

result he never personally took up the appointment, preferring to remain at home as the London representative of the firm in which he was a partner, namely, Messrs. James Flower and Sons, Mechanical Engineers, largely occupied in the construction and importation of machinery for gold-mining. He was thus occupied until the spring of 1888, when, owing to some misunderstanding with the Cape banks, the firm were obliged temporarily to suspend payment, being at the time in the full swing of business. This untoward event caused a shock from which Mr. Flower never recovered, and he died broken-hearted on the 12th of April, 1888.

Mr. Flower was elected an Associate of the Institution on the 2nd of December, 1873, and was transferred to the class of Associate Members on the separation of the former grade into two divisions.

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SAMUEL HARPUR was born at Derby on the 1st of March, 1820. At the age of seventeen he was articled to Mr. Samuel Henry Oakes, a civil engineer, whose daughter he subsequently married.

In 1841, shortly after completing his pupilage, he was appointed Borough Surveyor of Derby, where he carried out some important engineering works, amongst them the construction of the Flood-sewers and Main-drainage of the town, also the erection of a bridge across the Derwent. In 1846, while at Derby, he invented and first used the transverse invert-bricks, now so generally employed in the construction of sewers.

In 1851 he resigned his appointment at Derby, in order to become Managing Partner in the firm of Thomlinson, Harpur and Harpur, Contractors. Among the works carried out by him in that capacity were: The main drainage and waterworks at Ashby-de-la-Zouch; the Thornton Reservoir of the Leicester waterworks; the main drainage and sewage-disposal works of the City of Coventry; sewerage works at Burslem, and sewerage and sewage-disposal works at Cheltenham. These contracts occupied him until the year 1859, when he removed to Merthyr Tydfil, his firm having taken the contract for the construction of the filter-beds, depositing-tanks, pure-water reservoirs, engine-house, and erection of pumping-machinery, as a portion of the scheme for supplying the district of Merthyr with water. With that contract began Mr. Harpur's connection with Merthyr Tydfil, and it became the means of the firm acquiring other work in the neighbourhood. On the failure of the original contractors for the construction of the storage-reservoir at Pentwyn, also in connection with the Merthyr waterworks, the,

contract was given to Mr. Harpur, who carried it to completion in a satisfactory manner. The whole of the foregoing works were executed under the personal supervision and instructions of Mr. Harpur, his two partners seldom visiting the works.

In consequence of serious difficulties encountered in the construction of the Pentwyn Reservoir, Mr. Harpur sustained heavy pecuniary losses, and as a result, on the completion of his contracts for these works in 1862, he severed his connection with the firm of Thomlinson, Harpur and Harpur, and resumed the profession of a civil engineer. About this time the appointment of Engineer and Surveyor to the Merthyr Tydfil Local Board became vacant, and Mr. Harpur applied for the post, to which he was unanimously elected. The district of the Board was at that time in a lamentably unsanitary condition, the registered death-rate being upwards of 30 per 1,000. Mr. Harpur immediately set to work with a determination to improve the health of the locality. Under his directions the water-supply was at once extended to the outlying districts, and as the water came to be used by the inhabitants generally, the necessity for a proper system of drainage became more and more apparent. Mr. Harpur thereupon prepared a scheme of sewerage for the district, and for disposing of the sewage by irrigation. The Board, however, after lengthy discussions, decided to carry out the sewerage scheme only, leaving the matter of the ultimate disposal of the sewage for further consideration, and in the meantime to discharge the sewage into the Taff. The contract for the complete sewerage of the district was let, and the work carried out in 1868-9. Scarcely, however, had the sewers been completed, when a Chancery injunction was obtained against the Board, restraining them from discharging sewage into the river. The Board were now forced to face the question of properly deodorizing and disposing of the sewage, and ultimately decided to adopt Mr. Harpur's amended scheme of irrigation. Some of the lands selected for irrigation purposes were situated at a distance of 10 or 11 miles from Merthyr, and the line of the outfall sewer lay in places through very precipitous ground, crossed in numerous instances by deep ravines. In surmounting these, Mr. Harpur introduced a new feature in sewer-construction. Instead of following the contour of the ground, or siphoning under the depressions, he carried the sewer over by means of timber tubes supported on stone piers, the tubes being formed in segmental sections, banded together by iron straps. This mode of construction has proved highly satisfactory, and the traveller on the Taff Vale Railway cannot but be struck by the novel features presented in numerous

places by these tubes. Subsequently to the completion of the Merthyr Outfall Sewer, and when the lands of the Merthyr Local Board were being prepared for the reception of the sewage, the Merthyr Board arranged with the neighbouring Local Boards of Aberdare and Mountain Ash to treat the sewage of those districts on their land, and Mr. Harpur was engaged by those Boards as Consulting Engineer to carry out the work. The lands for irrigating the sewage of these three districts (some 400 acres in extent) were ultimately laid out by Mr. Harpur, and are now accomplishing all the objects which were sought to be attained, and are yielding a profit on working expenses. Upon the delivery of sewage from Aberdare and Mountain Ash on to the farm, the three Local Boards became joint-owners, and the farms were invested in a Committee representative of the three Boards, entitled the "Merthyr and Aberdare Joint Sewage-Farms Committee." To this body Mr. Harpur continued to act as Engineer up to the time of his death.

In 1885, failing health compelled Mr. Harpur to resign his appointment under the Merthyr Local Board, but latterly his health had to outward appearance very much improved, and his death came at last very suddenly, on the 10th of November, 1888, after an illness of only five days' duration.

He was elected an Associate of the Institution on the 6th of May, 1873, and was transferred to the class of Associate Members on the formation of the latter grade.

Mr. Harpur was a man of great reserve; he was earnest, conscientious, and upright in his dealings with all men, and scrupulously straightforward and impartial in the conduct of his business; he was, moreover, very unpretentious in his manner, would never push himself forward in any way, and a marked trait in his character was a want of ambition. From his long experience in sanitary engineering, his advice and assistance was frequently sought, and he was often engaged as a witness in Parliament and elsewhere upon sanitary matters, though seldom seeking such engagements.

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ERNEST FREDERIC MORANT, son of Mr. John Edward Morant-Gale, was born on the 29th of July, 1849, at Upham, in Hampshire. He was educated for the Indian Civil Service, but on reaching full age he resolved to try the more adventurous life of a sheep-farmer in Uruguay. Like many others, he was unfortunate,