devoted much of his leisure to music, sketching, and literary composition; and these attainments, added to his lively and agreeable conversation, made him a most pleasant companion. He was also invariably kind and considerate to those with whom he worked. He was elected a Member of the Institution of Civil Engineers on the 5th of December, 1865.

MR. THOMAS EMERSON FORSTER, who died at Ellison Place, Newcastle-on-Tyne, on the 7th of March, 1875, was well known during nearly half a century, first as an able and successful 'viewer' or manager of collieries in the districts near the river Tyne; afterwards, in addition to greatly extended practice as a mining engineer, he was consulted as to the general management of large mining concerns, and by his probity, practical skill, and intelligence, he attained high eminence in his profession. One of his intimate contemporaries described him as having been the hardest worker he ever knew, and few, if any, have exceeded him in the skill and vigour with which he applied himself to matters connected with practical mining. His ambition was to be "a thorough pitman," by which is implied the possession of every faculty, bodily and mental, that conduces to success in the practical working of coal-mines.

The birthplace of Mr. T. E. Forster was Garrigill, a small and retired hamlet on the left bank of the river South Tyne, only a few miles from its source on the eastern slopes of the mountain of Cross Fell, in Cumberland. This part of the county is well known as the Manor of Alston Moor, and is essentially a mining district, containing valuable lead-mines, with some inconsiderable beds of coal, which present a conspicuous feature in the aspect of the country. There is little doubt that the future profession of the subject of this memoir was influenced by circumstances surrounding his birthplace. Mining was the chief occupation of the inhabitants of this and adjacent places, and some of the family connections of young Forster were remarkable for advanced skill and knowledge. One of these, a cousin of his father's, was Westgarth Forster, whose name became a sort of household word among North of England lead-miners from his having, in 1816, published a book called "A Section of the Strata from Cross Fell to Newcastle-on-Tyne," of which a second and greatly improved edition appeared in 1821. Another connection of the family named Westgarth had, so long ago as 1771, gained high commendation

for practical skill from no less an authority than Smeaton,[1] who for a time had charge of the mining district of Alston, and whose great, though by no means greatest work—the Nentforce Level—was being driven during all the years of young Forster's youth, at a distance of only 3 or 4 miles from his birthplace.

Mr. Forster, senior, having removed to Hebburn, near the mouth of the river Tyne, his son received a good ordinary education, and at the age of fifteen was apprenticed to Mr. Wade, one of the owners of Hebburn Colliery—of which the resident viewer at that time was Mr. Matthias Dunn. The head viewer was Mr. John Buddle, then, and for many years afterwards, known as the most eminent colliery viewer in the North of England. Of the opportunities thus afforded, young Forster made good use, and he had the further advantage of instruction from his relation, Westgarth Forster, to whom he always acknowledged a deep debt of gratitude. As a youth, he was strong, active, and willing, qualities which gained him the favour of influential friends. When little more than twenty years of age, he was appointed resident viewer at Walker Colliery, in Northumberland, in the immediate vicinity of Wallsend, the produce of which colliery was so famous. Two years afterwards he took a highly responsible position at Hetton Colliery, in the county of Durham, and in 1831 removed to Haswell, where he resided many years in a house built purposely for him, and in which he was as hearty and hospitable in his leisure hours as he was diligent in all his duties. These, it may be observed, were, even under ordinary circumstances, of a very arduous character, but the difficulties in sinking one of the principal shafts were greatly increased by an extraordinary influx of water from sand-beds lying under the magnesian limestone, so that, notwithstanding every exertion, it was deemed desirable to abandon the shaft and make a winning at another place. The position of chief viewer, which he now held, increased his field of duty, without in any way diminishing the actual labour for which he had been conspicuous. Rising at four in the morning was a usual practice, and his occupations day by day might justly be described as indefatigable.

When the wooden wagon-ways or railways, so long in use in the North of England colliery districts, were superseded by iron rails, and the modern system of locomotion came into use, Mr. Forster took an active part in laying out and constructing the Durham and Sunderland railway, and became connected with various collieries and other works, amongst which may be named

[1] *Vide* Reports of the late John Smeaton, F.R.S., vol. ii., p. 376.

the Belmont, Shincliffe, Shotton, Byers Green, and Scremerston collieries. He became Consulting Engineer to the Earl of Lonsdale, to Lord Boyne, and to other large owners of mineral property, and was connected with many of the most important and extensive mining works in the North of England. He became a Member of the Institution of Civil Engineers on the 16th of February, 1836, and was afterwards, from 1866 to 1869, President of the North of England Institute of Mining Engineers. Of these and other matters, of which the details possess chiefly a local interest, many particulars are given in an excellent Memoir in the pages of the Transactions of the last-named Institution.

The duties of a colliery viewer, in which Mr. Forster was so largely engaged, were such as none but the most vigorous and laborious men could execute. Sometimes at midnight, or at the early hours of two or three o'clock, he was subject to be called upon to travel many miles, to descend deep pits, to traverse underground works, and, not unfrequently, to penetrate into parts of a mine where nothing but the most careful judgment could preserve him from extreme risk of explosion or other accident. The commander, as it were, of many thousands of miners, he not only directed their labours, but gained their friendly confidence. In the mine he was thoroughly at home. He affected only such habits and modes of speech as were perfectly understood by the pitman; and to this peculiar tact his usefulness and success were in a great measure owing. In dealing with those of elevated rank, a respectful deference was never allowed to interfere with the most plain and freely spoken expression of opinion; and thus he maintained at all times a consistency of character, and a large amount of influence with all parties he met, or for whom he was concerned in professional business.

In 1846 Mr. Forster settled at Ellison Place, Newcastle-upon-Tyne, and here the remainder of his life was spent. Until about two years before his death he retained much of the activity of former years, though less called upon for extreme bodily exertion. He aimed steadily at improvement, and pursued with enthusiasm plans which appeared likely to be of use; he endeavoured to keep pace with a progress which in all matters of scientific import was more rapid than it had been in any former time. In 1866 he acted as one of the local Commissioners of Inquiry into the Produce and probable future Supply of Coal. His evidence, whether in Parliament or elsewhere, was always clear and straightforward, and if marked by a somewhat urgent manner and local mode of expression, yet it was much more strongly marked by a complete practical knowledge of his subject and by more than usual ability in making himself clearly under-

stood. He may be considered as having been, in his own department of engineering, one of the most earnest practical men who have been connected with this Institution. The work of a mining engineer, however arduous and however diligently performed, is not of a kind to present many salient features to public observation, but not less important, therefore, to the large manufacturing industries of this country and the domestic comforts of its inhabitants are the unseen, and, in a great measure, unknown labours by which large supplies of fuel are obtained from the bowels of the earth. It is, therefore, with more than common interest that an endeavour has been made to do honour to the memory of a distinguished member, who, by untiring industry, by constant adherence to duty, however difficult, and by blending practical skill with scientific research, has left an example worthy of being commended to all Engineers. All honour is due to such men, and accordingly prominence is here given to the name of Thomas Emerson Forster, as having united the special knowledge and practice of a colliery viewer with the general skill and varied experience of the Civil Engineer.

MR. GEORGE HARRISON, son of the late Joseph Harrison, of Birkenhead, was born in Liverpool on the 4th of June, 1815. He served his apprenticeship as an engineer with Messrs. Mather, Dixon, and Co., of Liverpool, and Messrs. Jones, of Newton-le-Willows, on the completion of which he went to France, and became the Locomotive Superintendent, at Paris, of the Paris and Rouen railway, on its opening in 1843; he remained there until his appointment as Locomotive and Carriage Superintendent of the Orleans and Bordeaux railway, which appointment he held until the revolution of 1848 compelled him to return to England. He afterwards became Locomotive Superintendent of the Scottish Central railway and of other lines in Scotland associated with it. In 1853 he was consulted by Messrs. Peto, Brassey, and Betts in reference to the construction of the locomotives for the Grand Trunk railway of Canada. He therefore visited Canada, and, upon his report, it was decided to establish works in England, in preference to Canada, for the purpose of constructing the locomotives and wrought-iron bridges; whereupon the Canada Works were founded at Birkenhead, with which he remained connected up to the time of his death. The great bridge over the river St. Lawrence at Montreal was made at these works, and since the completion of the Grank Trunk railway, works of a gigantic