

with Mr. Richardson.¹ In an interesting pamphlet,² written by the latter for private circulation, are given in detail the particulars of his connection with this arduous undertaking, which was successfully brought to a completion and opened in 1887.

Mr. Richardson was also Engineer to the Bristol Harbour Railway, constructed by the Great Western and the Bristol and Exeter Railways jointly, from Bristol Station to the quay near Hill's dry-dock. This line had heavy works the whole way, the first portion consisting of a viaduct on arches from Bristol Station to near Redcliffe Church, then a tunnel under the churchyard and Redcliffe Hill, and a bascule bridge over the lock between Bathurst Basin and the floating harbour. This bridge can be opened or shut in about thirty seconds, and an ingenious knee-lever arrangement was introduced, which relieves the axle of the bridge when a train is passing over. Mr. Richardson likewise prepared plans for the Exe Valley Railway, which fell through at the time, but has since been carried out. While he was engaged on the Bristol and South Wales Union line he noticed the excellent quality of the bricks made out of the clay in the cutting below Patchway Tunnel and erected works there at which some 200 hands are now employed, the output being about 12,000,000 annually. Mr. Richardson took the keenest interest in all that related to the profession. In later years he prepared several Papers: an account of the Severn Tunnel was read before the Clifton Scientific Club in 1887, and in the same year he gave a Paper on Arches to the Bristol Naturalists' Society, of which he was for many years President.³ Mr. Richardson's death, which took place on the 10th February, 1896, at the age of eighty-one, six days after a paralytic seizure, was a fitting close to a useful life. In temperament he was benevolent, genial, peaceful and contemplative, while his straightforwardness and honour were such as are rarely met with. His modest disposition prevented his being known to fame, and it was only those who were intimately acquainted with him who realised the nobility of his character. He was elected a Member on the 6th April, 1875.

GEORGE ROBERTSON, born on the 23rd July, 1830, was a son of the late Lord Benholme, and a grandson of the late Lord President Hope, Scotch judges of distinction. After being

¹ *Engineering*, vol. xxxiii. p. 48.

² This pamphlet is in the Library of the Institution.

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educated at Edinburgh Academy and the Civil Engineering College, Putney, he was articled in 1851 to the late Mr. George C. Dobson,¹ under whom he served on the Holyhead Harbour of Refuge works.² He then entered the office of the late Mr. James Meadows Rendel,³ and, subsequently, acted under Mr. Rendel on the London Docks extension works. An outcome of this was a Paper entitled "An Investigation into the Theory and Practice of Hydraulic Mortar, as made on the New Works of the London Dock Company, 1856-7,"⁴ which was read and discussed before the Institution in April, 1858, and obtained a Telford medal for its Author. Mr. Robertson then became associated with Sir A. M. Rendel, as Resident Engineer, in the construction of a large dry dock at Leith, and was subsequently engaged with him in designing and superintending the construction of the Albert and Edinburgh Docks and other works connected therewith at Leith. The plans for the Albert Dock were prepared in the year 1864; the dock was then immediately commenced, and was opened in July, 1869. Subsequently, also in conjunction with Sir A. M. Rendel, Mr. Robertson designed and superintended the construction of the Edinburgh Dock at Leith. His connection with Leith Docks was severed in the summer of 1883, when he gave up practice and settled in London. In the library of the Institution may be found two pamphlets he wrote on the works at Leith.⁵

In 1870 Mr. Robertson was sent out by the Secretary of State for India to examine and report on the formation of harbours in that empire. His exhaustive and valuable reports on this subject, as well as a pamphlet descriptive of Narrakal and Allippey as natural harbours of refuge on the Malabar coast,⁶ are preserved in the library of the Institution.

Mr. Robertson was in failing health for some years before his death, which took place at Cambridge Gardens, North Kensington, on the 7th February, 1896. He was a Fellow of the Royal Society of Edinburgh, and in 1867-68 was President of the Royal Scottish Society of Arts, to which he contributed several Papers.⁷ Mr. Robertson was a familiar figure at the Athenæum Club, of which he was for many years a member. He was elected an Associate of the Institution on the 3rd February, 1857, and was transferred to the class of Member on the 17th November, 1863.

¹ Minutes of Proceedings Inst. C.E., vol. xli. p. 214. ² *Ibid.*, vol. xlii. p. 95.

³ *Ibid.*, vol. xvi. p. 133.

⁴ *Ibid.*, vol. xvii. p. 410.

⁵ Tracts 8vo., vols. 136 and 142.

⁶ *Ibid.*, vol. 251.

⁷ Trans. Royal Scottish Society of Arts, vol. v. p. 195; vol. vi. pp. 25, 70 and 315; and vol. vii. pp. 39, 365 and 570.