

ment. He also acted as Commissioner for the Russian Government at the International Exhibition of 1874, in commemoration of which he received a bronze medal from the Prince of Wales. On his return to Russia, Colonel Greck accepted an appointment as Assistant to the Chief Engineer of the Petersburg-Moscow Railway, which post he resigned in 1884 to become Chief Engineer to the Moscow-Taroslav Railway. This line was never in such good order as when under his control, and his last work, which was completed about a month before his decease, was the construction of a culvert so skilfully executed that the traffic of the line was not once interrupted. His death, which took place on the 9th of May, 1888, at Moscow, was caused by an attack of scarlet fever, accompanied by a paralytic stroke.

Colonel Greck, by his upright and honourable conduct, won the respect and esteem of all who served with him. His domestic relations were exemplary, and he leaves a widow and three children to mourn their loss.

He was elected a Member of the Institution on the 2nd of February, 1869.

THOMAS ELLIOT HARRISON was born on the 4th of April, 1808, at North End in the parish of Fulham. His father, William Harrison, at that time held an appointment in Somerset House, but soon afterwards migrated with his family to Sunderland, where he started business as a ship-builder (on the site of the large works on the Wear, now so successfully carried on by Mr. James Laing), and he also promoted several local railway lines, constructed mainly for the conveyance of coal and lime.

Mr. Thos. E. Harrison, although not actually born in the North of England, was always strongly attached to the Sunderland district, and during nearly the whole of his long and eventful career he made it his home. He was educated at the Grammar School at Houghton-le-Spring, in the county of Durham, which school became rather celebrated as the place of education of several men of mark belonging to the North of England and to Scotland. At the early age of sixteen he left school to serve a pupilage under the late Mr. William Chapman, a civil engineer who then had an important local practice, and whose chief work at that time was the construction of Seaham Docks, in the neighbourhood of Lord Londonderry's collieries. There the young engineer gained his first knowledge of dock construction, and became familiar with the mechanical appliances for shipping coal. He

proved himself a most honest and energetic pupil, and tradition yet lingers, after a lapse of over three score years, of his devotion to his work, and of his indefatigable efforts to perfect his knowledge, both in the theory and practice of every detail of the profession. He became a thoroughly good engineering draughtsman, and also obtained considerable skill in freehand drawing, as shown by several sketches which still remain in the possession of the family.

On the completion of his pupilage in 1829, he determined to visit London, where he foresaw that the introduction of railways, which were then beginning to develop into a practical form, might open out for him a promising career. Armed with one letter only—but this letter to a man at the head of the profession—he started for London sanguine in his expectations and confident in his own capabilities, when on arrival he received a check which sadly damped his youthful ardour.

This event is best told in his own words, taken from his address as President of the Institution, in 1873, when he said:¹ “In my own case, after completing my term of pupilage under the late Mr. W. Chapman, I came to London to seek employment, bringing a letter of introduction from that gentleman to Mr. Telford. He received me most kindly, and when I had explained the object of my visit, he said, ‘Young man, you have made a great mistake in choosing civil engineering for your profession, and the sooner you turn your attention to something else the better, for there are very few who rise to eminence; all the work is centred in them, and the rest have little or nothing to do.’ For twelve months I was cast down, and thought what he said was only too true.”

Discouraged in this first attempt to get his foot on the professional ladder, he determined to wait, but he equally determined not to waste his time in idleness. He was received in the office of a friend of his father’s, an accountant, where the young man was thoroughly grounded in all the details of an accountant’s business. After twelve months of this training, he acquired a proficiency in unravelling complicated accounts which served him well in later years. In fact, he often said that he looked upon this year’s work as one of the most useful experiences of his life, and one which, in investigating railway accounts, and in arbitrating on the financial disputes of rival companies, he regarded as simply invaluable. There is little doubt that the frequency with which his services were sought as an arbitrator was almost as much owing to his clear and rapid grasp of all accounts laid before him, as to

¹ Minutes of Proceedings Inst. C.E., vol. xxxvii. p. 226.

his great experience in all railway matters, the soundness of his judgment, and the indisputable fairness of his awards.

He now formed his first acquaintance with Mr. Robert Stephenson, which afterwards ripened into a firm and life-long friendship. In 1830, Mr. Harrison, then a young man of twenty-two, was employed on his first railway work by Stephenson, in preparing parliamentary plans and sections from Wolverton to Rugby, on the London and Birmingham Railway, the Bill for which was, however, in the following year, thrown out by the House of Lords. In 1831, he was again sent by Stephenson to prepare plans in the same neighbourhood. In 1832, the Bill was passed for this line, which now forms a portion of the London and North Western Railway. During these two years his work was always characterized by its great accuracy, and every task entrusted to him was certain to be completed in a conscientious manner. In all he did, he was essentially "thorough," and this was the main feature which marked Mr. Harrison's whole life, and, to a great extent, formed the secret of his success. In any undertaking carried on under his supervision, he could honestly feel that no effort on his part had been wanting to ensure it against failure.

He might have continued in the South engaged in this class of work had he chosen to do so, but a more promising opening now presented itself in the North. It appears that his father, in conjunction with a few other influential men, was then promoting a line known as the Stanhope and Tyne Railway, which was to be formed for the conveyance of minerals from the interior of the county of Durham to the Tyneside. Mr. Robert Stephenson was retained as consulting engineer, but Mr. Harrison was offered and accepted the appointment of engineer, and practically had the sole charge of all the operations. The construction of this railway proved to be a very important feature in his life. It formed, as it were, the foreshadowing of his whole future; it developed and first brought into play all his latent abilities; and it proved for him the commencement of a long and successful career in the North. This was the first of many railways constructed by him, which eventually became linked together, so as to form one great system, now known as the North Eastern Railway. For these reasons it may be well to make a few remarks on this proposed line, as the period of its construction formed such a memorable epoch in the life of Mr. Harrison.

The Stanhope and Tyne was one of the earliest railways in the North of England. It provided the means of communication between the ironworks at Consett and the colliery districts of

Medomsley and Pontop, and the River Tyne at South Shields. It entailed the construction of over 30 miles of railway through a heavy undulating country, and also of a river-wall or quay, and loading-jetties on the Tyne. No parliamentary sanction was required (Parliamentary Bills for railways being at that time unknown in the North of England), railways being then constructed by private arrangements with the landowners, with payments to them for way-leaves. Large ravines or gills (as they are termed in that district) had to be crossed, but the promoters had no adequate funds for the erection of the viaducts necessary to span these valleys. To overcome this difficulty, a series of rope-inclines, some worked by stationary engines and others self-acting, had to be constructed. In those days there were few, if any, precedents for such a railway; consequently, everything referring to the construction and equipment of the line, and every detail in connection with the working of the inclines, the shipment of the coal, and the construction of the quay, were left for the engineer to design and execute. All these details were successfully carried out, and with so high a regard to economical working that from that time Mr. Harrison began to be looked upon as a rising practical engineer. There is no doubt it was the experience gained here, and his having been thrown so entirely on his own resources as a young man, that first gave him that thorough knowledge of detail which served him so well in later years.

Before the completion of this line in 1834, Mr. Harrison was engaged in the construction of a railway between Pensher and Usworth, which, at a later period became, and for many years afterwards was used as a portion of the main line of the North Eastern Railway. The erection of the Victoria Bridge over the River Wear formed a remarkable feature on this line. This bridge was built in solid ashlar masonry, and consisted of several large arches, the central one having a span of 160 feet, the height of the bridge above the foundations being 170 feet. Not only was this the first individual work of magnitude designed and carried out by Mr. Harrison, but at that time it was considered the finest railway-bridge in the North, and was deservedly looked upon as a triumph of engineering skill. It was completed during the year of the Queen's accession (hence its name), and the railway was finally opened in 1838. Immediately afterwards, Mr. Harrison started with the construction of a line from Darlington to Pensher, which formed the last connecting link between London and Newcastle.

In 1845, Mr. Harrison, still associated with Mr. Robert Stephenson, was engaged in the construction of the main line from New-

castle to Berwick. This railway formed the occasion of a memorable parliamentary fight between Stephenson and his locomotive on the one side, and Brunel with his atmospheric railway on the other, which fortunately ended in the victory of the former, when the line was at once proceeded with, and was carried out by Mr. Harrison. The Royal Border Bridge over the Tweed at Berwick,¹ of which Sir George B. Bruce, now President of the Institution, was the Resident Engineer, was the main feature of the line. The High Level Bridge at Newcastle was completed in 1849. Mr. Robert Stephenson was the Engineer, but there is no doubt that Mr. Harrison equally shares with him all the honours of this great work. It was then considered a marvel of engineering design, and is still regarded with just pride by all the inhabitants of the North.

On the opening of the line to Berwick in 1849, Mr. Stephenson retired from active service in the North, and Mr. Harrison was appointed Chief Engineer to the York, Newcastle, and Berwick Railway, which included most of the existing railways in the counties of Durham and Northumberland. It was during this period that he constructed the Berwick and Kelso, and also the Durham and Bishop Auckland Railways.

Great dissatisfaction having at this time arisen amongst the shareholders of the York, Newcastle and Berwick Railway, as to its management under the Chairmanship of Mr. Hudson, a Committee was appointed in 1849 to investigate fully into the affairs of the Company. It is unnecessary to refer to that inquiry except as it bears on Mr. Harrison, and it is still more unnecessary to say that throughout the inquiry not a shadow ever rested upon him either personally or professionally. On the contrary, the Committee soon discovered the kind of man with whom they had to deal as the Company's Engineer, and amongst various matters on which they consulted him they asked him to report specially on the important question of the renewal and maintenance of the permanent way and rolling-stock. This Mr. Harrison did in the most elaborate and exhaustive manner, and in a form which it is believed no engineer had previously attempted. These reports were presented to the shareholders, and in doing so the Committee used the following words:—"The reports by Mr. Harrison are so minute, clear, and convincing, and bear such internal evidence of honesty of purpose, and that the writer was fully competent to deal with his subject, that the Committee feel that it would be a work of supererogation for them to say more than that the

¹ Minutes of Proceedings Inst. C.E., vol. x. p. 219.

plan proposed, as a great experiment in the right direction, meets cordially with their approval."

After the Committee had finished their labours, a new Board of Directors was constituted, and one of the first points to which their attention was turned was the future management of the Company. Affairs were in a most critical position, and much required to be done to bring them into order. Various suggestions were considered, but ultimately the Directors came to the conclusion that in Mr. Harrison they had the man they wanted to take the entire charge of the Company's affairs. In the report to the shareholders (August 1850) they stated that "after most mature consideration they had come to the conclusion that it would be for the interest of the Company not only to secure the continuance of Mr. Harrison's services as Engineer, but at the same time to vest in him the supervision of its general business, and they have made arrangements with him accordingly. The Directors entertain the highest opinion both of the ability and integrity of Mr. Harrison, and, looking to his thorough knowledge of the whole affairs of the Company, and his intimate acquaintance with the business of the district, they believe that much advantage will arise from this arrangement." Mr. Leeman, who was then Chairman, in addressing the shareholders, added that "it was absolutely necessary to have a master-mind to superintend generally the affairs of the Company," "and that Mr. Harrison, with his intimate knowledge of all its affairs, was the man to whom they could entrust this duty."

In 1852 Mr. Harrison took a leading part in the negotiations for bringing about a union between the York, Newcastle and Berwick, the York and North Midland, and the Leeds Northern Railways, which resulted, in 1854, in the legal formation of the North Eastern Railway Company. This was one of the most important railway amalgamations which had then been effected, and the preliminary negotiations were necessarily of the most difficult and intricate nature. There is no doubt it was mainly through Mr. Harrison's influence and ability that these difficulties were overcome and the various conflicting interests reconciled. It was with great satisfaction, therefore, that he at last saw the three Companies fused into one harmonious whole, and a large and powerful Company formed, which, while it has proved highly beneficial to its proprietors, has at the same time contributed in no small degree to the prosperity and development of the trade and commerce of the entire North Eastern district. It may be added that the principle on which the above amalgamation was based was novel, and has formed a precedent for subsequent railway unions.

An important work, undertaken at this time by Mr. Harrison, was the construction of the Tyne Dock at South Shields. So long ago as 1847, the York, Newcastle, and Berwick Railway Company had obtained a Bill, and had even let the contract for the construction of this dock. But the state of the Company's affairs in 1849 put an end to further proceedings, so that in 1850 the contract was rescinded. After the amalgamation, Mr. Harrison again brought forward this scheme, and while showing how absolutely necessary an improved method of shipping coal in the Tyne had become, he produced careful estimates to prove not only that the dock would directly pay, by improving the trade of the district, but would also on its own merits become a commercial success. Accordingly the Company applied for a new Bill, and in spite of a strong opposition from the Admiralty, who endeavoured to prove that this dock would injure the navigation of the River Tyne, the Act was passed in 1854. The site of the dock was an area of unreclaimed land, in fact a large mud-bank known as Jarrow Slake. Its construction presented considerable engineering difficulty from the soft nature of the foundations; but the work, which was commenced in 1855, was successfully completed in 1859. In this work, Mr. Harrison carried out various improvements in connection with the shipment of coal, and also introduced the employment of hydraulic power for opening the lock-gates. On the occasion of the opening of the Tyne Dock, the Directors, at a dinner at Newcastle, presented him with a valuable service of plate, in testimony of their appreciation of his services. A full account of this dock and of the appliances for loading coal was given by him in a Paper read before the Institution.¹ It may be stated that his anticipations as to the success of this dock were fully realized.

A railway to shorten and improve the connection between Hull and Doncaster was completed by him in 1869. This line included the construction of a swing-bridge over the Ouse at Goole; the opening girder was 250 feet in length and weighed 670 tons, and, swinging on a central pier, was turned by hydraulic machinery. This bridge attracted considerable attention at the time, owing to its novel construction and to the ease and rapidity with which it was turned. The Government Inspector in his report stated that it was the most perfect structure of the kind ever erected. A few years afterwards Mr. Harrison erected another bridge of the same description over the Ouse near York, in connection with an

¹ Minutes of Proceedings Inst. C.E., vol. xviii. p. 490.

improvement of the East Coast main line from London to Scotland, and at the time of his death he was designing a third bridge in substitution for the existing one over the same river at Selby.

The erection of the large, commodious, and handsome new station at York, with a short curve line, completed in 1877, was a work of which he was justly proud, and any one who remembers the old low-roofed station, its inconvenient approaches, and the manner in which all trains had to be backed out, will fully appreciate the great improvement thereby effected, though few will know the immense time and trouble Mr. Harrison devoted to the matter. One of Mr. Harrison's strongest points was in arranging the details of stations and station-yards, so as to meet the requirements of traffic. On this subject he was largely consulted by other Companies, and after the opening of York station he prepared for the Caledonian Railway the plans for a proposed new station at Perth, and for some time before his death he had devoted much time and labour in maturing plans for a considerable extension of the central station at Newcastle.

During the past quarter of a century many lines were constructed by Mr. Harrison for the North Eastern Railway Company, the last being that from Alnwick to Cornhill, 34 miles in length. In addition to these railways he carried out for the same Company the construction of large docks at Hartlepool and an extension of that at Middlesborough, and it may be said that the last duty assigned to him by the Directors was to prepare a report on deepening and improving the entrance to the Tyne Dock. All these works bear the impress of his "thorough" character, and are distinguished by the soundness of their design and the solidity of their construction.

But Mr. Harrison by no means confined his thoughts solely to works of construction. He devoted the most constant attention to the duties of locomotive superintendent, more especially in his earlier days, when he had the charge of this department, as well as of the permanent way and new works. So far back as 1837 he gave, at the request of the President, some information to the Institution¹ on the locomotive-engines used on the Stanhope and Tyne Railway, and seemed satisfied with the result that they maintained a rate of 10 miles an hour with their full complement of loaded wagons. While engineer to the York, Newcastle, and Berwick Railway he introduced a systematic method of keeping records of the running of all locomotives and wagons. His report

¹ Minutes of Proceedings Inst. C.E., vol. i. (1837), p. 38.

on the rolling stock of that Company, presented to the Committee of Investigation in 1849, already alluded to, showed the perfection to which he had carried the system, and was most favourably commented on at the time. These results, carried to a later date, appeared in the Proceedings of the Institution in the session 1864-65.¹

Mr. Harrison's time was also much occupied in the study of permanent-way materials, and more particularly of the manufacture of rails, which formed such an important industry in the North Eastern district. In later years the manufacture of steel in the Middlesborough district was a matter of much interest to him, not only as tending to develop the trade of the district, but as furnishing material for an improved road. The use of steel sleepers also latterly engaged much of his attention.

Towards all appliances for the safety of passengers his thoughts were continually turned, and nothing roused his indignation more than any remark about the amount of the dividend being a matter of more vital importance to Railway Directors than the safety of passengers. He alludes to this topic in his address as President, when he says: so far from "economy governing the actions of Directors, I say, from my own experience, that when it is clearly shown to them, by their responsible officers, that the adoption of any improvement will tend to promote the safety of the public, they do not hesitate to adopt it."² There is no doubt that Mr. Harrison had thoroughly mastered the study of all appliances which concerned the safe working of railways, and he suggested improvements in the system of interlocking points and signals, which have been largely adopted. He also devoted much time to the study of automatic brakes, and eventually became a great advocate for the Westinghouse brake. He suggested several improvements, in connection with the triple valve and the couplings, which were utilized and much appreciated by Mr. Westinghouse.

From this slight sketch of Mr. Harrison's connection with the North Eastern Railway it will be seen that, as Engineer to that Company, he held no ordinary position. He was a "railway man," in the fullest and widest acceptation of the term, and possessed a complete knowledge of every detail of railway work. He had thoroughly mastered the various branches of civil engineering and general management, by a process the most complete in existence, viz., that by which he was compelled to overcome each

¹ Minutes of Proceedings Inst. C.E., vol. xxiv. p. 491.

² *Ibid.*, vol. xxxvii. p. 240.

difficulty as it arose, and to work out from the beginning, by his own unaided exertions, the details of each department. It was thus that he acquired the rudiments of his future vast experience. It may be well imagined that this practical knowledge, combined with his shrewd common-sense, and thorough honesty of purpose, caused him to become the friend and adviser of the Directors. By the successive Chairmen of the Company he was held in the highest esteem, and by none more than by the late Sir Harry S. Meysey-Thompson, who occupied the Chair from 1855 to 1874, during which period many important amalgamations, arrangements and works were carried out, on all of which the advice of Mr. Harrison was invariably sought and relied on. Mr. John Dent Dent, the present Chairman of the North Eastern Railway, thus writes:—

“I dare not then have undertaken the responsibility of accepting the chairmanship had it not been for the confidence with which Mr. Harrison inspired me. To myself, as well as to every other Director, he was ever ready to impart information from his vast store of knowledge of North Eastern affairs. His eminent professional skill, his indefatigable industry, his sound, sturdy north-country sense, added to the transparent honesty of his character, gave a weight to his opinions that made itself felt in all our deliberations. He knew thoroughly not only the history of the Company, but of all the trades of the district, and invariably took a liberal view of the policy we ought to pursue, and the reasons he adduced for his opinions were so sound that for the most part his decisions were acquiesced in unanimously. To his other qualities you must add a singularly kind and affectionate disposition which underlay the somewhat forcible style that occasionally awed those who did not know him. All the Directors, old and young, felt the same affectionate respect for him, and I believe there has seldom been any public servant who exercised so powerful and so deserved an influence over the policy of a company as Mr. Harrison.”

For some years he had an office in Westminster, and, in a very short time, without an effort, acquired a large and lucrative private business. As a parliamentary witness his services were much sought after, and his evidence was always listened to with respect, as coming from a man who had thoroughly mastered the subject. His straightforward answers, his frank look, his impressive and dignified bearing, acted as a counterfoil to the sharpest cross-examinations of opposing counsel. No consideration could ever induce him to enter a witness-box unless he was satisfied with the goodness of the cause which he advocated; and there is no doubt that this fact, as it became more widely known, added greatly to

the weight of his evidence, and acquired for him the not inappropriate sobriquet of "Honest Tom."

As an arbitrator, on account of his vast experience, his sound judgment, and his unimpeachable integrity, Mr. Harrison's services were in constant request. A reference to his private papers shows that at one time or another he was consulted by nearly every railway company in Great Britain and Ireland. In 1881, Mr. Barlow, Mr. (now Sir John) Fowler, and Mr. Harrison, representing respectively the Midland, the Great Northern, and the North Eastern Railway Companies, were requested to report as to the practicability of erecting a bridge over the Firth of Forth near Queensferry; and the design, now being carried out by Sir John Fowler and Mr. Baker, was ultimately jointly recommended by them as fully adequate for the purpose. In the details of the erection of this bridge Mr. Harrison always took the deepest interest, and he visited the works three or four times a year.

Mr. Harrison was appointed a member of the Royal Commission for the Water-supply of London, 1867-69, and of the Royal Commission on railway accidents in 1874. He also acted as arbitrator during some of the negotiations between the telegraph companies and the Post Office.

Mr. Harrison became a Member of the Institution in 1834, and he was President in 1873, when he delivered an address, containing advice and encouragement to the younger members of the profession. At the annual dinner in 1874 Lord Granville, when proposing his health, paid him a well-deserved compliment, saying: "It would be idle of me to talk to you of a man whom you know better than I do, and I can say I have known him nearly a quarter of a century, and, happening once to speak of him to one of the most cautious of your body (Sir William Cubitt), I said, 'Am I right in having consulted Mr. Harrison?' Sir William replied, 'All I can say is, that Tom Harrison is one of the soundest and most honest men I ever knew.'" This sentiment will be fully endorsed by all who knew or came in contact with him.

Mr. Harrison's home life, in the northern village of Whitburn, with all his "cares of office" laid aside, and surrounded by his children and grandchildren, formed a picture of almost ideal happiness. It may not be out of place to quote a letter on this subject, written by a well-known member of the Institution, whose professional acquaintance with Mr. Harrison afterwards ripened into a firm and lasting friendship. The letter is as follows:—

"In reference to our dear friend, Thomas Elliot Harrison, it was my privilege with my firm to carry out large works under

his instructions, and I may truly say that I have never, in all my experience, met with any man who more thoroughly commanded respect and confidence, not only for his very great experience and knowledge of his profession, but also for his innate sense of justice and love of truth and honesty. Earnest and great as he was in his professional life, he was, to my mind, even greater in his pure and holy home life, looked up to and beloved by all around and about him, a man among men, and a child among children. You and I know how charming it was to see him in their midst, always full of loving sympathy, and taking the greatest possible delight and interest in all their engagements as well as their work. Taking him, all in all, I have never met with such a man, or one whose example and footsteps any of us might so well profit by and wish to follow."

During the five months of each year that he resided in London, Mr. Harrison made constant journeys to the North; but, for the most part, he left the carrying out of the constructive portion of the North Eastern work under the charge of his brother-in-law, the late Mr. Robert Hodgson, M. Inst. C.E., an engineer of great practical ability. Unfortunately Mr. Hodgson died in 1877, and this event chiefly determined Mr. Harrison to relinquish his London practice and to confine himself solely to the more congenial, although less lucrative, occupation on the North Eastern Railway. There was another reason that partly influenced him in this determination. He was then in his seventieth year, and, as he became older, he found his private work growing larger than he could conscientiously undertake, in addition to his duties in the North. He frequently in private alluded to the careers of Brunel and Robert Stephenson, both of whom he considered died young from the strain of over-work. He would recall how Stephenson, in 1849, attempted in vain to retire. Bearing this fact in mind, he resolved that the last years of his life should not be harassed by the constant worry of ever-increasing work. He therefore decided to sacrifice his private business with its large emoluments, to give up his London house and office, and to devote the remainder of his days entirely to the service of the North Eastern Railway. And this he literally carried out. On the 19th of March, 1888, he spent the whole day in his office at Newcastle, actively engaged in the affairs of the Company, and had made appointments for the following day. On the morning of the 20th he rose as usual to fulfil his daily duties, when he was taken ill, and died suddenly in his chair, amidst the surroundings of the home and family he so dearly loved.

Thus a great man and a great engineer has been taken from us

amidst the affectionate regrets of all who knew him. In the circle in which he more immediately moved, a blank has been created which can never be filled up. The memory of his long and distinguished career, of his eminent ability and unsullied reputation, will long survive him, while his numerous important works will tell to future generations of the soundness and skill which devised them, and of the integrity and care with which they were carried out.

It may be added that a marked trait in his character was a want of what may be called ambition, so far at least as mere honours or social position were concerned. There were things that he did not value; and, while he did not shrink from taking his proper position, he never thought of pushing himself forward in any way. He was also most unselfish in money matters. In 1883, at the request of the Directors of the North-Eastern Railway Company, he consented to sit for his portrait to be hung in the board-room at York. This was painted by Mr. W. W. Oules, R.A., who now, by permission of the Directors, is engaged on a replica to be presented to the Institution by some friends of the deceased.

The portrait which forms a frontispiece to this volume is from a photograph by Messrs. Maull and Fox in July 1886.

RÁI BAHÁDUR KANHAYA LÁL was a native of Jalésar in the Agra District of the North-West Provinces of India, a town which gave its name to a well-known regiment of the old Bengal army, the 9th Native Infantry. From school at his native place he went, in 1843, to the Government College at Agra, where he highly distinguished himself, and, besides several scholarships, gained four medals, for Translation, for History, for English Essay, and for proficiency in Blackstone's Commentaries. This last prize perhaps shows that he had at one time a different profession in view from that which he afterwards chose, but the great aptitude he evinced for mathematics induced some of the English officers, of the college and of the Government, to advise that he should become a pupil of the Engineering College at Roorkee. At Roorkee he was as highly distinguished as he had been at Agra. In December 1851, prizes for Mathematics, Engineering and Surveying, were awarded to him, with the certificate of qualification for admission to the Public Works Department in the rank then called Sub-Assistant Civil Engineer.

After employment for a short time on the Eastern Jamna Canal,