At the time of his death Mr. Parkes was still acting as Consulting Engineer to the Madras Harbour Works, and was also the Engineering agent for the supply of wharf materials, dredging plant, &c., to the Kurrachee Port Trust for the inner improvement of the harbour.

He was elected an Associate of the Institution on the 3rd of February, 1846, and was transferred to the class of Members on the 17th of April, 1860. His sudden death from heart disease at his house at Surbiton caused the greatest sorrow, not only to his immediate relatives, but to a large circle of friends both in London and at Surbiton, where for many years he had taken a prominent part in the management of local affairs.

GEORGE HENRY PHIPPS, until within a very few years of his death one of the best known figures at the Institution, passed quietly away on the 11th December, 1888, at the ripe age of eighty-one. To the last he took the keenest interest in all that appertained to the profession of engineering, in which he was destined to see the rise and fruition of three distinct epochs. He began life at a period when the traditions of the older engineers of the Smeaton type still held full sway. His own active career was fulfilled in the middle period, which commenced with George Stephenson's first railway works, and ended with the death of Robert Stephenson—the eventful era of the English railway system. He yet lived to see, as an interested spectator, the full development of the third or modern period, when engineering has broken the bounds first imposed upon it as a craft restricted to the provision of means of communication, and has become one of the most diversified and wide-reaching of human vocations.

Mr. Phipps was born on the 27th of March, 1807. On completing his schooling, he was apprenticed to a firm of mechanical engineers in London. About the year 1828, he entered the locomotive works of Messrs. Robert Stephenson and Co., at Newcastle-on-Tyne, at that time busily engaged on the preliminary design of the famous "Rocket," which won the first prize at the Rainhill trials in October, 1829, and virtually decided the future of the locomotive-engine. The original rough sketch of the "Rocket" was chalked out on the floor of the drawing-office, at Newcastle, by Robert Stephenson and Mr. Phipps, and the latter took no inconsiderable part in the subsequent triumphs and disappointments that attended its realization before success was finally attained.

The Stephensons, father and son, but especially the latter, appear to have possessed a magnetic power of attracting to them, and retaining through life, the affectionate devotion of those whom they once employed; it is not therefore surprising to find Mr. Phipps' career intimately connected with that of Robert Stephenson. When the Act for the London and Birmingham Railway was obtained, Phipps followed his chief to London to assist in starting the works. "The great drawing-office at the Eyre Arms tavern, St. John's Wood, which was the headquarters of the railway company, has become classic in the history of modern engineering; for within its bare walls was located a staff of clever engineers, such as was probably never before, nor has been since, assembled at one time."[1] Mr. Phipps was one of them. His special branch was the designing of bridges, and working out of calculations, for which his mathematical powers peculiarly fitted him. When all was ready for beginning the construction, he requested that a district might be assigned to him where there was heavy work. In accordance with this desire, Robert Stephenson posted him to the Roade and Kilsby section, including the Blisworth cutting, Stow Hill tunnel, Weedon viaduct, and the heavy work through the Government ground at Weedon, but not the Kilsby tunnel. On the opening of the London and Birmingham Railway, and the consequent dispersal of the construction staff, Mr. Phipps was for two years an assistant of Mr. Brunel. He then became manager of the factory of Messrs. Alexander, Gordon, and Co., who executed a large amount of ironwork for lighthouses and beacons for the Trinity Corporation, of Deptford-le-Strond. Notable among these works were the cast-iron columns and wrought-iron bracing of the Maplin Sands lighthouse, on the estuary of the Thames. This lighthouse was remarkable as constituting the first successful application of Mitchell's screw-piles to submarine foundations. The firm also executed, during Mr. Phipps' managership, the cast-iron work for the celebrated Wolf Rock beacon, which preceded the existing granite lighthouse. On the closing of the Deptford foundry, Mr. Phipps again became associated with Mr. Stephenson, and for him made, in conjunction with Mr. George Berkley, a series of experiments and examinations of the deep wells of Liverpool, in reference to the water-supply of that city. Mr. Phipps was next engaged in conjunction with Mr. M. A. Borthwick, who was acting for Mr. Stephenson on works in Egypt, besides being himself concerned in numerous railway

[1] Minutes of Proceedings, Inst. C.E., vol. lvii. p. 297.

projects at home, at the busy time of the railway mania, when Mr. Borthwick had in one session, 1844–45, as many as twenty-two sets of plans and sections deposited. In 1852 Mr. Phipps became Engineer-in-Chief of the Western Railway of Switzerland, a line from Morges to Lausanne, and thence to Yverdun, his friend Mr. J. M. Heppel going out to superintend the works. He also, in conjunction with that accomplished engineer, made designs for the Carlisle Bridge, Dublin, in a well-known competition; and also for the bridge over the Brisbane, the metropolitan river of Queensland. The last engineering work in which Mr. Phipps was engaged, was the assisting of Mr. Robert Stephenson to remodel the historic cast-iron bridge over the Wear, at Sunderland. This interesting operation was carried to completion by Mr. Phipps, who fully described the work in the course of a series of lectures delivered before the School of Military Engineering, at Chatham, in 1873.

With the death of Robert Stephenson, Mr. Phipps' active career was brought to a close, although he was destined to survive his friend nearly thirty years. Having achieved a competence, he was able to lead a life of leisure, varied by occasional reports on matters wherein his opinion was sought; but for the most part devoting himself to the study of various recondite problems of engineering science. The movement of floating bodies, and the many elements affecting the propulsion of ships, were subjects to which he paid great attention; as were also the fundamental considerations determining the design of iron structures. Mr. Phipps was, however, a thoroughly "all-round" man, there being but few departments of engineering in which he was not an expert, as may be judged from his having been chosen to deliver the series of lectures on "Practical Engineering," at the Chatham Military School before referred to. He was a most indefatigable attendant at the meetings of the Institution, of which he was elected a Member on the 14th of April, 1840, and until a short period before his death, took a keen interest in the discussions, in which he was a recognized and respected participator. In addition to his important paper "On the Resistances to Bodies passing through Water,"[1] for which he received a Telford Medal and Premium in 1864, his contributions to the discussions occupy for citation alone a space of no less than three pages of the subject-matter index to the first fifty-eight volumes of Proceedings, while many of his later utterances are not recorded in that volume. His activity in this

[1] Minutes of Proceedings Inst. C.E., vol. xxiii. p. 321.

respect ranged over the whole field of modern engineering, the experience accumulated in his long career, coupled with his extensive and profound reading, conducing to render his participation in the debates of much value and interest.

BENJAMIN PIERCY was born at Trefeglwys, Montgomeryshire, on the 16th of March, 1827. He was the third son of Mr. Robert Piercy, who was well known in the counties of Montgomery, Denbigh and Flint as commissioner, valuer and surveyor in the inclosure of commons and waste lands, and who was also extensively engaged in the construction of public roads and other works, and in surveys and valuations under the Poor Law and Tithe-Commutation Acts. Mr. Benjamin Piercy, who was educated privately, at an early age entered his father's office, and soon became actively engaged upon important surveys and other work of varied description. About 1847, he became chief assistant to the late Mr. Charles Mickleburgh of Montgomery, who had a large practice as surveyor, land-agent and inclosure-commissioner, with whom he remained four or five years. During this period, as well as during the time passed in his father's office, Mr. Piercy devoted the whole of his leisure to the study of civil engineering and general railway practice. He had had the opportunity of travelling through every part of Wales, and had noted the necessity which existed for the establishment there of railway communication. He had not long to wait for an opportunity of participating in active work. The late Mr. Henry Robertson,[1] sometime M.P. for Shrewsbury, and subsequently for the county of Merioneth, engaged Mr. Piercy to assist him in making the parliamentary surveys for the Shrewsbury and Chester Railway. So much energy and attention did Mr. Piercy devote to the work, that he was the means of preventing the loss of a year in obtaining the Act for that line. He was afterwards employed under Mr. Robertson upon the plans and sections for the first Bill for a railway from Oswestry to Newtown; that Bill was not passed. Application was made to Parliament in a subsequent session, and Mr. Piercy was again engaged in the engineering, but upon that occasion, too, the Bill was not passed. It was in 1852, when he became the Engineer for the Red Valley Railway Bill for constructing a line from Shrewsbury to Minsterley

[1] Minutes of Proceedings Inst. C.E., vol. xciii. p. 488.