far the greater portion of the earth's crust. His views are not only to be reckoned with by every student of geology,

but are now accepted as representing the truth concerning the mechanism of rock-origins. Although Hutton died in 1797, he was one of the bright band that crossed the century. He read his epoch-making paper before the Royal Society of Edinburgh one evening in 1785. It caused no stir next morning; and perhaps few who heard it knew that they had listened to a discourse which was destined to revolutionize geological conceptions, and to raise a controversy which was not to be set at rest for the next three-quarters of a century.

In 1800 it was declared that Hutton's views were "not only hostile to sacred history but equally hostile to the principles of probability"—and this because Hutton believed that the earth's crust had been laid down more than 6,000 years ago.

James Hutton, the son of an Edinburgh city official, was born in the old town in 1726. After studying at the High School and the University of his native place, he went to Paris and to Leyden where he graduated M.D. By 1768 he had settled down in Edinburgh to prosecute systematically those researches on the great problem he was to make so peculiarly his own. Hutton's style in writing was heavy and almost obscure, while that of his disciple and biographer, Professor John Playfair, was lucid and interesting. In 1802 Playfair published his famous "Illustrations of the Huttonian theory of the Earth" which supplied new arguments in favour of his master's contention. Playfair's is an important name in the science section of Edinburgh society, so important that on his death he was considered worthy of a monument on the Calton Hill. His chair in the University was Mathematics, but he wrote on Natural Philosophy as well as Geology for *The Edinburgh Review*.

Hutton was particularly fortunate in his expositors. Sir James Hall, fourth Baronet of Dunglass in East