

the river to such an extent that ships of the largest tonnage can sail up to the quays at Cork and discharge afloat at the jetties. His report to the Cork Harbour Commissioners, dated December 1871, bears record to the improvements made of late years in the navigation of the river Lee under his direction. Besides these works affecting the city, he built forty-eight bridges in the county of Cork during the time he was Surveyor. He was also Engineer-in-Chief of the Cork and Limerick Direct railway, and of the Rathkeale and Newcastle railway.

For the last two years of his life Sir John Benson was in very delicate health, brought on by excessive attention to his professional duties, and he was obliged to resign his appointment and retire from active work. He died at South Kensington, on the 17th of October, 1874.

Sir John was elected a Member of the Institution of Civil Engineers, on the 4th of March, 1862.

MR. GEORGE BLACK, the eldest son of Mr. James Black, the head of an old family in the county of Limerick, and lately of Tramore, in the county of Waterford, was born on the 4th of March, 1823, and passed his early years in France, his tutor being the Rev. Hugh Oxenham, then of Dinan. Afterwards, his education was matured at the college of St. Servan, under the immediate care of one of the professors, in whose house he resided. On leaving France, he adopted the profession of a civil engineer, and was articled to Mr. Joseph Mitchell, M. Inst. C.E. In 1846, Mr Black became an assistant on the Oxford, Worcester, and Wolverhampton railway, under the late Mr. Brunel, Vice-President Inst. C.E., where his genial disposition, zeal, intelligence, and assiduity made him a general favourite. Whilst thus employed he acquired much experience of detail in laying out the line in the valley of the Avon at its various points of crossing that stream, also in traversing, in the most judicious manner, the valuable and highly-cultivated garden ground at Evesham. This may have helped to guide his subsequent practice when dealing with larger rivers and less cultivated areas in Western America. The supervening dearth of employment in this country led Mr. Black to seek occupation abroad, and in 1851 he went to California, where he became largely engaged in the construction of roads, canals, and other works, and in the general practice of his profession. He was employed by Mr. Jos. P. Ronayne, M.P., M. Inst. C.E., first on the surveys, and subsequently as Resident Engineer, during the construction of the

works of the Sierra Nevada Water Company, for a period of nearly four years. Mr. Ronayne, on the 3rd of December, 1862, wrote to his father:—"While thus engaged with me he had the charge of the surveying, laying out, and the supervision during construction, of nearly 100 miles of main canal and branches, and the various works connected therewith, including roads, dams, aqueducts, &c.; the importance of some of the works upon which your son was engaged, and the arduous nature of the duties he had to perform, may be estimated from the fact that one reservoir alone contained over 350 acres of water, and was formed by the construction of an artificial dam nearly 100 feet high; and the works had to be laid out and constructed in mountains covered with snow in winter and through a region of dense brush and forest heretofore uninhabitable and unexplored, and in its natural state almost inaccessible. During the four years that your son was thus engaged, he gave me the greatest satisfaction, and I ever found him anxious, reliable, and conscientious in the discharge of his professional duties, while no terms would be too strong for me to express my high opinion of his honour, integrity, and general personal character."

Mr. Black wrote a pamphlet on the engineering operations of the Sierra Nevada. He was employed in works of importance in nearly every district of the Pacific coast. The Truckee Mining Ditch, one of the largest in California, the Donalme and Cloverdale railroad, the Cliff House Road, and many of the most important works of California were designed and wholly or partially executed by him. His sound, disinterested advice saved one company a large sum of money, for which he obtained from them a cordial and unanimous vote of thanks. His last letter home was dated June 27th, 1873, wherein he says:—"I am now engaged in making a report on the project of bringing water to this city (San Francisco), and latterly I have made a trip of 3,000 miles through the state of Oregon to report on railroads there, and on the practicability of connecting Oregon and San Francisco by railroad." Whilst thus in the midst of his active career, he was cut off on the 15th of August, 1873, after three days' illness, in the fifty-first year of his age. A local paper of San Francisco in recording the death of Mr. George Black, observed, "He justly held a foremost place among his professional brethren on this coast. An unsullied integrity, a chivalrous spirit of honour, and a warm heart marked the career of Mr. Black in life, and attached to him a numerous circle of friends who are left to regret his untimely death."

Mr. Black was elected a Member of the Institution of Civil Engineers on the 2nd of May, 1865, but his residence abroad prevented him from taking any personal part in its proceedings.

MR. JOHN D'URBAN HUGHES was born on the 11th of June, 1807. His father was a doctor in the army, and he was destined to follow the same profession; but showing a great distaste to this, it was decided he should enter as a combatant officer. Accordingly, in 1821 he joined the Royal Military Academy, Sandhurst, where he pursued his studies with untiring perseverance, displaying a decided aptitude for mathematics and scientific subjects. He passed the highest examinations at the college, and subsequently received a commission as Ensign in H.M. 91st Regiment of Highlanders. In 1825 he became Adjutant of the 92nd Gordon Highlanders, and continued in the regiment for three years, leaving the army in order to prepare himself for the more congenial profession of a civil engineer.

In 1838, having had previous experience on the Ottawa and Rideau canals, and on extensive Government surveys in Canada, Mr. Hughes was appointed to take charge as Resident Engineer of the construction of 26 miles of the Birmingham and Gloucester railway, including a cast-iron bridge over the Avon, near Tewkesbury, of three arches on cast-iron caisson foundations.¹ On completing this portion, the remaining length of 14 miles was placed under his management, including the Lickey incline, some heavy earthworks, and a tunnel $\frac{1}{4}$ mile in length. In 1844-5 he was employed as principal Engineer by the Birmingham and Gloucester Railway Company to make the surveys for an extension of their line. In 1845-6 he was occupied chiefly with Parliamentary business, and with the surveys for two new lines of railway. Afterwards he was during many years engaged for Messrs. Fox and Henderson, and for that firm had charge of the execution of several important works. Among others may be named the large iron roofs, timber sheds, and hammer shops, and the smitheries in H.M. dockyard, Pembroke; the water stations, engines, machinery, and iron roofs at terminal and intermediate stations, with the switches, crossings, turntables, &c., on the Lancaster and Carlisle, Caledonian, Scottish Central, and Scottish Midland railways; in 1849 of a cast-iron bridge on screw piles, on the Great Northern railway, and in the same year he was employed to report on the progress of the electric telegraph in England, for the information

¹ *Vide* Minutes of Proceedings Inst. C.E., vol. iii., p. 60.