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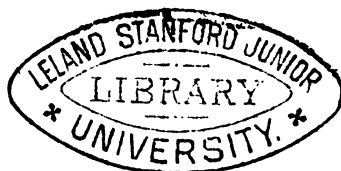
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RAILWAYS IN INDIA^a.

REPRINTED FROM THE RAILWAY REGISTER.

THE establishment of a system of railways in British India is the latest, and at once the most gigantic, the most ambitious, and the most interesting problem which the enterprising genius of the age has propounded to the world. Indeed, the project is one fraught with results of greater magnitude and importance,—not only as regards our national strength and wealth, but as regards the progress of civilization throughout the world, than the most sanguine and speculative mind could well comprehend at a glance. Vast and important as have been the advantages, commercial and social, of the opening of our great lines of railway communication in the mother country, the extension of a similar system to India must, when fully developed, lead to results of still more remarkable and extensive importance. That this is no exaggeration will be admitted—1st, when we recollect that rapid and easy intercommunication of persons, of goods, and of ideas, was in England only a matter of degree, whereas in India it will be an entirely new element of civilization; and 2ndly, when we consider the enormous territorial extent and population of our Indian peninsula, as compared with the mother country; the latter being as upwards of six to one. Moreover, the industrial energies of our population, and the productive powers of our soil, have alike been exerted to the utmost, worked out almost to their limits by the untiring skill, and enterprise, and competition of ages; whilst on the other hand, the productive lands of India teem with most valuable natural products, which from the scanty and inefficient means of conveyance hitherto available, have in great part remained to rot in their native soil, and the industrial energies and moral capacities of her inhabitants have been for ages at the very lowest conceivable point. Whenever by improved means of communication those abundant natural products are brought forth for the uses of society, whenever through the same regenerating influence the latent energies, mental and physical, of these myriads of people are called into active and profitable employment, let the philanthropist calculate;—and calculate with pride—the vast increase which will be made in the sum of the happiness of his fellow men, both on this and the other side of the equator. The mere calculating man of the world also will see his advantage in the increased demand which will thus be opened for our manufactured products.

^a "Report upon the Practicability and Advantages of the Introduction of Railways into British India," &c. By R. Macdonald Stephenson, C. E. 1845.

But it is not merely as improving the social condition, and developing the natural resources of our Indian empire, that the importance of railway communication consists. It would be vain to deny that these are considerations which, encouraging and stimulative of honourable energy as in themselves they are, depend upon circumstances of such a nature that it would not be reasonable to expect their fulfilment within any very limited period. In this, therefore, as a mercantile speculation, consists the difference between any projects for establishing railways in England and in India. In the case of the former, a profitable return is confidently looked forward to, the amount of which is even calculated with nicety from the moment the line is opened; the traffic is as it were ready cut out to hand, and the public wait impatiently to pay their money to the projectors, not the projectors for the public to patronize their new mode of conveyance. In India, on the other hand, the case is very different. With the exception of a very limited number of persons, almost exclusively men in official positions, who perform tedious and expensive journeys on stated occasions, there are no travellers in India. The vast native population are so poor and so saving of everything but time, that it would be long before they could be induced to pay even a very few *annas* to be conveyed, instead of walking, a journey of twenty miles. With respect to the conveyance of merchandize, we may find some favourable exceptions. We have here the property of merchants who are men of calculation and intelligence; and who, suffering daily under the delays and risks, as well as the enormous expense of the present modes of conveyance, would gladly avail themselves of a substitute at once infinitely more prompt, secure and economical. So far as merchandize is in question, therefore, it might not be unreasonable to expect that, in a line of country where such traffic prevails to any extent, a railway established upon economical principles might meet with a remunerative return. But then the question immediately suggests itself,—where are such lines capable of being traced? and we find upon examining the map, and upon considering the course of the principal existing traffic of India, of existing traffic which might be considered sufficient to reward such an undertaking, that the field is a very limited one. The mind at once turns to the rich depôts of Calcutta, and runs up along the banks of the sacred Ganges by which they are supplied, where it sees an old and valuable carrying trade already open for competition, and then is at a loss to fix upon any other line of road in which railway capital might be profitably invested throughout this vast extent of territory. We do not deny, nor doubt, that there may be many localities in which the experiment might be tried with ultimate success; but we question whether there is any other so obvious in its results as to engage the capitalist who invests his money for the mere sake of profitable return, to engage in the undertaking; and we are confirmed in this impression, when on examining the report of Mr. Stephenson, who has so actively promoted the vast scheme of railway communication in India, we find a line from Calcutta to Mirzapore, with a probable extension to Allahabad and Cawnpore, to be the only one suggested by him after receiving the opinions of the most experienced commercial men in the Bengal Presidency on the subject.

We shall come presently to a careful consideration of Mr. Stephenson's report, more particularly as respects the grounds upon which he

recommends a grand scheme of railway speculation in India to the British capitalist;—but before we proceed to look upon the subject in this restricted view, we have a few more words to say upon the larger question with which we set out, namely, the importance of railways as affecting the grand national and social interests of India. The two questions are quite distinct as to what would be a profitable investment for a company of shareholders, and what may be the requirements of a great and populous territory; and this solution will have to be determined upon very different grounds. Enterprises of this kind, which it would be rash for individuals to undertake, it might absolutely behove a government, having the future as well as the present welfare of the community in their hands, to see carried into effect, undismayed by the labour and cost of the necessary works, and the probable lapse of time before they would lead to any profitable return. In a word, it is in a political, and not merely in a commercial point of view, that the government of India should look upon this question. They should consider what would best give unity and strength to their vast empire, promptness and certainty in the execution of the orders of the ruling powers; and to this end they must admit that nothing is so essential as a speedy means of receiving intelligence from the most distant quarters, and of transmitting instructions in return, as well as the necessary agents and troops to see them carried into effect.

And in this respect, brilliant as is the prestige which hangs over our Indian empire, it must be confessed that it is still in a state of helpless and discreditable barbarism, many, many centuries behind the example set by any other nation in civilized history. The tardy conveyance of intelligence, and the tedious, fatiguing, and expensive marches to which our troops are subjected, are matters of too much notoriety, and too painfully felt by all whose duties are concerned, to require more than the mere mention of the fact. But the consequences of this state of political helplessness have been manifest on many occasions in more serious ways than the mere inconvenience and suffering of individuals. The enormous expense of these marches has been so severely felt by the government, that by degrees they have endeavoured to cast off part of the burthen, by diminishing the field allowances of the officers and men; thus converting a public into a widely felt private grievance. The contests about these *batta* regulations have on frequent occasions led to the most lamentable results, ending sometimes in what has amounted, or been considered to amount to mutiny. One instance of the kind may suffice as an illustration, and it is the more remarkable as having led to a great deal of painful excitement throughout the presidency in which it occurred, as well as much severe animadversion by the press of England. In December, 1843, the Sixth Madras Light Cavalry,—(a regiment heretofore bearing a high and unspotted character,) harassed out with a long course of marching and counter-marching, and irritated by frequent disappointment of promises made on this subject,—were at length, when at Jubbalpore, driven to a state of madness by the sudden refusal of their *batta*, or field allowance. They refused to turn out to parade, but subsequently consented, at the earnest persuasion of their troop officers. For this mutinous conduct they were severely reprimanded by their commanding officer, and the next day the order for withdrawing the *batta*, which was issued erro-

neously, being countermanded, the men returned cheerfully to their duty. The government allege that it was still their intention to have punished the mutineers for their conduct,—and that the reason they could not do so on the spot was the distance from head-quarters, (about four or five months' march,) and the want of sufficient force on the spot to carry such a course of proceeding into effect. However this may be,—certain it is that the governor-general, the Marquis of Tweeddale, sent a letter expressing his satisfaction at the return of the men to their duty, couched in terms which sounded like a complete forgiveness of the offence, and that this letter was read at the time by order of the commanding officer at the head of every troop in the regiment. Extraordinary,—humiliating to relate however!—no less than nine months subsequently,—the troops having made a tedious and fatiguing march to Arcot in the mean time, and having been under arms and performing their usual duties during the whole period;—nine months afterwards,—such was the tardy, feeble process of executive vengeance in this territory,—about seventeen of these men were selected for trial, the result of which was, that two were put to death, and the rest transported for life,—whilst several others were summarily dismissed the service. As to the legality even of this proceeding, there has been a great deal of discussion, in which the weight of authority and argument, we think, appears clearly against it;—but not to enter further upon that head, it may be fearlessly avowed that the proceeding was an ungracious one,—undignified, and repulsive to every feeling and dictate of candour, and honour, and humanity, and utterly unworthy of a high and powerful executive. Yet such proceedings must again and again occur, unless the Indian government take measures for introducing into their territories the improved means of communication and transit which the rest of the civilized world is so actively promoting.

We need not remind the East India Direction of the example of the ancient Romans, who, when they conquered a new territory, made it their first business to construct roads between its principal stations and the head-quarters of rule:—we need not point to the example of the more barbarous conqueror of the present age,—the Russian emperor,—who, with no love for civilization, has found it necessary to adopt the formation of railways in his vast and benighted territories,—not with any consideration for the personal comfort of his subjects, but as a necessary means of strengthening and extending his rule. Upon looking at the social condition of the wretched inhabitants of the East, however, we feel bound to say that they do not appear to have gained more in this behalf by their subjection to British rule, than the hordes of the Steppes have under the benign influence of the Russian eagle;—whilst in these respects both fall immeasurably behind the examples of Roman colonization. It is not, therefore, with any hope of inspiring the company of British merchants trading to India with an expensive sympathy for the social and moral advancement of their millions of native subjects that we urge the formation of a well-considered line of railway communication,—but as a necessary means of giving strength, efficiency, and compactness to their political rule in those territories.

Upon consulting the map, with a view to determining the great trunk lines which should be first laid down upon the political grounds

here stated, one has little difficulty in adopting that triangular or pyramidal outline which connects the two more eastern seats of government, Calcutta and Madras, with Bombay, the nearest outpost for postal communication with the mother country, and also for connecting Madras with the seat of the supreme government of Bengal. By the southern line, passing through Hyderabad, and thence to the south to Madras, the whole extent of railway might, at a rough estimate, amount to 1500 or 1600 miles;—and this again, at the rate (which Mr. Stephenson suggests) of 10,000*l.* a mile would call for a total expenditure, independently of the working plant and staff of engineers and officers, of say 16,000,000*l.* If the northern line by Mirzapore to Bombay were also to be constructed, we should have to calculate upon an extra capital of 12,000,000*l.*, making a total of 28,000,000*l.* for these great trunk lines of communication between the three presidencies, independent of some necessary shorter branches. The works of these would probably take twenty years to complete^a.

Now, looking at this scheme of railway communication as comprising what the political interests of India primarily demand, we find that the experimental commercial project of a line to Mirzapore forms a portion, and but a very small portion of it. Common sense also at once satisfies us, that if as a commercial investment the success of the scheme to Mirzapore be problematical, that of the more extended enterprize between the presidencies can admit but of little room even for question. It must be obvious that these great lines, being of importance chiefly for their through traffic, presenting few intermediate stations from which a ready local traffic could be expected, must be completed, or nearly so, throughout their entire length, before any return would be derived for the capital laid out. Upon this point we have the concurrent testimony of several gentlemen of high official standing, who write their opinions in answer to applications from Mr. Stephenson. Dr. J. McClelland, secretary of the coal committee, very comprehensively observes:—"With regard to railroads, the objection to a long line at the commencement will probably consist in the greater period of time that must elapse before any return can be expected, and the uselessness of one portion of the line until the whole be completed. Referring to the great lines of railroad in America, they seem rather to have consisted of a number of separate undertakings, begun and carried out for separate and independent objects, though naturally (as the interests of all such undertakings must necessarily incline to) linked on to one another. This lessens the risk and removes many of the objections that parties might have to a more extensive undertaking, though it might come to the same thing in the end."

On the other hand, Col. Warren, C.B., Town Major of Fort William,

^a It is mere guess-work, however, at present to estimate either the course or length of the necessary lines, or the average cost. Mr. Vignoles guesses the cost at one-third, or probably a quarter, of the average cost in England, namely, from 16,000*l.* to 25,000*l.* per mile; which would give from 6,000*l.* to 8,000*l.* per mile. Mr. Ashburner doubts that a double line to Mirzapore could be laid down for 6,000*l.* a mile, but thinks a single one might for something less. Captain Goodwyn guesses at 3,000*l.* a mile, which is obviously too low, for Mr. Stephenson himself suggests 8,000*l.* to cover all contingencies. The prospectus of the East India Railway Company, however, proposes a capital of 4,000,000*l.* for the line to Mirzapore, about 400 miles, which points to an average of 10,000*l.* a mile.

declares, "There cannot be two opinions upon the subject. For my own part, I regard their introduction (namely, of railroads) as likely to effect such a change throughout the whole country, and to confer such incalculable benefits upon both the government and the public, that no cost (within reasonable limits) could be too great to accomplish the object. The importance of the undertaking, in a commercial point of view, I presume to be great, but of this I am unable to give an opinion; but of its advantages in a military and political point of view, I have no hesitation in stating that the advantages are infinitely beyond what upon a cursory examination of the subject would be supposed, and would be cheaply purchased at almost any amount." He then proceeds to add particulars of the advantages which would be procured to the government from such an enterprize:—"The practicability of receiving intelligence from distant parts of the country in as many hours as at present it requires days, and even weeks, to accomplish, and of sending instructions, with troops and stores, in the same brief period, are considerations which cannot be too highly estimated. Troops could be kept at more distant and healthier stations than at present, and much loss of life from sickness would by this means be spared. Stores would not to the same extent be required at the various depôts, and the loss by decay, and the destruction incidental to the climate which now obtains would also be avoided."

The opinions of these two gentlemen so completely confirm the general principles which we have been endeavouring in the above observations to enforce upon this important subject, that we feel it unnecessary to add one word more of our own, except to recapitulate those principles;—first, that the question of establishing railroads in India is one which should be considered upon other grounds than those which regulate such enterprizes in England;—secondly, that the immediate considerations which regulate such enterprizes in England, consist in the prospect of speedy profitable return upon the capital expended, which are purely commercial considerations, whereas in India the immediate considerations should be the political requirements of the state, commercial gain being a remote and contingent, but as we conceive, certain consequence of the general scheme. It follows as a necessary corollary to these two positions, that though the construction of a trunk line of railway in India may not be such an enterprize as any body of capitalists would undertake with a view to immediate profit,—the government of India may be bound in duty to the country and people whose destinies they hold in their hands, to construct such works at any amount of cost within reasonable limits.

That the government of India, as at present constituted, however, will very readily view the matter in this light, we own we are not sanguine enough to anticipate. Indeed, we regret to observe by the wording of their recent despatch to the Governor-General, dated May the 7th, that they do not appear as yet to be at all impressed with the full extent of responsibility which attaches to them in this matter. They say, (Art. 6.)—

"In the applications on the subject which have been addressed to us, it is contemplated that railroads in India should be constructed and managed as they are in this country, by means of private enterprize and capital. In that view of the subject we are disposed to concur; but it will be necessary

to make provision, as Parliament has latterly done, that the Government should have the command of railroad communication for its own purposes, on payment of a reasonable remuneration ; and that at least the great trunk lines should, on settled terms, be liable to become ultimately the property of Government."

They thus show themselves very willing to allow private individuals to sink their capital in these precarious undertakings, taking provision to ensure their own purposes at their own terms, and eventually the possession of the works themselves. And in another paragraph they refer to a proposition made by Sir George Larpent, the chairman of the Provisional Committee of the East India Railway Company, to guarantee a certain minimum return for the capital subscribed for so novel but important an undertaking, in a manner which still more plainly shows their slowness to perceive or to admit the real bearings of the case. Sir George Larpent's application is worded as follows :—

"India is, and always has been, entirely dependent on the Government for public works, and the Committee are satisfied that there do not exist the means there of raising the funds for an undertaking of this nature. These must either be provided by the Government or subscribed here ; and it would not be reasonable to expect that individuals should advance money here on a work so totally new in its nature as an Indian railway, without some further assurance of profit than is to be afforded by an undertaking, the probable results of which they possess so little means of estimating. It was in this view that the Committee suggested a guarantee of a very low rate of profit for a limited time, as the mode likely to be most satisfactory to British subscribers, while it would be attended with least inconvenience to the Government. Indeed, considering that the Government itself would probably make very considerable use of the railway, for the conveyance of mails, of government stores and troops, the guarantee might fairly be considered as a payment for these services."

Than this proposal nothing we think could be more reasonable. Indeed, we hardly should have thought that the East India Company, considering their tenure of property and authority in their territories, could have hoped to have raised the enormous capital required for these essential undertakings upon terms so moderate as are here suggested. But they view the matter in another light, and write as follows to the Governor-General :—

"With regard to a guaranteed return on the capital laid out, which the parties who have applied to us request, we consider that mode of co-operation liable to many objections, and likely to prove very unsatisfactory ; but, when the information now called for shall have been received, we shall be prepared to take into consideration the mode and extent of such pecuniary assistance as it shall be proper for the government of India to afford towards the execution of at least the first approved line of railroad in that country."

Now, we assert again, that in all this the Directors of the East India Company have not shown themselves alive either to what is due to themselves, or what is due by them to the public interests they hold in charge. True it may be a question, how far they might be able, under the temporary parliamentary authority by which they hold their government in India, to raise or guarantee so large an amount of capital as must be required for the full accomplishment of these great public works. And here it may not be out of place, perhaps, to remind the reader that the

East India Company hold their possessions and government in the East by virtue of an Act of Parliament, for a limited period, renewed from time to time; that they hold possession, &c., only as trustees for the crown, and that their remunerative return from the revenues of the country is limited to 10% per cent. on their capital; the said capital being subject to be redeemed by the crown in 1854, upon twelve months' notice being given, at the rate of 200% for every 100% stock. It would be a wide question to discuss, and here, perhaps, not very appropriately, how far such a compact between a subsidiary province and an imperial Government may be necessary or justified by the rights of the latter; but certainly it requires no extraordinary gift of wisdom to discover in it the secret of much mismanagement, or at least much inefficient management of the possessions held fettered by such conditions.

In all reason, what inducement could the East India Company be supposed to have to improve to the utmost bounds the revenues, and consequently the social enjoyments, of their dependent territory, from which they can, under any circumstances, receive but a limited income? What inducement can they have to lay out a considerable amount of capital in great public works for the improving and strengthening that territory, which in ten years may be taken out of their hands at an unimproved price? As regards the East India Company, therefore, we discover in these considerations much of excuse for their errors of the past, and their blindness or disregard of their duties for the future; but for the Government and the Parliament, who by their extraordinary legislation reduce the Company and their millions of dependent subjects to this state of things, we can find no such excuse. To the Company mediately, but to the imperial Government immediately, we attribute the wretched unimproved state of things which has so long prevailed in India, and we call upon both to put forth their energies to remove this blot in our history with as little delay as possible, and to place our Indian possessions in that state of efficiency and civilization which prevail in every other part of the busy globe on which European influence has alighted.

Submitting these observations for the consideration of the East India Company, and of her Majesty's government, we proceed now to the matter more immediately before the public, namely, the report of Mr. M'Donald Stephenson, upon which has been founded the projected East Indian Railway Company, capital 4,000,000%, deposit 5s. per share. After a very careful consideration of this publication we feel bound to say, that whilst it takes in view only a very small portion, and that not, as we consider, the most immediately important portion of the railway requirements of India, it does not even afford sufficient grounds for the investment of the more moderate amount of capital required for that experimental line from Mirzapore to Calcutta at present contemplated. It is but just to add, however, that we believe the amount of the nominal capital will not be called for, unless the surveys now about to be undertaken under the authority of Government should prove satisfactory, which we sincerely trust will prove the case.

To proceed, however, to give our reasons for questioning whether Mr. Stephenson's report is sufficient, as the basis upon which to risk the investment of four millions of British capital in a distant part of the world. We arrive at this conclusion upon a careful perusal of Mr.

Stephenson's own report, and of the communications and documents which accompany it. Mr. Stephenson concludes his report with this unhesitating and unqualified recommendation of the project, a recommendation having regard, it will be observed, to purely economical considerations :—

“ In conclusion, I may mention that, having travelled over and examined a considerable number of the European, as well as American lines of railway, I have no hesitation in stating that the amount of existing, as well as of the certain prospective traffic in goods and passengers, through several of the principal districts in India, with the facilities which the country affords for the economical construction of railways, are calculated to render such an undertaking one of the most remunerative, and extensively beneficial of any similar work with which I am acquainted.”

How does he arrive at this conclusion,—upon what practical and local knowledge is it based? We humbly submit, none whatever; at least none which appears in this Report. The progress of Mr. Stephenson's inquiries and correspondence upon this subject is certainly a little remarkable. The first of the documents following the report is dated, “ Calcutta, July 15th, 1844, and is addressed to Frederick James Halliday, Esq., Secretary to the Government at Bengal, in which he says :—

“ The project of establishing railroads in this country has not been entirely disregarded, notwithstanding the impression on the part of many who, not being aware of the circumstances which constitute the practical recommendations or objections to them, entertain an idea that their introduction into India, at present, would be premature. The consideration of the practicability of laying down a line of railway, of the advantages which would attend it to the Government equally with the public, and of the particular lines which would yield the greatest returns, and would in other respects be the most eligible, have for some time past engaged the attention of several parties, both in this country and in England, and it is to the result of this inquiry I would beg to direct your attention.”

He then goes on to ask whether, in the event of a company in England raising sufficient capital to carry out the work, the supreme government would assist to procure the land and other facilities for the construction of the railroad. Then follows this extraordinary observation :—

“ The line upon which it is intended to commence operations has not been definitively determined, as it is dependent upon the amount of capital which can be raised at once in London for the purpose. *As, however, it cannot signify to the Government (who must derive considerable benefit from the measure under any circumstances) which line may be first completed,* it will probably be unnecessary to do more than to state, that upon receiving your reply to the foregoing requisition, namely, whether the Government, in the event of a Company being formed in London, or elsewhere, of unexceptionable respectability, and with sufficient capital to accomplish their objects, will give their support to the extent specified, arrangements will be immediately made for active operations.”

Mr. Stephenson adds, that if he gets the promise of government assistance he requires, he will “ be, *in the course of a few months,* prepared to submit *complete details* of the undertaking,” and so forth.

Now we would remark in the first place, that in a vast emprise of this kind, the question “ which line may be first completed,” is an

element in the subject which it would behove the government, above all others, carefully to consider. Besides the waste of government land and of private capital which would be incurred by opening a disadvantageous line, the discouragement which this failure would occasion, would probably postpone indefinitely the undertaking of similar works in directions in which they might really be pressingly required. Passing by the bold promise, as to the procurement of full details, of a line which could not possibly yet have been surveyed "in the course of a few months," during which the projector was to undertake a journey to England and back, we naturally revert to the earlier part of Mr. Stephenson's letter, and inquire what were the means of information on the subject in the possession of that gentleman at the time he opened this correspondence with the head of the executive in Bengal; and we are certainly somewhat astonished, upon inspecting the subsequent documents, numbered 3 to 60 inclusive, to find that, with the exception of a few statements of figures, chiefly obtained from ordinary government returns, they consist of correspondence between Mr. Stephenson and parties locally interested, all doubtless persons of high respectability and considerable experience, but all which correspondence took place subsequently to the date of the letter addressed to the Bengal secretary. We should state by the way that Mr. Halliday, in reply, states that "it would not be in the power of the deputy-governor of Bengal, in the present state of the law, to authorize a railroad company to treat for the purchase of land as for a public object, under Reg. I. of 1824, but that he would have no objection, in the event of the formation of a company with sufficient capital to accomplish the object in view, to apply to the legislature to make the provisions of that enactment applicable to such purposes."

It was after the receipt of that letter, namely, on the 15th of August, 1844, that Mr. Stephenson addressed a circular letter to the principal mercantile houses in Calcutta, asking their opinions and suggestions in regard to the projected scheme.

After opening the matter of the proposed London Company, he says, "I am desirous to ascertain from the principal mercantile houses, their opinion of such an undertaking in a commercial point of view. I shall also esteem it a favour, if you have given the subject any previous consideration, if you will give me your opinion of the advantages which are likely to attend such an undertaking, provided it be placed under due and efficient control and good management, and whether you would consider it, under such circumstances, as an eligible investment of capital?" He then, after mentioning the "cordial interest" expressed by the deputy-governor in the matter, proceeds to make the following important statement, viz. :—

"In regard to the importance in a military point of view, and to the practicability of the undertaking, the several communications of the chief engineer officers of the government are equally decided and conclusive. To the commercial benefits which may be expected to attend it, and the probable advantages as a means of investment for capital, the opinion of experienced commercial houses is now required."

This is the position in which the inquiry stood on the 15th of August last,—the replies of the commercial houses upon the question of pro-

fitable investment follow afterwards in order, together with some few communications from military men,—but we look in vain for the “several communications of the chief engineering officers of the government,” as to the “practicability of the undertaking,” (query, what undertaking? no definite line having been even suggested in the preliminary letter to the deputy-governor,) and the omission is certainly one to be regretted; the reader being thus left completely in the dark as to a main element in any speculative undertaking, namely, its feasibility and probable cost. But of the engineering department of the project, we shall have occasion to speak at length on a future occasion,—in the mean time we turn anxiously to the replies of Mr. Stephenson’s various correspondents, as to the probable commercial advantages of the undertaking, and are disappointed to find them such as by no means to warrant (as upon their authority) the sweeping declaration contained at the conclusion of Mr. Stephenson’s report, and which we have already quoted. These gentlemen, writing all with great prudence and candour, whilst they all declare a strong desire for the establishment of the line as one calculated to do great benefit to the country, almost to a man distinctly hesitate to give an opinion as to the profitable issue of the undertaking. Messrs. Colvin, Ainslie, Cowie, and Co. say:—“With regard to the undertaking as an investment, we are not, as we have said, yet in a position to judge.”—Messrs. Gillanders, Arbuthnot, and Co. “cannot venture an opinion.”—Messrs. Allan, Deffil, and Co. “cannot go further (than mere surmise) in forming an opinion of its eventual success, as an investment, not having seen any documents bearing upon the subject.” Indeed, not to go on repeating the same expression of opinion a dozen times, a like evasion of this critical item in the inquiry is resorted to by almost every one of these gentlemen, so addressed by Mr. Stephenson, for their opinions upon this very particular.

There are others, however, who express their opinions more in detail, but not, to say the truth, more encouragingly. To begin with Mr. G. Ashburner, who expresses views very much coinciding with those we laid down in the early part of this article. He observes:—

“The only serious difficulty I foresee, therefore, in the prosecution of a plan for the introduction of such works into Bengal, is the organization of a system of management which shall secure public confidence, not only at the commencement and during the construction of the work, but subsequently.

“Joint stock companies, under private management, have almost invariably failed, from one cause or another, in this country; and I do not think I am wrong in stating that, however well they may succeed elsewhere, they are looked upon here as ill adapted to our present state of society; which, from undergoing great and rapid changes, does not possess materials for checking the abuses to which monied institutions are so liable.

“A somewhat similar difficulty exists on the continent of Europe, and the extraordinary delay attending the construction of railways in France, and other European states, is, I believe, principally attributable to it.

“Were this consideration overlooked, and English ideas and precedents taken as a guide for public works here, the result, I fear, would, sooner or later, prove disastrous; but should Government ever become alive to the incalculable commercial and military advantages attending the investment of capital upon railways, and following the example of the larger continental states, be disposed to patronize such undertakings in the matter requisite, I am confident a system of management might be framed, which would afford

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the desirable security, and render the returns derivable from them a matter of certainty."

Mr. Kettlewell, of the firm of Leach, Kettlewell, and Co., writes much to the same purport :—

" That such a railroad as I have suggested, to Mirzapore, would be extremely beneficial to this country, and to those connected with its commerce, I have no doubt; its success as an investment for capital I consider to be dependent on the facilities, assistance, and superintendence government would afford; the absence of any such natural or other obstacles on the line as could not at a moderate cost be overcome; the rate of carriage for heavy or bulky goods, to which it would mainly have to look, being, under the circumstances previously stated, afforded sufficiently reasonable to draw the bulk of what now go by river and land carriage, its projectors looking to passengers as a minor consideration; and last, though not least, to its being begun and carried on free from jobbing, economy being the interest and object of those employed in its construction and working."

On the other hand, Messrs. Livingston, Syers, and Co., write still less encouragingly: " We are not so sanguine," they say, " of the advantages to be obtained in a mercantile point of view, till the lines had created an independent employment for themselves, which, in a country possessed of resources like India, they might naturally be expected to do in a few years."

Mr. C. J. Richards, of the firm of Gisborne and Co., says, " I am glad to find that the feasibility of their introduction (railways) into this country as profitable investments, is likely even to be proved, or the reverse, by a Company established in London," adding at the end of his letter :—

" The commercial benefits referred to in your fourth paragraph in my mind are more than doubtful. I do not think railways in India generally can be profitable, and unless they are made so, how can we look for commercial benefits ?

" In conclusion, I beg to say, that although I have probably not answered your letter in so satisfactory a tone as you might wish, it may have perhaps been caused from want of information on the subject, as none of the papers left with me convey any information respecting the working of railways in this country, or the estimated traffic of goods and passengers, or I may perhaps have been influenced by a feeling of timidity, preferring not to encourage in any way untried schemes of internal improvements in India, rather than to feel responsible for having been the cause of leading parties in England into disastrous investments of capital.

" Finally, I merely have to say that I shall be glad to find myself prove a croaker, and remain," &c.

Our last quotation on this head is from the letter from the Bengal Chamber of Commerce :—

" In reply, I have to acquaint you that the Chamber considers that, in the abstract, the introduction of well-planned lines of railway in India would be very advantageous; but that, upon the benefits likely to attend, or the eligibility of an investment of capital in them, the Chamber is not in a position to decide, knowing, as it does, nothing of the lines you contemplate, of the cost, of the expense of working and maintenance, or of the traffic which may be expected to pursue those routes. A close examination of all these particulars, and of the railway system as applicable to this coun-

try, would be necessary, to enable the Chamber to pronounce the specific opinions you desire."

We cannot think that there is enough in all these communications from parties to whom Mr. Stephenson applied for opinions upon this very point, to warrant his unhesitating and decisive promise of "such an undertaking being one of the most remunerative and extensively beneficial of any similar work with which he is acquainted." Be it observed, however, that we enter upon all these particulars, not with a view of discouraging the project of a well-considered scheme of railways for India, but to enforce the necessity of careful and impartial investigation before the capitalists of England, having no local interests, are called upon to embark deeply in such an undertaking. In justice to Mr. Stephenson, we now insert his own summary of the anticipated traffic on this particular line, drawn from the official documents to which he refers; the facts contained in which must at best be looked upon as rough items out of which to form a speculative estimate:—

"From the accompanying documents it appears, that the imports and exports of Calcutta amount to 16,570,000*l.* in one year, of which the chief portion has been received from or is conveyed into the interior;

"That the traffic which passed the Jungypore toll on the Bhagurette River, in one year amounted to 83,493 tons down, and 95,373 tons up the river, and of passengers 31,950 down, and 26,428 upwards, and that the opium has not been included in the former calculation;

"That the traffic by the Soonderbands (of which a sketch is given showing the present circuitous route adopted during nine months, as the trade via Bhagurettee can only be carried on during three months of the year, except by vessels drawing less than eighteen inches draft of water) is in excess of the above;

"That the traffic by land over the Annabad Bridge in the year 1837-8, also taken from official documents, amounted to 7,742 carriages of all descriptions; 168,694 loaded bullocks and other cattle, 33,180 passengers in various conveyances, and 435,242 foot passengers;

"That on the Allahabad and Cawnpore road, to which it is intended hereafter to continue the lines, the year's traffic amounted to 107,613 hackeries or carts, 172,377 camels, bullocks, &c., and to 63,720 coolies, employed in the transport of goods and merchandise—and 38,619 carriages of various descriptions, 122,751 horses, camels, &c., engaged for conveyance of travellers, and 266,052 foot passengers;

"That the sugar alone which passed the north west frontier on its way to Calcutta, in the first six months of 1842, amounted to 64,507 tons;

"That of upwards of 18,000,000 acres in the north west provinces under cultivation, there are 577,035 acres of sugar cane;

"That between Hoogly and Burdwan the traffic taken for a consecutive period of nineteen months amounted for one year (1843) to 73,000 foot passengers, 25,080 loaded hackeries, 17,155 empty returning hackeries, 64,415 loaded bullocks, and 339 Government Daks;

"That the trade between Burdwan and Calcutta in salt alone amounted in one year to 12,962 tons, and in sugar and goor to 18,518 tons, of which three-fifths are sent by land and water, and two fifths by land, at a cost elsewhere referred to, and estimated at about three-pence per ton per mile;

"That the transport of merchandise between Calcutta and Mirzapore averages by water 2*l.* 7*s.* 6*d.* per ton, and by land 10*l.* 16*s.* to 13*l.* 10*s.* per ton, the former occupying an average of six weeks, the latter seven weeks, in the transit;

"And that the estimated traffic, at a moderate calculation made by an experienced officer in the service, who has furnished the most recent and

carefully collated details of the trade between Calcutta and Burdwan, will amount to upwards of 107,310 tons a year upon the existing traffic, exclusive of passengers."

In regard to the engineering part of the question, upon which depends the cost of construction, and consequently the balance of expense and receipt, though Mr. Stephenson is equally confident, we cannot perceive that he speaks upon more authentic grounds. He says in his report: "The several points connected with the engineering details, will not, in the present report, require to be more particularly referred to than to mention that *they have been most carefully investigated*, and will be available when the time shall arrive for the consideration of active and practical operations."

He then refers to the high authority of Mr. Vignoles, to whom, he says, "the whole of the documents, plans, levels, &c.," have been referred; but upon turning to the letter of that eminent engineer on the subject, we find little to tally with such a statement, or at least to lead to the impression that these "documents, plans, and levels," have enabled that gentleman to arrive at a definite and practical conclusion on the subject.

We give Mr. Vignoles's letter entire:—

"4, Trafalgar Square, London, 23 Nov. 1844.

"Sir—I have carefully perused your papers, and examined the documents which accompany them, relative to the proposed establishment of a Company for the introduction of railways in India generally, and for at once commencing operations upon the great line between the capital of Bengal and Mirzapore. My opinion upon the subject is not based exclusively upon the evidence at present before me, as you are aware that I have already given considerable attention to the matter, and that I have collected much practical information upon the subject, which I am gratified to be enabled to bring to bear upon the consideration of it in the present instance.

"I have no hesitation in assuring you that the results of my own investigations fully bear out and confirm the statement and references contained in your report, and although *without personal observation, or a complete and accurate survey of the country*, I should be unable to pronounce with confidence the cost per mile of railways in India generally, I can state without hesitation, my conviction that India is, without exception, the most favourable country for the introduction of such works, of any with which I am acquainted, and that the average expense of a railway will not, at the outside, exceed one-third, and probably not one-fourth of the amount that has been required for the same purpose in this country.

"I consider that the line selected as the first work to be undertaken is unexceptionable, on account of the remarkably level character of the country through which it passes, and as offering no engineering difficulties, while the trade appears from the returns to be such as to warrant the expectation of a very ample remuneration for the outlay.

"I am, Sir, your faithful servant,

"CHARLES VIGNOLES, Civil Engineer."

With all respect for Mr. Vignoles, whose professional character stands too high to be lightly impeached, we must be permitted to say, that until we know the extent of practical and accurate data which were submitted to him, we must look upon this letter merely as a very off-hand—certainly a very polite—and somewhat encouraging document, but one by no means pledging him as a professional man, nor sufficient to warrant the public in attaching to it any weight of practical importance. We

say this the more advisedly when we remark, that throughout the whole course of the correspondence with Indian engineers, contained in this Report, there appears to have been confessed by them an utter ignorance of the engineering details of the matter. For instance, Mr. S. Ashburner, C.E., dating from Calcutta, dated 9th September, 1844, writes as follows:—

“ Calcutta, 9th September, 1844.

“ My dear Sir—I return with this the sketch of a line of Railway from Calcutta to Mirzapore, and accompanying documents you did me the favour to send me on the 7th instant, at the same time requesting me to inform you whether, upon examination of the papers, I consider the undertaking can be completed at the cost estimated.

“ *With these data only, it would be impossible to arrive at any very accurate estimate for the line under your consideration*, as, although a great portion of it is described as level, or nearly so, the number of streams crossed, their velocity, width, depth, liability to overflow, &c., &c., are not given; and these may constitute very important elements of cost.

“ Without a section through the hilly district, and description of the cuttings, I would hardly venture an opinion upon the subject, and what I have already remarked regarding an examination of the smaller streams, is still more applicable to the Soane. Having had, however, at a former time, occasion to make a tolerable careful personal examination of part of this line, together with the information I then obtained concerning the whole of it, enable me to judge to a certain extent as to the sufficiency of your estimate; and, although my impression is, undoubtedly, that it would be very difficult to find elsewhere a route offering so great inducement for the construction of a railway as that from this place to Mirzapore and Allahabad, I confess I am a little inclined to doubt the practicability of getting a well built *double* line from this to Mirzapore, with easy gradients, into operation for six thousand (6,000*l.*) per mile. Nevertheless, I would take the liberty of suggesting that a *single* line will, for the present at least, be found to answer every purpose, both for the conveyance of goods and passengers. If so, recollecting the extraordinary facilities for procuring good materials, and the small price of earth-work and masonry in this country, I have no hesitation in giving it as my opinion that the work may be completed in the most approved and desirable manner for something less than the sum named per mile throughout. And, as is likely to be the case upon survey, if a favourable line is found through the hilly district, a large deduction may be made from this amount.

“ Believe me, my dear Sir, very truly yours,

“ S. ASHBURNER.”

“ R. Macdonald Stephenson, Esq., 5, Government Place.

“ P.S. If you can, before the 18th, send me even a rough line of levels over the hilly country, I will with pleasure give you an approximated estimate more in detail.

“ Yours,

“ S. A.”

We cannot but express our conviction upon the consideration of the whole case, as presented by Mr. Stephenson in this little publication, that at least he is somewhat premature and sanguine in the encouraging estimate which he forms, both of the probable difficulties and expenditure to be encountered in the construction of the line he proposes and of the returns to be expected from it. We are glad to observe, however, that the East India Company have determined upon sending out “a skilful engineer, fully and practically acquainted with the construction and working of railways in this country, and, if possible,

in America likewise, to be associated with two engineers in the service," to investigate the subject^a; and that they have likewise directed inquiries to be made as to traffic matters, and other considerations of the like kind. From their inquiries, ably, as we doubt not they will be, prosecuted, we may hope for some much more practical information on the subject than we at present possess; and when it arrives we trust the Government of India will be in a position, and feel it to be their duty to carry out the project upon a scale, and with a magnanimous purpose, commensurate with the magnitude of the interests involved in it.

Other companies have already been formed for the construction of railways in India, to the consideration of whose prospects, and the matter in general, we shall return on an early occasion.

SECOND ARTICLE.

THE importance of the question of the establishment of a system of railways in India is evidenced by the activity which is displayed by men of business and experience in the formation of companies for the promotion of this object. We last month wrote at some length upon the general bearings of the subject, referring more particularly to the East India Railway Company, established under the influence of Mr. R. Macdonald Stephenson. We may be permitted here to remind the reader that we in that article laid it down as a principle that the question of railways in India ought not to be looked upon in a mere commercial point of view, but as an important political agency, and that even if in the former light they should not hold out a prospect of immediate profitable return, it was still the duty of government to stand forward and take them up as a matter essential to the safety and well being of the state. Above all things we pointed out the expediency in the first instance of connecting the seats of government of the three presidencies, and by consequence of bringing all three into closer relations with the government at home. Mr. R. M. Stephenson proposed to effect this as an ultimate object, but looking in the first instance to a line in the North Western direction from Calcutta, namely, to Mirzapore, which would be valuable chiefly in a commercial point of view, and would afford but the beginning of a circuitous route to Bombay. Upon

^a There are now the best prospects of these great public works being carried into effect under the auspices of the Government. The Court of Directors of the East India Company have, it is understood, engaged Mr. F. W. Simms, a civil engineer of high character, to proceed to India, and remain there three years, for the purpose of superintending surveys of the country, with an especial view to the selection of eligible lines for railway communication. Mr. Simms's qualifications for this important duty are attested by Mr. Cubitt, Mr. Donkin, and General Pasley; and at the expiration of three years, if the local Government should deem it expedient to retain his services for a longer period, they are to be at liberty to do so. Mr. Simms is to receive a salary equal to 4,000*l.* a year, in addition to which he is to be entitled to reasonable travelling expenses. For outfit and passage he is to have 500*l.*, and the like sum on his return. He is to take with him a qualified assistant, who is to receive a salary of 900*l.* a year, and 200*l.* for outfit. It is expected that Mr. Simms and his assistant will depart in July.—*Allen's Indian Mail*, June 20.

considering the whole scheme as contemplated by Mr. Stephenson, whereby the three presidencies might be ultimately connected, it appeared that it could not be estimated at less than an extent of 28,000 miles, an undertaking of such magnitude that one could hardly hope to see it effected within any reasonable lapse of time.

Since our former article was written we have seen the prospectus of the Great Indian Peninsular Railway Company, having a most influential Direction, chiefly composed of gentlemen of long residence and experience in the east, and the line projected by which presents several features of originality and promise. In the first place, with the great ultimate object in view of connecting the three presidencies, it does not neglect the considerations of local traffic, whilst in the course it takes it effects the connexion between the Eastern and Western coasts, by a much shorter line than that which Mr. Stephenson's scheme embraces. It is true that the Great Peninsular Company do not go directly from Bombay, either to Calcutta or Madras, but to the only harbour on the coast lying between them, namely, Coringa, whence communication may be had by means of steamers with both of them; the voyage to Calcutta occupying about 70 hours, and that to Madras about half as much. The length of the line between Bombay and Coringa is about 736 miles. The whole saving of time in the transit of mails, &c., between Bombay and Calcutta, is calculated at from five days in the fair season to ten in the bad season, to say nothing of the mails going altogether in one mass, instead of piecemeal on men's heads as they now do; and the greater security, both of the mails and their bearers, who now not unfrequently fall victims to tigers, water-torrents, and quicksands, in their way through the wild districts between Nagpoor and Calcutta.

The total extent of the scheme immediately proposed by this Company, with its branches as laid, is as follows:—

	Miles.
Main line	736
Branches,—	
From Ahmednuggur to the frontiers of Candeish	80
From the line at a point between Poonah and Ahmednuggur to Sholapoor	120
From the junction of the Manjera and Godavery to Nagpoor, with branch to Oomrawutty	255
From the turn of the road from southward to eastward in the Circar of Eilgundel to Secunderabad (for Hyderabad)	82
	<hr/> 537
Total	1,273

Or say 1,300 miles.

It is also in contemplation at some future period to form the extensions marked with the dotted lines, particularly those between Madras and Calcutta and Coringa, the ground for which latter is extremely favourable.

We have been favoured by Mr. Chapman, the active Manager of this Company, with a long communication containing the details of his observations and views in regard to this important project. We shall in-

sert this interesting document at length in the course of the present article ; but before we do so, and before we go into any of the details of figures which are necessarily involved in the subject, we think it right to seize the only opportunity we may have of making a few general observations upon the engineering difficulties connected with the adoption of a system of railway communication in India, and which it is but right should be taken into consideration in connexion with any statements coming from parties who, being deeply interested in promoting the project, might be apt to overlook, or in imagination to overleap, many of the uglier features of the case ; features, however, which they will inevitably have to deal with in a plain matter-of-fact way, when the project comes to be carried into effect. We consider that we act the fair and manly part in thus looking the worst of the matter fairly in the face, before giving the sanction of our influence to this or any other project of the kind ; and we are sure that the reader will attach greater weight to opinions coming after this impartial consideration of both sides of the question.

The physical obstacles which are to be overcome or neutralized before a system of railways can be carried into execution in India, have, to a certain extent, been foreseen and pointed out by the East India Directors, in their letter of the 7th of May last, addressed to the Governor-General of India. In that letter they observe, (par. 3) :—

“ Independent of the difficulties common to railroads in all countries, there are others peculiar to the climate and circumstances of India, which may render it advisable that the first attempt should be made upon a limited scale.

“ These difficulties may be classed under the following heads :—

“ 1. Periodical rains and inundations.

“ 2. The continued action of violent winds and influence of a vertical sun.

“ 3. The ravages of insects and vermin upon timber and earthwork.

“ 4. The destructive effects of the spontaneous vegetation of under-wood upon earth and brickwork.

“ 5. The unenclosed and unprotected tracts of country through which railroads would pass.

“ 6. The difficulty and expense of securing the services of competent and trustworthy engineers.”

These obstacles, combined with the “ entire want of definite and scientific information relative to the applicability of railway communication to India,” have induced the Company to take the step to which reference has been already made, that of employing a qualified engineer to survey the country, in order to fix upon the most eligible lines which might be available for the experiment.

But the foresight of the Court of Directors, as displayed in the six objections, which we have copied above from their despatch, has not included within its range all the difficulties and obstacles which the “ peculiar climate and circumstances of India” must and will entail upon the persons who attempt to carry out the railway system in that country.

In addition to the physical impediments which they have mentioned we should have some regard to the following :—

First : The difficulties which the instability of soil itself presents.

Second : The impediments which the variations in the surface offer, these presenting features of a character wholly distinct from the ordinary difficulties which present themselves in climates and regions such as those of France, England, and other European countries.

And first with respect to the soil, the basis upon which the various bridges, embankments, tunnels, cuttings and other engineering operations are to rest. Were we dealing with an ordinary case we should be disposed to treat with scorn and disregard a theory of alarm, which was founded on the accidents of nature, or as commonly known as "the visitations of Providence." The gulf into which Curtius plunged might very harmlessly be classed with the earthquake at Lisbon of 1756, and these two signal convulsions, separated as they are from each other by more than twenty centuries, might embrace and neutralize all similar catastrophes that had occurred in Europe between the two periods. But India is a very different country : what constitutes the exception in more temperate climes forms unhappily the rule there, as any one may ascertain by referring to the meteorological history of that continent for the last half century, within which time only European observations have been regularly conducted. It is a notorious fact that there seldom a month passes during certain seasons of the year, in which the shock of an earthquake is not felt in one part of India or another ; not often, we admit, so severe as to crumble cities into ruins, or so continuous as to produce any very great degree of alarm in those who experience it, but still sufficiently powerful^a and of a duration quite long enough to alter levels, to undermine bridges, to loosen embankments, and so forth ; thus occasioning unavoidably interruption to the traffic, if not more serious casualties.

In proof that we state no groundless case of difficulty and anxiety, we would ask the reader to take the trouble to cast his eye over a file of the Bombay or Calcutta papers^b, and reckon up the number of shocks that are recorded as having been felt within the ranges of those presidencies in any given season ; and it should be borne in mind that, although the vast majority of these shocks are so slight as merely to rock a chair, or create that momentary sensation of sickness which an earthquake causes, it does not always follow that in one or another part of the country, where the impulse was originally given to it, the shock may not have amounted to a sort of convulsion, sufficiently powerful to produce very destructive effects to so exposed and delicate a structure as a railroad^c.

The second of the peculiar local obstacles to which we have alluded

^a That of 1819, however, destroyed upwards of 2,000 persons, and levelled to the ground the principal part of the towns of Bhuoj, Anjar, Mothora, Thera, Kotheree, Nulliah, Mandree, and Luckput ; besides damaging many forts and other large works. The effects of this earthquake were distinctly felt in a range embracing a space of 18° latitude and 20° of longitude, extending to Calcutta on the east, Catmandoo on the north, Pondicherry to the south, and the mountains of Beloochistan to the west.—Vide *Bombay Transactions*, Vol. III. pp. 96—101.

^b Or what, perhaps, may be more within the reach of ordinary readers, let him consult the Index of the *Asiatic Journal*, or any other periodical register of Indian occurrences, and he will find ample proofs of the assertion we make.

^c It is fair to state, however, that the line projected by the Great Peninsular Company, passes for the most part over the great plateau of the continent, which with its solid iron surface would be less liable to feel the force of shocks of this description than places having a weaker superficial crust.

consists in the various and uncertain nature of the surface upon which the rails are to be laid; there being necessarily included in this description of impediment those geological difficulties which the different strata and the nature of the upper soil present.

We need hardly remind the reader of the well-known fact that during four months in the year the whole country is annually subjected to an inundation which covers its surface to a depth varying from 18 inches to several feet, according to its level; as we approach the uplands the continuous rains form water-courses, rushing with irresistible rapidity, and carrying all before them occasionally. During the hot and cold months respectively these water-courses are dried up, forming ravines, which, in the case of a high road being carried in their direction, are necessarily bridged over. In general the traffic roads in Hindostan are merely the dried-up beds of water-courses^a, and when the periodical rains commence, of course travelling by land-carriages ceases. After the rains have subsided, it is often found that the bed of the river has changed^b, and the mighty volume of the Ganges has thus been known more than once within the memory of man to change its direction, and to leave its ancient channel dry. The alluvial nature of the soil in the lower provinces renders this operation of nature an easy one, nor can the precautions which are adopted of constructing *bunds* or dykes always avert it.

It must be obvious that this liability of the soil to shifting by the accumulation of water must present a formidable obstacle to the permanent stability of any line of railway, or, indeed, any other extensive structure built upon the ordinary principles. We are aware that it may be answered that these *bunds* or dykes have themselves stood the brunt of the torrent for many years, (one of them, for instance, namely, that at the Pakhlal Lake, bears an inscription which is considered to fix its date as far back as 800 years ago,) and that they thus afford evidence of the practicability of the ground for stable erection. But, on the other hand, it should be borne in mind, that a dyke is not a railroad, and that a sinking or settling of the soil to the extent of a few inches, which to the former would be of comparatively trifling importance, would, if it occurred at any part in the course of the line of the latter, lead necessarily to disarrangement of its parts.

Let it not be supposed that we dilate upon these difficulties with a view to discourage the promoters of Indian railways, or to damp the ardent desire of the public to co-operate in undertakings which no one doubts must be of signal value, not merely to the inhabitants of the east, but to the mother country itself, in its relations with them. Far from it; and we think we appreciate too justly the persevering ingenuity and the indomitable energy of our countrymen of the present age, to suppose that any amount of difficulty will have other effect, when standing in the way of a great and useful undertaking, than to stimulate them to the exertions necessary to overcome it. We think it our duty, however, to state these difficulties at the outset, because we know they must at one time or other come into the consideration of our engineers and of the promoters of the undertaking;

^a Vide *Modern India*, by H. H. Spry, M.D., F.G.S., &c., Vol. I. p. 296.

^b Vide Rennell's *Memoir of a Map of India*.

and we think it may be better to do so now, than at a later period, when the necessary plans may have been maturing upon principles and under circumstances which may be found inapplicable to the occasion.

After much consideration of the subject we do not hesitate to hazard an opinion, that in applying a system of railways to India we must do it upon a principle considerably modified from that which prevails in this country; first, on account of the expense to which such works applied to a face of country such as India presents would necessarily incur; and secondly, on account of the risks of dislocation of the line from the natural causes we have mentioned, and which the more nice and expensive the original structure would be the more difficult and expensive to re-adjust. We think it very probable, in short, that by copying and improving upon the principle of American railroads, we might effect an extensive line in India, at much less cost, and put together in a way much better adapted for the rougher work they would be subject to, than by attempting to transport a Birmingham or Great Western, with all its switches and complicated arrangements, into Hindostan. We are glad to observe, therefore, that in their recent despatch the Directors of the East India Company advise a reference to the experience of American as well as of European railways. At the meeting of the shareholders of the Great Indian Peninsular Railway, held at Bombay on the 19th of April, the idea is also hinted at by Mr. Ayrton, in moving one of the resolutions, in the following words:—

“In the Report of the Commissioners for Ireland, they expressed their opinion that railroads might be constructed in that country at the rate of 10,000*l.* a mile, showing that a very great reduction in the cost of English railways was practicable; but he (Mr. Ayrton) would rather turn to the consideration of railways in that country, which more resembled India in its extent, and in the circumstances which affect the construction of railways. The United States of America had constructed long lines of railways at a cost very much below that stated by the Irish Commission. It was true that they were not finished works of art, but he believed they were found sufficient for all the purposes of commerce and for public convenience; he would therefore regard them as the model for an Indian railway. He found it stated that part of a railway had been constructed even as low as 1,600*l.* a mile, whilst the most expensive railway had not cost more than 9,460*l.* per mile; he wished to direct public attention to that railway, (which was peculiarly interesting on the present occasion,) for some persons considered themselves wise enough to laugh at the bare idea of a railway over the Ghauts; but the railway he was then referring to was constructed over the Alleghanny mountains, and ascended a height of 1,398 feet.”

In “Weale’s Ensamples of Railways” there is a curious description of the manner of constructing railways upon wooden piles, adopted in America, which is as ingenious as it is economical. The line, as it may be said, makes or grows upon itself; that is, the machinery by which the piles are driven into the soil advances along the line as it is completed, bit by bit; and thus a wooden frame road is erected across the surface of the country, over jungles or rivers, without the necessity of embankments, or any previous adjustment of the soil. The line thus completed may be left open, which, perhaps, in districts liable to floods, would be the best plan; or the sides may subsequently be embanked, if it be deemed advisable.

The recent arrivals from America make mention of another species of road, entitled a plank road, which is being laid down in that country to a considerable extent, and attended with great success. It is thus described:—

“ A very successful report on Plank Roads has been made by Mr. Whitteley, agent for the city of Ohio, on the utility and feasibility of Plank Roads, from an inspection of those already established in Canada. In that territory they have in successful operation a road from Port Stanley to London, 26 miles, which has been built one or two years; a road from Hamilton to Port Dover, on Lake Erie, 37½ miles of which are in operation. East from Toronto there is a road of ten miles, planked, which has been 11 years in use. Roads are already graded, and a number are about being made, all leading directly towards our lakes, the country being generally level. The cost of grading, ditching, and timber for these plank roads averages about 3,500*l.* per mile. As to durability, it was ascertained that the plank, after two years' wear with sand, had worn only one quarter of an inch; the grit sand penetrates the wood and forms a hard coating; the surface wear is not as great as the wear by rot. About twenty dollars per mile will be required the first year in repairs. The motion is very easy, and eight miles an hour is a fair average with a light buggy. In heavily timbered countries these roads can be cheaply made, and will last for many years, until the increase of travel and population will authorize the erection of iron railroads. It is only a temporary and economical substitute—for the true and permanent method, it is not to be denied, is the iron one; but it is very costly, and where there is little toll, the road will not pay the interest.”

Upon the whole, we cannot help thinking that wood^a is the staple material which could be most advantageously applied to the construction of Railways in India, particularly in those parts which, besides being less frequented, are more subject to the contending influences which we have been describing above. There have been several inventions recently published in this country, which will facilitate the adoption of this material: as, for instance, Kollman's and Prosser's guide-wheels, two distinct inventions, very simple and efficacious for the object in view; and with respect to the permanence of the material itself, Sir William Burnett's invaluable invention for preserving wood against rot and the devastating encroachments of insects. With these appliances, it appears to us that wooden railways, with wooden wheels, might be built upon an extensive scale in India, and worked at a moderate speed without much risk from casualty, even taking into account the peculiar disturbing causes we have above alluded to. For it must be very obvious that a very slight disturbing cause, which might cause an iron rail to snap or start, so as infallibly to throw a train passing at high speed off the road, would produce a comparatively unimportant effect upon

^a It has been suggested to us that the ravages of the white ants would be fatal to the use of wood in the construction of Railways in India. We apprehend, however, that some liquid might be used, (Sir William Burnett's invaluable composition, for instance,) which would effectually harden it against their attacks. There is, indeed, a liquid, known in India under the name of wood oil, which is used successfully for this purpose. It is, we believe, a species of naphtha, which is found on the coast of Malacca and Arracan. It is not improbable that even this preventive need not be resorted to, as it is found that these insects will not attack wood which is liable to be frequently shaken, as the sleepers of a railway would be. Sand, also, is found to be a barrier against the progress of these insects.

a line of road constructed of the more yielding material, wood, which would not sensibly disturb the course of a train protected by a series of guide-wheels.

Having thus fairly stated the difficulties which, as it appears to us, are in the way between us and the construction of railways in India, and given our reasons why we confidently believe that they will by no means be found insuperable, but on the contrary will only lead to greater triumphs of engineering than any we have hitherto achieved—we proceed now to lay before our readers Mr. Chapman's statement in reference to the projected works of the Great Indian Peninsular Company. We shall afterwards go into the details of estimates, &c., as laid before us by the Directors.

"SIR,—In reply to your application for information respecting the engineering and statistical details of the Great Indian Peninsular Railway, I have great pleasure in placing in your hands the following statement. If it be less complete and conclusive than those you have been accustomed to see in relation to English or even European lines, I trust it will not be forgotten that it refers to a distant and very extensive country; that the facts have necessarily been collected under many disadvantages; and that no pretence is made of having done more than is requisite to induce and direct further investigations.

"The accompanying printed papers will supply the most important facts; I therefore shall here go only into particulars which, though unsuitable to the purposes for which those papers were compiled, will be required for a more exact account of the line.

"From Bombay to Tannah, at the north-east corner of the island of Salsette, the ground has been carefully examined by Mr. Clark, who is now at Bombay, and whose experience as a railway engineer in England justifies reliance on his opinion. The length of this portion of the line is 28 miles; the ground favourable, and the earthworks light. At Tannah a river of about 400 yards wide is crossed to gain the main land. So far, there is little choice of the route to be taken, and little of any kind to remark; but from this point the direction to be taken by the main line must be matter of anxious consideration, and can be finally determined only after careful and extended inquiry. The line I shall describe is that which, from the best information I have obtained, seems on the whole best calculated to answer all the purposes, as the first to be made. Other lines, which are doubtless very desirable, will follow, I hope, in due time.

"Every body knows that at a small distance inland from the western coast of the peninsula of India, a range of rugged and precipitous mountains, improperly but generally called the Ghauts, buttresses and defines the table land of the Deccan; between this range and the sea is a strip of land, called the Concan, low and flat in the valleys, but much intersected and encumbered with transverse offsets from the great range. The highest points of the Ghauts rise to the elevation of above 4,000 feet, and the face of the range towards the sea presents little but precipitous walls or impracticable slopes. In a few places, however, the crest is cleft down to the level of the inland plain, that is, about 2,000 feet above the sea, and a transverse spur at the same place, jutting westward into the Concan, affords the means of ascending to it, though commonly not without considerable difficulty and labour.

"Previous to the government of this part of India falling into the hands of the British, little had been done to improve any of these natural passes; but on the extension of our territory on the table land at the close of the war which dethroned the Peishwa, the road up the Bhore Ghaut, which leads south-eastward from Bombay to the great military station of Poonah,

was much improved, and of late years considerable sums have been laid out on the Thull Ghaut, to the north-east of Bombay, by which the table land is reached at Nassuck.

"Through these two openings in this rocky and precipitous barrier the trade of the interior passes to and from the coast; it has therefore been suggested by most of those who have interested themselves in the question, that railways should take the same routes. I am fortified, however, by a high authority in India, in wishing and hoping that between these Ghauts, which are 100 miles asunder, another route could be found favourable to the construction of a railway, and more nearly in the direct line from Bombay to Ahmednuggur. My reasons for desiring such a route are, that I wish if possible to avoid incurring twice over the expense of works required for such an ascent before the full development of the traffic requires it—that it seems advisable to have at present but one line below the Ghauts, where much the heaviest rains of the monsoons fall—that such a road would open new and fertile districts, instead of merely superseding roads already constructed—and that such a ghaut could probably be given up entirely to the use of the railway without injustice or inconvenience to any part of the public. The Malsejee Ghaut, which was carefully surveyed by Lieutenant Suart, Bombay Engineers, in 1837, seems to possess every requisite by which we can hope such an ascent shall be favoured, and to be situated very favourably for both the northern and the southern traffic. Dismissing then the Thull and Bhore Ghauts for the present, with a hope that the increasing traffic will require them also to be fitted up as railroads at no distant period, I proceed to describe the route by the pass above mentioned.

"From Tannah and its bridge the line 'passes first over a great deal of rice ground,' which, from the nature of the cultivation, is evidently flat and low; 'as it approaches the Ghaut the country becomes intricate, and the streams rapid and numerous; but the Ghaut itself is surrounded by an easy ascent, averaging only 1 in 26½, being in some places 1 in 18, and in others 1 in 32. Since the rise within what is termed the Ghaut or pass, is only 1208 feet, while the height of the plain at the top is, according to Col. Sykes, nearly 2200 feet, it seems that a considerable elevation is attained in the 'intricate' country between the rice lands and the point which is deemed the foot of the Ghaut. At no other place within the Bombay Presidency does it yet appear that the table land can be reached so easily as here.

"The ascent of the Ghauts is always spoken of as the great difficulty on this line, and the chief objection to it. The description of the Malsejee Ghaut, just given from official papers, may properly serve to diminish the force of any fears on the subject. Nevertheless, the climbing of these celebrated heights by mechanical means will still remain a most interesting practical problem. If it can be accomplished by means already in use, and suitable to the circumstances of the case, it will be better to do so than to incur the cost, risk, and delay of new contrivances: if, however, such be not at our disposal, I do not speak by guess in saying that the requisite devices will not be wanting.

"From the top of the Ghaut to a considerable distance 'the country is quite open and level,' and as far as Ahmednuggur presents no difficulties, if only a detour towards the south be made, which will not only avoid a table land lying in the direct route, but will shorten the branch to Poonah, and favour considerably the southern traffic.

"The chief engineering feature of this level district is the occurrence of the black 'cotton soil,' or 'regur,' which may require considerable care and some experience for the construction of sound earthworks upon it. In the rainy season it is a tenacious clayey mud, in which men and horses sink to the middle of the leg; in the hot months it is a hard earth, intersected through its contraction in drying by fissures of considerable width. Since, however, good cart roads have been constructed on it, by the use of suit-

able materials, without complaint of failure in any season, it may be presumed that this kind of soil will neither present any insuperable obstacle, nor require expensive works. This is a subject of some importance, since the cotton soil is of very extensive area in the Deccan, and its great fertility, by rendering it a great source of traffic, will always form an inducement to the construction of railroads upon it.

"The nullahs or water-courses in this tract are numerous; but as many of them are narrow, and all are nearly dry during several months in each year, the cost of bridging them cannot be considerable.

"The length of this part of the line, as surveyed by Lieutenant Suart, is as follows:—

	MILES.	FUR.	YDS.
From opposite Tannah to the bottom of the Ghaut	56	6	94
From the bottom to the top of the Ghaut	6	0	100
From the top of the Ghaut to Ahmednuggur	66	2	14
Total	129	0	208

"The cost was estimated by the same officer, and the estimate was approved by his able and talented superior, the late Captain Foster: 'For a good, firm gravel road, 18 feet wide, embanked and drained most carefully throughout, and bridged in all its water-courses from one end to the other,' the estimated cost was 69,874*l.*, or about 542*l.* per mile. In this were comprised all the works in the Ghauts, including a tunnel and a suspension bridge. The item of bridges amounts to nearly half the entire cost.

"The whole of this country, both above and below the Ghauts, which is traversed by this part of the proposed line, seems well able to supply its share of the needful traffic. Its fertility is well known, and it is admitted on all hands that it wants but suitable means of transit to render it one of the richest districts of Western India. At present the produce of the valley of Jooneer and the neighbouring parts of the country must reach Bombay, either along the miserable tracks by which the Ghauts are at present descended in that quarter, or it must be carried round by Poonah or Nassick, adding in either case 50 miles to a distance which ought to be but 70. The lower country is equally productive, and equally destitute of a road; its population was a few years ago described, in an official paper, as very willing to labour and apt to improve, but kept down in a state of poverty merely by the want of means to transport their produce. It should be observed that the local traffic of this district, which it is evidently well fitted to supply, has been omitted from our calculations of income, along with that of the rest of the line.

"In connexion with this part of the line, two branches at least should be constructed. That to the northward would be carried to the range of Ghauts which form the southern limit of Candeish. At present the cotton of Nagpoor and Oomrawutty is carried by little bullocks, or perhaps partly by carts, along the valley of the Tapty, and ascends the Ghaut at Chandore. This traffic, added to that of the rich valley of Candeish itself, is of great magnitude and importance, and would be met by the branch about to be described. I am informed by officers who have been in charge of these districts, that at a little distance eastward of Chandore there is a break in the Ghauts of some miles in width, down which a railway workable by locomotives would easily be constructed. This break would determine the position of that part of the line; but it is not so easy at present to say at what point the branch should diverge from the main line, for of the country between the Mool river and Sungumnair the documentary notices are very slight, and I have not met with any person much acquainted with it. There is some reason, however, to expect that a way may be found or made from a point somewhat to the east of Jooneer, which, crossing the range on the north of

that place, shall follow the Mool river into the alluvial plains of the Godavery. If this cannot be accomplished at moderate cost, the branch must have its origin at Ahmednuggur. In either case, the valley of the Godavery once gained, the difficulty is over; for, up to the frontier of Candeish, the country is perfectly flat, exceedingly fertile, and highly cultivated. The bridges here, as elsewhere in this part of India, must be so constructed as to withstand sudden and violent torrents.

"This branch, it is evident, will form the first portion of a road to be extended hereafter along Candeish and Berar, eventually joining any line which may be brought from the Ganges southward.

"The southern branch would terminate for the present at Sholapoor. In this part of India large quantities of cotton are grown; and probably the effect of this branch in encouraging the supply would be felt beyond the Kistnah. From the southernmost point of the detour in the main line, where it would probably originate, this branch would pass over a remarkably level country. Col. Sykes travelled over nearly the whole of it 'without seeing any hill,' except in one case, where 'the road lies over a rise which exceeds a little the general level of the country, and which may almost be denominated a low hill.' After the monsoon 'the country appears one great field of grain.' Here the chief occasion of expense will be the narrow valleys, or rather wide ravines with precipitous banks, which intersect the country, and which may require bridges, or else that the railway should wind between their heads by means of considerable detours.

"The principal part of a direct line from Bombay to Hyderabad, and the first portion of one from Bombay to Madras, would be supplied by this branch.

"A branch would be requisite for the accommodation of the important city and military station of Poonah: it is not easy to say where it would best originate. The country in the direct line between Jooneer and Poonah is very rugged, and it may require considerable local investigation to determine how far directness of route must be sacrificed for cheapness of construction.

"So far, the lines I have described lie entirely in British territory; and the design, if executed only so far, would procure for itself sufficient traffic; for its extremities are so placed as to receive all the commerce of the interior, and the cost of conveyance would be so much lower than that by the existing means, as to affect materially the price of goods, both at Bombay and in the Deccan. If, therefore, it should seem prudent, for political or other reasons, to abstain for a time from pushing the line into the territories of the Nizam, the undertaking might safely rest at this stage until circumstances should favour its extension.

"The city and great military station of Ahmednuggur, up to which I have described the line, is about 15 miles west from the frontier of the native state of Hyderabad, the ruler of which is denominated the Soubahdar of the Deccan, or the Nizam. At a short distance to the north of this city, the plain is reached through which flows the river Godavery; that short distance is occupied by broken ranges, which seem to connect the transverse spurs of the Western Ghats with the table-land which occupies the middle of the space between the Godavery and the Kistnah rivers. The documentary description of this rugged tract do not suffice to show exactly where a railway would best cross it; but I have the assurance of officers whose public duties especially related to that district, that there will be no difficulty in finding a passage. In entering the flat valley of the Godavery, called the Gunguturree, it is probable an abrupt but by no means formidable descent will be found.

"Of the plain of the Godavery, as far as the Manjera river, it may be said in general that it presents no engineering difficulties. It will probably be necessary first to go to some distance to the north of Ahmednuggur before

an easterly direction is taken; it may also be requisite to keep near to the river at Kheir; and the Manjera will probably best be crossed near its junction with the Godavery. Except at these points the country presents a surface of from a dozen to twenty miles wide between the Godavery and the table-land before spoken of, in which the line may be made to take any course best suited to the traffic, the passage of the rivers, or any other consideration. If there be any part of this tract, 150 miles in length, to which this observation does not strictly apply, it is that of the last 30 miles before we come to the Manjera, where low hills will require some care in searching for the best line. It appears, however, from a comparison of the barometrical section of the road from Daigloor to Nandair, lately sent to England by Major-General Cullen, with the forthcoming sheet of the splendid Atlas of India, which is being published under the care of Mr. Walker, Geographer of the East India Company, that if there be less width for choice of ground, there will certainly be no difficulty, and probably no heavy works.

"The surface along the whole tract now under description is composed partly of the cotton soil before mentioned, and partly of a firm, red, gravelly soil of considerable fertility, well suited to engineering purposes. Stone is abundant and cheap; timber less so. The population is numerous, and the country is well fitted for the production of cotton, sugar, wool, and various other valuable articles of export.

"Before I enter on the description of the tract east of the Manjera it may be necessary to observe that no published map correctly represents it. The only authentic source of information respecting it is the Hyderabad Survey, which was founded on and connected with the General Trigonometrical Survey of India. The maps and detailed operations of this survey, with the accompanying statistical memoirs, executed by Lieutenants Morland and Du Vernet, are in MS. at the India House, and have afforded me invaluable guidance through this little-known district.

"The bridge over the Manjera will be one of the great works of the line. The exact width of the river is not given in any of the documents I have met with; it is roughly stated to be 'about a furlong.' Beyond this river the railway would traverse for about 40 miles a country which is generally open, cultivated, and fertile, keeping, however, in the neighbourhood of the Godavery, in order to avoid the rocky chains which would be encountered further south. On reaching the longitude of about $78^{\circ} 35'$ a country is entered which permits the line to take a direction nearly s.s.e. I cannot discover from the maps, or from the detailed description of the tracks, mis-called roads, that any impediment exists for 16 or 18 miles; but at that distance from the turn towards the south a rocky tract will be found, through which, however, it appears there are at least two easy passes, which lead into the valley of the Manar.

"On approaching the last-mentioned river the course of the line will gradually become more easterly, and will pass the town of Ellgundel, which gives name to the cirar. This river flows from west to east, (not from east to west, as the maps hitherto published show it to do,) and its valley is studded with isolated rocks of various forms, rising abruptly from the midst of a level sheet of verdure.

"Before we quit this part of the line it may be proper to note briefly the towns and products of the district; and the more so as some mistakes on the subject have occurred. From the Manjera to the Manar rivers the line runs through a district producing a peculiar iron ore; it is said indeed to be the identical ore from which the celebrated Damascus blades are fabricated, and it is certain that it is carried to Persia and countries farther west, where attempts have been made in vain to imitate the steel produced from it. A very interesting account by Mr. Malcolmson of this important mineral and its treatment is to be found in the *Transactions of the Geological Society*, Vol. v., 2nd Series, p. 547. I regret that it is too long for insertion here. Steel,

and iron implements are made in several towns within the influence of the intended line, and at many others brass pots, paper, silks, fine and coarse cloths, ghunnies, and kumlies.

"Of the towns the following may be mentioned, still confining ourselves to the line between the Manjera and the Manar, viz.: Indoor, '3000 houses,' probably 15,000 inhabitants; Boden 'covers about a square mile,' '2000 houses;' Balconda, 'large and spacious;' Yelgudpa, '3000 houses;' Banouli, '1000 houses;' Bausur, '1200 houses;' Koodaunpoor, '500 houses;' Juktial 'contains a number of regular streets of bazaars,' and 'famous for its manufactures of fine and coarse cloths;' Korutla, 200 bazaars' and '34 manufactories of coarse paper;' Sircilla, 'a large trading town;' Gumberowpet, 'large and respectable population, partly employed in manufactures and partly in the extensive cultivation of land;' Yamulwadda, 'covers 15 square furlongs, houses mostly of brick, various and excellent manufactures;' Cheerlavuncha, 'large and populous,' and Eilgundel with '2000 inhabitants.' These are all within a distance of the line which even in England would be deemed to justify their being taken into its traffic account. In India, however, the towns are of less importance than the villages and the general area of the country; and in the present state of locomotion there, we should also be entitled to take into account the effect of the railway, not only on the towns near which it passes, but on others very much farther off. The above facts are given, however, to show that in this part of the line, which is generally, and in some respects justly, deemed one of the least encouraging portions of it, the elements of future prosperity are by no means wanting. These fourteen considerable manufacturing towns occur on or in the neighbourhood of about 70 miles of railway, being on the average one in every five or six miles.

"Quitting the immediate vicinity of the Manar River, at a point not far from Eilgundel, the line would take the general direction, of the existing track, as far as Mullangoor, and then would have a wide choice of country to Warungool, where it would pass the line which divides the affluents of the Godavery from those of the Kistnah. The same direction carries it along the valley of a large branch of the Moonyair River to Kummummet, from which a course nearly straight, and almost due east, conducts without difficulty to Rajahmundry, an important town on the lower part of the Godavery. The documents I have examined show that no mountain ranges, steep descents, or other physical obstructions, will be met with on the track thus marked out, and that very considerable difficulties of that kind occur on every other route, north or south of it. That other lines through the granite ranges, which are intersected by this series of valleys, will be made eventually, I hope and believe; but at present it seems absolutely necessary to choose that which can be most cheaply constructed.

"On one part of this division of the line, if anywhere, will difficulties occur from climate and the state of the population. From Eilgundel to Kummummet the country is impoverished by the arbitrary and excessive exactions of the Nizam's government, or its subordinate officers. Many of the people have fled from oppression, and the land which once supported a large and powerful population is in some districts overrun with jungles, which shelter beasts of prey, and engender a malaria still more dangerous than they. It must, however, be remembered that these are difficulties which will present themselves on every route by which a suitable point on the eastern coast can be reached—that this would be the portion of the line to be executed last of all, when great facilities would be afforded by the parts already made, and the population had been favourably affected by their operation,—and that it is by no means improbable a different state of things as to the political management of the district will be established long before it will be necessary to undertake the works here.

"The natural capabilities of this part of the country are very great. Under its Hindoo government, previous to the Mahomedan invasion, it was

thickly populated; the numerous tanks and other public works attest the skill and vigour of its former inhabitants; and even now the town of Warungool, the ancient capital of the country, has a manufacture of cotton carpets of singular beauty and durability, which has lately been pointed out as a fit subject for the imitation of our own artisans. If, therefore, for the present we consider the cost of this portion of the line as a dead weight on the rest of the undertaking, we may safely predict that eventually it will produce its due share of the traffic.

"From near Kummummet to the Godavery, the line lies within the British territory, and requires no remark. The crossing of the river will be matter of anxious consideration. At Rajahmundry it is two miles wide, and its banks are 28 or 30 feet deep; it is full and sometimes overflowing in the rainy season, with a rapid current; but during the rest of the year, it consists of small streams, meandering in its wide, sandy bed. Before it is determined to cross the river here, it may be proper to examine the islands in its bed a few miles above the town; for although they are known to be much acted on by the stream, they present some features which render it probable they consist in part of rocky and stable points. If so, they may much facilitate the passage of this great river.

"From Rajahmundry three routes to the coast present themselves; 1st. along the north bank of the Godavery, which passes through a rich and highly cultivated country, but would be incommoded by floods; 2nd, by Biccavole, which would traverse a district scarcely less productive than the first-mentioned, but swampy and unfavourable to engineering operations; and, 3rdly, a route which, by making a detour to the north, and then passing Samukotta, would keep on high and firm land, but would find less cultivation and produce on its way. Local inquiry alone can determine which shall be chosen.

"Coringa is the only harbour on the eastern coast of India; all the other ports have only open roadsteads. Following, therefore, the rule, which I hold to be especially important in the affairs of Indian railways, of looking chiefly to natural capabilities, and only in a secondary though important view to the present seats and course of traffic, it seems to me here ought to be the outlet at the sea for this great system of internal communication. Its intermediate position between Calcutta and Madras is also another consideration in its favour.

"The harbour of Corinna itself admits ships of 600 tons burden, and is the seat of an increasing commerce; but beside the harbour itself, the bay, which is well sheltered by Point Gordeware, extends to Kakeenada, a distance of nine miles; and in fact it is at the last-mentioned place that the large ships which lie in the bay chiefly communicate with the shore. These considerations, together with the swampy nature of the land immediately inland from Coringa, seem to render it expedient that the line should first approach the shore at Kakeenada, and then skirt it to Coringa. It is believed that the harbour itself is capable of considerable improvement. Further inquiries on this subject are in course of prosecution.

"Having reached the eastern termination of the proposed main line, we may return to the interior, where there are two branches not yet described. That to Nagpoor will necessarily cross a district of which the survey has not been completed. As far as the country has been described it is very favourable to the construction of the road; the middle part of the route, which is that not yet surveyed, possesses ranges of hills which will require careful examination and probably some expensive works.

"From Major-General Cullen's barometrical section of the road over this district it does not appear that any long declivity will be met with worse than 300 or 400 feet in five miles, even on the present unformed road; but shorter and steeper passes occur in three or four places. Other descriptions, of a verbal nature only, would lead one to suppose that the difficulties were

much more formidable. Until an actual examination of the country is made, it is perhaps not possible to locate the line with any degree of exactness.

"The branch to Hyderabad, or more probably to Secunderabad, will be about 80 miles long, and will rise in its whole length about 800 feet; this elevation is attained, however, with considerable uniformity along the whole line. I cannot find the slightest indication of any thing which would be deemed a serious difficulty, or would occasion extraordinary expense.

"The engineering character of this undertaking having required so much space for its exposition, I feel that I ought not to trouble you further at present. Permit me, however, to say, that should future circumstances require it, I shall be quite ready to verify by reference to authorities, not only the statements I have made in this paper, but those in respect to population and commercial statistics, which you will find in our printed documents.

"For the means of doing so, I am greatly indebted to the access given me by the liberality of the Directors of the East India Company to their papers and documents; to the courtesy and very kind assistance of the various gentlemen in the India House, with whom I have been in frequent communication; and to the valuable information given me by many gentlemen who have held high official appointments in India, both under the British and native governments. The map which will be supplied to you, I trust, will be sufficiently explanatory of the design; it is the production of Mr. Walker, who, to his great acquirements, adds on this occasion the peculiar advantage of being the geographer of the East India Company. I have had very much to thank him for in the course of this inquiry.

"In a subject of this kind, embracing such a variety of details, applying to a country so extensive, and capable of being considered in so many different views, it is not possible that, previous to the actual examination of the country for railway purposes, entire coincidence of opinion should prevail on every point. While, therefore, a cordial agreement subsists amongst the promoters of this scheme, as to its general character and prospects, I have thought it right to take on myself the entire responsibility of the particular details I have given above. To what extent, if any, deviation from the line I have described is desirable, may be left to future inquiries to determine.

"Should the future course of the subject require further information from me, you may rely on receiving it; and in the mean time, I am,

"Yours respectfully,

"17th July, 1844."

"J. CHAPMAN.

Leaving Mr. Chapman's statement to speak for itself, we proceed to notice the estimates of cost and return which the Directors of this project have set forth. It need hardly be observed, that these estimates, from the very nature of the case, can at the best be looked upon but as matter of surmise; and we confess that in many cases they appear to us to be too low. However, having no means of putting in an estimate of our own, we shall content ourselves with that of the promoters. In the first place, they put down the original construction of the railway at 3,000*l.* a-mile, allowing 500,000*l.* extra for getting over the Ghauts, and 600,000*l.* for what is technically called "the plant," namely, the stock. At this rate the total estimate for the construction of 1,300 miles, which the main line and its branches would consist of, amounts to 5,000,000*l.*; but to cover all risks it has been determined to make the capital 6,000,000*l.* With respect to the estimate of 3,000*l.* a-mile for the construction, the promoters state that it has been arrived at upon a consideration of the cost of the rougher sort of railways in use in America, the average cost of which, including stations, is 2,812*l.* a-mile for a single line. The promoters then go on to calculate, that in consequence

of the greater cheapness of labour in India than in America, 3,000*l.* would be an ample estimate, it being understood "that the line should be double or single, as the traffic may require." Now we cannot help thinking that there is a considerable error in this calculation. Labour, so called, is certainly cheap in India, but then it is of a very different sort to the labour of the Old World or of America. Moreover, mere labour, unconnected with some degree of skill, is not sufficient to carry on the works of a railroad, and in this latter respect we fear the labouring classes of Hindostan will be found very deficient. All that has regard to the direction of the works must, we apprehend, be conducted by European or American engineers, and such persons we could hardly hope to get under double the pay that they would get at home. Add to this that the wooden railways of America are chiefly constructed through districts where the staple material is close at hand all along the road, whereas in India it will often have to be conveyed a considerable distance; and we have said enough, independently of the engineering difficulties which the country in India must continually present, to throw considerable doubt upon the accomplishment of an extensive line of railway in the latter country at the moderate cost estimated by these projectors.

With respect to the working expenses of the line, the following estimate is made upon the basis of the experience upon the Midland Counties Railway in 1843.

COMPARATIVE ESTIMATE OF COST OF LOCOMOTIVE POWER IN INDIA.

ENGLISH.			INDIAN.		
Deduced from the Accounts of the Midland Counties Railway for July —Dec. 1843.					
Fuel.—	d.	Per mile per train. d.	Fuel.—	d.	Per mile per train. d.
Coke, at 18 <i>s.</i> 5 <i>d.</i>	. 2.848	} 3.495	Coke, delivered at Bombay or Corin- ga, at 59 <i>s.</i> per ton, and costing $\frac{1}{4}$ <i>d.</i> per ton per mile for 125 miles haulage . . . 9.929		} 12.645
Coal, at 9 <i>s.</i> 2½ <i>d.</i>	. 0.647		Coal, delivered at 33 <i>s.</i> 6 <i>s.</i> with the same additional charge . . . 2.716		
Wages.—Engine and Firemen	1.112		Wages.— Engine and Firemen, say half English cost . . . 0.556		} 0.667
			Half native, one- fifth English . 0.111		
Oil, tallow, and sundries . . .	0.272		Oil, tallow, and sundries, say as English	0.272	
General charges, including cleaning the engines, care of coke stores, extra engine- men, cotton, waste, cleans- ing, &c.	2.320		General charges, great part being labour, say half En- glish cost	1.160	
Carried forward . . .	7.199		Carried forward . . .	14.744	

Brought forward	7.199	Brought forward	14.744
Repairs	2.407	Repairs, at first expensive, but eventually, as native labour may be employed to a great extent, say, on the average, as English	2.407
	<hr/>		<hr/>
	9.606		17.151
		It should be observed that this cost will be greatly reduced if wood be used for fuel, as in America.	

Here, again, we are bound to recommend a little more liberality. In the matter of coke we have nothing to complain of; it may probably be a very fair estimate; and should wood be used as a substitute, it cannot be doubted that the expense will be considerably diminished. When we come to wages, however, we are inclined to go upon a totally different principle to that of the promoters. However successfully the native hands of India may eventually be trained to guide the hissing locomotive, and feed its craving appetites, we consider that in the first instance the great majority of hands employed must be Englishmen; and these could not be obtained at less than double the rate at home. But even if we had only half Englishmen, they would cost as much as the full complement of hands at home, namely, 1.112 per mile; and then, adding the half number of natives, at whatever they might be content with, we increase this item by more than 6*d.* a mile. There is another point to be taken into account in the matter of wages, namely, that in England the calculation is made upon a line in full and constant operation; repeated trains going at a rapid rate. In India the trains would be less frequent, and would go considerably slower; and, the wages being paid by time, the cost per mile would obviously be increased. In regard to the items of general charges and repairs, the same observations apply to the full extent; so that, upon the whole, we think the gross estimate of 17.151*d.* would probably be found to be increased by 3*d.* or 4*d.* in practice.

On the other hand it must be stated that the promoters make what appears to us to be a most modern estimate of income; charging only for the carriage of a certain amount of goods (no passengers) which they have ascertained to be available to the line. Mr. Chapman makes his estimate upon the hypothesis of 500,000 tons per annum, carried over 250 miles, at the rate of 2½*d.* per ton per mile.

EXPENDITURE.	£	RECEIPTS.	£
Maintenance of way and works, 1,300 miles, at 140 <i>l.</i> per mile	182,000	For carriage of 500,000 tons of goods 250 miles, at 2½ <i>d.</i> per ton per mile	1,432,292
Locomotive power :—			
10,000 trains, at 17.151 <i>d.</i> per mile per train for 250 miles	178,656		
Police	52,000		
General charges	129,540		
Balance applicable to dividend	890,096		
	<hr/>		<hr/>
£14 16 <i>s.</i> per cent. £1,432,292			£1,432,292

When we consider that in this estimate there is no credit taken for the important item of conveyance of mails, troops, government stores, and passengers, and that with these omissions a dividend of 14l. 16s. per cent. is calculated upon, we must admit that we can well imagine the actual produce derived from all sources, when the railway should be in full operation, to afford the means of meeting all the discrepancies we have pointed out in the estimate of expenditure, and to leave a dividend, if not exactly of 15l. per cent., at least of very handsome proportions.

In the mean time, however, before any of these results can be calculated upon, we again repeat what we have said before, that unless the government, who are above all people so vitally interested in the matter, take the lead in promoting the enterprise, we see little chance of private capitalists coming forward to a sufficient extent in the cause. British capitalists certainly could hardly be expected to do so, when those who are supposed to know so much more about the matter do not set them the example; and in India it is notorious that the native merchants, from long habit, attach so much importance to the opinion of the Board of Directors, that however individually they might approve of the project, and be willing to embark in it, it would be in vain to hope to get them to subscribe to it, except with the moral sanction previously given of the government at home. In what way and upon what conditions the government might most properly lend their aid is a question we do not pretend now to enter upon; probably, however, the guarantee for a certain number of years of a moderate dividend upon the original capital, say 3 per cent., against the liability for which should be placed as a credit the charges agreed upon for conveyance of mails, troops, &c., would be a fair proposal, which, whilst it would not incur a very heavy responsibility to the government, would save the shareholders from the apprehension of total loss in so novel a speculation, conducted at a distance which would render personal inspection and superintendence out of the question.

All these are matters, however, which will require much future consideration. We have done sufficient for the present in directing attention to the more important features of a subject which must eventually become one of engrossing interest.

THIRD ARTICLE.

It is impossible to pursue the consideration of the project for establishing railways in India, that last and most powerful element of civilization, without reflecting, and reflecting with bitterness and self-reproach, upon the total neglect of every other element of civilization which has been hitherto suffered to prevail in the extensive, fertile, but shamefully neglected plains of the East which have fallen under our influence. Indeed, the squalid misery of our fellow-men in Asia has long been so notorious, that it seems to have been looked upon as a matter of course, an esta-

blished fact which is to endure to all ages a monument of disgrace to ourselves and our ancestors. And it is no wonder when men of business reflect upon such a state of things that they doubt and hesitate as to the possibility of a remunerative traffic being obtained for so expensive an undertaking as a railway. Nevertheless, we are convinced of the necessity of establishing the means of railway communication, as one ingredient of the improvement which is so loudly called for; and as we have said in two former articles, we consider it to be the duty of the Indian government to assist in the carrying out of that great object, regardless almost, in the first instance, of any comparison between the outlay and the contemplated revenue.

There are some great lines of railway for the connexion of the principal seats of government, which we have no doubt will have to be established at a heavy sacrifice in the first instance. There are, we believe, on the other hand, some shorter local lines, passing through districts already occupied with traffic, in which railways might be established at the risk of individuals, with a fair prospect of profitable return. Every thing, however, in such a line as this depends upon its being traced in the most eligible direction to meet the great depôts of commerce, and upon the engineering features which the soil presents.

Of this latter character is the railway projected by Mr. R. M. Stephenson's Company, from Calcutta to Mirzapore, which we referred to in our number for July; and similar in object, and very near in locality, is the Great Western Railway of Bengal, more recently projected. Of the relative bearings and merits of these two lines we shall speak more in detail in the course of the present article; before doing so, however, we have some general observations to make as to the moral and social condition of the people, and the prospects which they hold out of improvement, a subject intimately affecting, and affected by, any vast scheme of enterprise of this kind.

The projectors of railways in Europe, when recommending their several lines to the public, endeavour to do so by stating the immense masses of population through which they will pass; their wealth and thriving condition, all which are considered as data upon which to estimate the returns of the proposed undertaking. In India, shame to the supineness of our government, such arguments cannot with any truth be referred to; if they were they would only excite a smile of reproach. Yet, paradoxical as it may sound, the very poverty and misery of the inhabitants of India, rightly considered, in connexion with the acknowledged capabilities of the soil, is rather a matter for encouragement than otherwise, to speculations of useful enterprise. It is in the development of the resources of a virgin soil that the speculator has the surest prospect of large eventual gain; and if in such a country he sees any thing like a fair probability of immediate moderate return for his capital, he may undertake the project with comparative confidence in the interim, and with the brightest prospects for the future, prospects in which the essential features of personal advantage are developed concurrently with the happiness and prosperity of a numerous community.

With this view let us, therefore, now consider: 1st, the wretched social state of the people of India; and 2nd, whether in spite of that wretchedness there are the means of supplying adequate traffic to a line of railway judiciously laid down, as, for instance, the great tract of country to the

north and west of Calcutta, comprised between the districts of Behar and Purnea.

With respect to the social condition of the native inhabitants of these provinces, as indeed of India generally, it is astonishing how little is known by the people of England, and above all by their legislators; and it is no less remarkable, how little pains the Government have been at to obtain accurate information on the subject. It is true, that in 1807 a survey of the districts in the eastern territories of British India was ordered to be made by the supreme government, and that Dr. Francis Buchanan was appointed to undertake it. This survey was to comprise a topographical and geological account of each district, the number and condition of the inhabitants, and their religion; the natural productions of the country, in fisheries, forests, mines, and quarries; the state of agriculture and of land tenures; and finally, the state of the arts and commerce. This survey occupied several years. In 1816 the result was forwarded to the India House, where it has since remained, without any attempt being made by the Directors to publish statements which might well be considered of the highest interest and importance. In 1838 Mr. Montgomery Martin obtained permission to inspect these voluminous papers, and to extract portions of them for publication, which he has done in a work of considerable extent. In his introduction to the third volume of this work^a, Mr. Martin says:—"That a survey containing such materials—offering so vivid a description of the social aspect of millions of our fellow-subjects, and corroborating every useful fact by minute statistics, should have remained so long in obscurity, is indeed to be deplored, and can only be accounted for, by supposing that it was deemed impolitic to publish to the world so painful a picture of human poverty, debasement, and wretchedness." And in the introduction to his first volume, he says:—"It is impossible to avoid remarking two facts as peculiarly striking:—First, the richness of the country surveyed; and secondly, the poverty of its inhabitants."

Though the fact is one which cannot be doubted, we will quote a few passages, almost at random, from the materials of Dr. Buchanan's survey, as edited by Mr. Martin, in illustration of the terrible extent to which it is true.

"*Patna*.—Although one of the chief cities in British India (it is nine miles long) has out of 52,000 houses, 22,188 mud-walled huts covered with tiles, and about 20,000 similar wretched tenements covered with grass. Paving, cleaning and lighting are totally out of the question. It is difficult to imagine a more disgusting place.

"*Patna District*.—The small number of houses that are built of rough stones with clay mortar, where such materials are so abundant, is a clear proof of extreme poverty. In most countries so situated, the meanest huts would be built in this manner. The huts here are far from neat, and although dark and close, have seldom more than one small aperture for a door. Wooden doors and glass windows are far beyond their reach.

"*Ratnaugunj*.—This is a fully occupied and very beautiful country, especially towards the north-west, where there are some rocky hills finely wooded, while the adjacent country is thoroughly cleared, and adorned with numerous plantations, consisting almost entirely of mangoes inter-

^a *The History, Antiquities, Topography, and Statistics of Eastern India*; by Montgomery Martin. 3 vols. 1837.

mixed with palms. The villages, however, are poor, and the wretchedness of the huts is concealed by fences and bushes. There is no lake nor marsh of the least note. Two of the Zemindars have small houses of brick, but there are no buildings that can at all be considered as an ornament to the country.

"Fayezullahgunj"—Is a jurisdiction of a moderate size. Were it in a decent state of cultivation it is a very beautiful country; but, owing to the neglect of the proprietors, it has in many parts a most dismal appearance. The northern extremity is low land flooded by the river, most beautifully cultivated, and adorned at each end by little hills.

"The natives have erected no dwellings of brick, and there are some Troglodytes who still live in caves. There are two or three miserable brick bridges, but no public work in any degree ornamental.

"Paingti"—There are a few scattered hills, and those of the northern tribe of mountaineers bound most of the territory on the south, and would render the scenery very fine, were the land between them and the river occupied and cultivated, but it is almost totally neglected, and I have nowhere seen such a wretched jurisdiction. There is no dwelling of brick.

"Rajmahal"—Is extremely fertile, and the whole district might be made most beautiful, as the hills of the mountaineers are everywhere in full view to diversify the scene, and the lakes add a beauty which is uncommon in India. There are 220 buildings of brick remaining, but they are in general so slovenly as to impress the mind with less regret than even the common huts of the peasantry. There are two bridges of brick; one at Udhwanala said to have been built by Kasem Ali, and another towards Pimpahar. They are both small and exceedingly rude, and although still of use seem fast hastening to ruin.

"Lakardewani"—This country is naturally beautiful, as it consists of very rich lands, finely interspersed with detached rocky hills, that are covered with wood. The country, however, has been miserably neglected, and is overrun with forests, and the houses are very mean.

"District of Goruckpoor."—The extent of barren land absolutely unfit for cultivation is small; there are few or no ravines, and hills only occupy 16 square miles.

"In the places where fallowing is best understood, it produces from 8 to 10 years, after a fallow of 2 years, and for the first three gives annually two crops. There is a great deal of rich vegetable mould, which is very retentive of moisture, so as to produce some verdure in the worst seasons, and to yield crops of wheat and barley without irrigation.

"Dinajpoor"—Embraces an extent of 5,374 square British miles.

"It is much to be lamented that the cultivation of these lands could not be further extended; for the soil, although in some places covered by beds of sand, is remarkably rich, while in its present state the value of its produce is very small, being chiefly a wretched pasture and long reeds.

"The people on the banks of the Ganges live much on cakes made of pulse, and the poor seldom procure rice.

"In a few divisions towards Dinajpoor, the poorest people eat little or no salt, and supply its place by ashes; and in a few others towards the north-east the lowest classes add some ashes to compensate the scantiness of the supply."

Here is a terrible picture of human wretchedness. Now contrast it with the picture which might exist if the natural resources of the soil, so bountifully bestowed by heaven, were turned to their proper account.

"Near the river a great deal of the land gives two complete crops in the course of the year. One-half of the rice land in the interior gives

a crop of Khesari (of the bean tribe) sown without any cultivation among the corn, when that is near ripe.

"*Puraniya*.—Here it must be observed that a great quantity of seed is sown without any previous culture. The farmer merely scatters the seed among the mud at the commencement of the fair weather, and is at no other trouble with his crop, until he comes to reap it.

"There are reckoned three harvests annually, viz. *Bhadai*, reaped in the rainy season, including broadcast rice, maruya, maize, &c.; *Khurif*, reaped in the cold season, including transplanted rice, janera, &c.; and *Rabi*, reaped in spring, including wheat, barley, linseed, peas, &c.

"Near Patna and Dinajpore, potatoes are cultivated to a great extent. The same field usually gives, in the intervals between the crops of the potato, a crop of vegetables, and another of maize.

"*Shahabad*.—In this district 2,297 square miles are occupied by fields, gardens, plantations and houses. The proportion of land that gives two full crops in the year may amount to one-twentieth of the whole. About one-half the district is cultivated with rice; but there is no doubt that, if proper pains were bestowed on irrigation, few countries are better fitted for this valuable grain.

"Here, as well as in Behar, there are reckoned three harvests."

The following is a startling illustration of the necessary consequences of this state of things—existing, be it remembered, for nearly a century—under the paternal auspices of a great and civilized nation!—

"When a pilgrim on his road falls sick and is unable to walk, he is deserted to his fate, and unless some charitable persons provide for his wants, he perishes. The officers of the police say that near the routes which the pilgrims principally follow, the number of bodies they are obliged to bury (to prevent the nuisance of their becoming putrid) is very considerable."

But the most striking and conclusive evidence of the wretched condition of these victims of misgovernment is found in the price which the sinews of their bodies—thus miserably starved, thus miserably lodged, thus miserably left to die on the road-sides—fetch in the market of labour. To talk of the wages of free labour were almost a farce, when it is to be calculated in pence and fractions of pence per diem; the best criterion, perhaps, is in the price of slave labour, where there is no pretence at free agency, and the highest price is obtained which the whole exertions of the victim are supposed to be worth. What must we think on this point of the case, when we find that the price of a slave in the East Indies—the whole price of his body, bones, and sinews, to the day of his death—averages from twenty to forty shillings; and recollect, that in the West Indies, whose sable sons of slavery have excited so lively and so creditable a burst of sympathy throughout the empire, the price of a slave amounted to forty, fifty, ay, and sometimes as much as a hundred pounds. Think of this, ye open-mouthed philanthropists! Beneath "the lowest hell" of your conception, a "lower hell appears;" a class of slavery in the East, twenty-fold lower in the scale of degradation than that upon which so much eloquence has been bestowed in our legislature, for which so much blood has been spilt on the seas, and to supersede which twenty millions sterling in hard cash was readily contributed. And when so much has been done for the African, "who is yet our brother," shall nothing be done for the sable Indian, who is our brother also, and who in honourable, manly intelli-

gence, and the fine feeling of loyalty—without unkindness be it said—far excels the negro slave of the West?

We said at the outset of this article, that it was impossible to discuss the subject of railways in India without entering upon larger topics of this kind. The simple facts which we have drawn from authentic records fully support our assertion; and we tell those who are intrusted with the government of the affairs of the East, fairly, that if the contemplation of the establishment of railways in India leads to these reflections, the actual establishment of them must do much more; it must force the glaring abuses, the results of which we complain of, to a practical and adequate remedy.

It might be too much to expect that railways should, of themselves, effect all the ameliorations which India, so long misgoverned, so sunk in poverty and wretchedness and sloth, stands in need of. But at the same time they will undoubtedly effect much: they will be a beginning upon which the rest must follow; for how is it possible to conceive that such a state of things as exists now should long continue, when improved facilities of communication have brought these benighted people and their ways under the observation and influence of the civilized world!

Two causes of complaint especially have long been urged against the government at home, in their policy towards India. First, the illiberal tariff, which, as is alleged, "compels" the natives of British India to receive our steam-wrought manufactures at a rate of but $2\frac{1}{2}$ per cent. duty, whilst we impose 20 and 30 per cent. on the hand-wrought cottons and silks of the Hindoos, and duties amounting to from 150 to 300 per cent. on their sugars, coffees, spices, &c. Secondly, the onerous nature and mode of levying of the land revenue. We are not going to enter into a discussion of the justice of these complaints, though we may say we believe they are in the main but too well founded. We cannot help thinking, however, that any measures which would promote the sale and transmission of the raw products, particularly the staples of wool, silk, dyes, rice, sugar, &c., to the steam manufactories of England, would at once improve the condition of the country in the most legitimate way, namely, by encouraging to the fullest extent the cultivation of the soil, now so direfully neglected. Once this was accomplished, it would be no hardship to the Hindoos to be "compelled" to receive their cottons in a manufactured shape, at a less exchangeable cost of labour than they could make them at themselves; and the land revenue would become lighter to the payer as a natural consequence. The fruits of this good beginning—for we should look upon it only as the beginning of the great scheme of moral advancement—would not be very long in showing themselves. Poverty and mismanagement, particularly in communities, are but too generally concurrent and reciprocal. No reforms can be achieved by a people sunk in the squalor of wretchedness; they have not strength to enforce their rights of themselves, and they have not means to enlist the sympathies of those who could effectually aid them. For civilization has an instinctive repugnance against association with degraded barbarism, just as health and life recoil from the chambers of putrescence and death. We cannot enter into the feelings of men with whom we can have no sentiments in common; we

can scarcely bring ourselves to sympathize with them in sufferings which seem naturally and inevitably attached to their condition. Accordingly, we have no instance upon record of civilized governments taking the initiative in any grand scheme for the amelioration of the condition of a barbarous people, for the mere sake of doing good*. Self-interest is the mainspring of all things in this world; and accordingly commerce in all times has been the precursor of civilization.

We have laboured in the foregoing observations to impress upon the public the great importance, both to the interests of the nation and the interests of humanity generally, of any enterprise which should open a more extensive and easy communication between the active, enterprising world, and the fertile but neglected fields of Asia. We have already considered the plans of two companies projecting railways for India, both in regard to their public utility, and the probability of their becoming profitable investments for the proprietors. We have now to consider the project of a third company in this latter point of view,—namely, the Great Western Railway of Bengal.

As we have already intimated, this railway is projected with a view to local, and chiefly commercial traffic, the receipts from passengers being scarcely taken into consideration by the promoters in their estimates. It proposes to accommodate much the same district of country as that of Mr. R. M. Stephenson, under the auspices of the East Indian Railway Company. It becomes, therefore, almost inevitable that we should consider the two projects together, in order to understand the relative merits of each.

Mr. R. M. Stephenson's plan, (we take his immediate project, without its ultimate extensions,) consists in a line of railway from Calcutta—or rather from Howra on the opposite side of the river—to that important mart, Mirzapore, with a branch to Lucheron. The length of this line would be about 400 miles. It would start direct from the right bank of the Hoogly, and so through Burdwan, direct to its terminus.

The Great Western Railway of Bengal takes a more northern direction. It starts from Calcutta, keeping the left bank of the Hoogly till it gets to Chogda, (an important military station,) where it crosses the river, and then proceeds, passing by Burdwan, Raneegunje, Kuruckdea, Behar, to Patna. From Chogda a branch proceeds more due north, by Kishnagur, Moorshedabad, to Sootee, an important commercial dépôt. The total length of the line to Patna is estimated at about 320 miles, and of the branch to Sootee about 115 miles, making a total of 435 miles.

With regard to the engineering features of the two lines, it behoves us to say a few words; though, from the great want of accurate information which exists on the subject, we cannot be supposed to examine either line throughout its length with any pretensions to accuracy or completeness. We took occasion, however, when noticing the Mirzapore project, to remark upon the very slight degree of actual engineer-

* The Act of Negro Emancipation may be pointed to, perhaps, as an instance. But we much doubt the purity of the motives which led to its accomplishment. It had grown by long discussion into a party question. It was, moreover, a popular question: and it was the force of public opinion—not the honest impulse of the Government—which caused it to be carried.

ing knowledge which Mr. Stephenson appeared to possess on the subject,—it being confessed, indeed, that no surveys had been made, though mention was made of “several communications of the chief engineers and officers of the government,” which, however, were not produced. From information which we have been able to acquire in regard to the nature of the country through which Mr. Stephenson proposes to travel, we apprehend there are many difficulties, the extent of which he has not calculated upon. For instance, in the very starting from Calcutta; by taking the right-hand bank of the river, he finds himself, from Howra for a distance of several miles, traversing a low tract of country, which for nine months of the year is flooded into a perfect sea; and which he could only get over by building his line upon arches some ten or twelve feet high. In fact, we believe that there is little doubt that he has started too abruptly to the west, and on the wrong side of the river, the opposite bank being elevated and firm. On arriving at the Soane a new difficulty, and a more fearful one, will present itself. How will he cross that rapid, uncertain river, so broad in the flooded season as to require a bridge of miles, not yards, in length? And then, when he has crossed it, ghauts come across his way which in ordinary engineering experience would be considered insurmountable. We throw out these hints very generally: those at all acquainted with the country will have no difficulty in appreciating their importance.

On the other hand, the Great Western of Bengal Railway, by adopting the left branch of the Hoogly, avoids the swamps in which the Mirzapore line is involved at starting. The width of the river at Chogda is by no means of insurmountable extent, perhaps about the width of the Thames at London Bridge, and being between well-defined banks, its course has not varied for years, and it is not subject to overflow. The tide, moreover, is moderate, an average of about three quarters of a mile an hour; so that, if found expedient on other considerations, it might be crossed by a floating engine bridge, a practice already adopted with success in this country. From Chogda all the way to Patna, we believe it may be stated with truth, in the words of the prospectus, that the line of route proposed is “nearly a complete level throughout, except in one point, where a little cutting may be required, and whereby a plentiful supply of building stone can be obtained for the necessary purpose of the works.” Generally, also, it may be stated as a great advantage, that there is an abundance of sandstone suitable for sleepers throughout the whole length of the line. To return to the levels, however: as far as Raneegunje the country has been already most accurately surveyed; namely, in 1842, by Mr. Morney, C. E., when Dwarkanauth Tajore, of the wealthy and influential firm of Carr, D. Tajore, and Co., actually projected a canal from Raneegunje to Culna^a. These surveys, as well as the actual sections of the proposed canal, we have had an opportunity of inspecting; and when we say that the country presents no difficulties even for a canal, the fall all along being only about ten feet in the mile, we put the notion of difficult gradients for a railway entirely out of the question. The rest of the line, from Raneegunje to Patna, goes over a tract of country

^a This enterprising and intelligent man is an active promoter of the Great Western of Bengal scheme, and has consented to act as trustee for the Company in India.

which has been surveyed by Capt. Princep, with a view to the restoration of native roads; and the result of these surveys shows a continuation of the same favourable gradients, with a slight exception in the mountainous district of Beeda, throughout the whole extent of the line. The branch from Chogda to Sootee, though not, we believe, as yet, surveyed with the same accuracy, may be considered practicable without any extraordinary engineering difficulties, when we know that it runs throughout the greater part of its course by the side of the military road, one of the best in India.

Upon the whole, therefore, in an engineering point of view, we think there can be little doubt that the Great Western of Bengal is the preferable scheme of the two which we have named.

We come now to consider the traffic advantages offered by the two lines. Upon this point it will be seen at a glance that, whilst Mr. Stephenson's plan connects Calcutta with a much higher point up the river, namely Mirzapore, it affords no accommodation to places lower down the river, and comparatively, by reason of the bend of the stream out of the direct way; as, for instance, the important city and depôt of Patna itself; for it could hardly be expected that merchandise should be sent up the river from Patna to Mirzapore in order to take advantage of a railway starting thence to Calcutta. On the other hand, Patna occupies a position on the river after it has received the waters of the Soane, as well as those of the Sargon and other tributary streams, feeding it with merchandise from the North; it will, therefore, suffice for the trade of Mirzapore, and a great deal more besides, coming from districts rich in natural products which only want a market. The branch to Sootee, moreover, opens a communication into the heart of an entirely new field—the Purnea district—rich in indigo, opium, and cotton, which is not even contemplated in the Mirzapore project. In a word, it can hardly be disputed that the Great Western of Bengal Railway will take in all the traffic which was proposed to be accommodated by the Mirzapore line, (with the drawback, certainly, of that portion of the traffic having to go some considerable distance down its present route on the Ganges, namely, to Patna,) in addition to that of the extensive and fertile districts between Benares and Purnea to the north of the Ganges, which would by the other scheme be left totally unprovided for.

We may observe by the way, that Mr. R. M. Stephenson's scheme ultimately includes an extension to Cawnpore and Feerozpoore; and that the Great Western of Bengal Company intimate an intention, at some period more or less remote, of extending their line from Calcutta to Diamond Harbour, and from Patna to the important station of Dinapore, and indeed eventually of ramifying further into the northern and western parts of India, crossing the Ganges near Patna, and proceeding by way of Benares, Allahabad, and Agra, to Delhi. With these extensive projects, however, we shall have nothing to do at present, contenting ourselves with the works proposed more immediately to be carried into effect.

The promoters of the Great Western of Bengal Railway, in its immediate extent, state that, in carrying out the above project, they "feel strongly impressed with the important advantages that must accrue to this portion of India by these projected lines, which immediately connect Calcutta with the fertile, productive, and important districts of the

north and north-west, and, by the junction with the Ganges at Patna, open a direct communication for the traffic upon that great river with Calcutta, and thus avoid the dangerous, uncertain, and tedious river navigation, at present the principal means of carrying the valuable commercial productions of the interior and north-western provinces for shipment to the ports of Europe and America. These productions consist of cotton, rice, indigo, silk, sugar, opium, coals, lac, dyes, timber, saltpetre, minerals, &c., which abound throughout the whole extent of this district; and when it is taken into consideration the great loss sustained by delay of transit, damage done to merchandise, expenses of freight, insurances, and various other losses, caused by the insufficiency of the present mode of internal communication, it may be confidently expected that this railway will, to a very great extent, supersede the river navigation, and bring down to Calcutta the enormous amount of traffic that at present floats down the Ganges."

This traffic down the Ganges annually, is estimated at from 800,000 to 1,000,000 tons, costing by water 26s. a ton, and occupying three weeks in the transit; and supposing that only half of this should be transferred to the railway, the goods' traffic, at the rate of a penny a ton per mile, it is estimated, after deducting the working charges, would give a dividend of 12 per cent. upon the capital outlay. This must of course be taken as a speculative estimate; but when we consider, on the other hand, that the directors take no credit for passenger traffic, conveyance of troops, mails, &c., which, particularly in the northern districts, would be considerable, we think it not irrational to calculate that a very handsome return would be made by the proposed railway after all charges paid.

In order, however, to enable the reader to form an opinion for himself of the importance of the districts through which this railway proposes to pass, we proceed to enter upon some statements of statistics, gleaned from the *Bengal and Agra Annual Guide and Gazetteer* for 1842, a work of authenticity, but difficult to procure in this country.

First, of the Burdwan district:—

Of the natural products of this district, coals hold a prominent place; and it is worthy of remark that all the district round Patna stands much in want of this commodity, every ton of which that is now consumed there having to be taken, by a tedious voyage of six or seven weeks, up the stream of the Ganges. The railway would convey them in a few hours. Calcutta also has to be supplied by the route of the Ganges.

"These coals are got from the Shairghur pergunnah, in the Collectorate of this district. The beds of coal are said to be very extensive, and so near the surface, that the outcropping of the strata is observed in all deep nullahs, and often even on the surface of the plains. The strata are of varied quality and thickness at different places. When it was first discovered it is difficult to say; but the natives seemed to know that it could be burnt, although they made no use of it. The late Mr. Marriott used to bring some cart-loads to Burdwan, before the government, in conjunction with Mr. Jones (in A. D. 1812), opened a mine, or sunk a few shafts at Raneegunge (Eghaira). After government had expended about 20,000 rs. on it, without any return, the property was given to Mr. Jones, who conducted it in a small, but profitable way, till his death in 1821 or 22. It was then purchased by the late Captain James Stewart, who, with the assistance of Messrs. Alexander and Co., got up a steam-engine, to keep the mine

clear of water. The mine soon passed into the hands of Messrs. Alexander and Co., and was carried on more extensively; and, at their failure, was beginning to be a valuable concern. The scarcity of money at that time made people fearful of taking up the concern, and it passed for a small sum into the hands of that enterprising native gentleman, Dwarkanath Tagore, since which time it has been a most flourishing concern, in the hands of Messrs. Carr, Tagore, and Co."

The quantity of coal taken down of late has been about 13 or 14 lacs of maunds, equal to from 43,000 to 46,000 tons; and the manner of its storing, &c., for that purpose, (all which would be avoided on the establishment of a railway,) is thus explained:—

"The coal raised from the mines during 9 months, must first be taken down to the river side, where it remains regularly piled up, till boats can be sent up; when it is taken down within the influence of the tides to Amptah (some 120 miles from the mines, and 74 miles from Burdwan). From this depôt the coals are taken to Calcutta as wanted. Boats are not yet plentiful on the Damooda, and none above 500 or 600 maunds can ply easily in the higher part of the river. Establishments have consequently to be kept up at the mines for digging and for filling the boats (the latter requires to be done with all dispatch on the arrival of the boats): also at Amptah to procure the boats, receive the coal and send it to Calcutta as wanted, and at Calcutta to sell and weigh out the coal and supply the steamers, all which establishment requires a large company effectually to supply. Coals are also brought down the Adjye, but the navigation there is so much more obstructed than on the Damooda, that the quantity which is brought down is very small."

Amongst other natural products of this district, we have the following:—

"Sandstone of a very good quality is also procurable in the Shairghur pergunnah. Messrs. Alexander and Co. had a quarry at Choorooliah, which was worked for some time, but found unprofitable; sandstone slabs have been brought down to Calcutta for flooring, but found too soft. This was chiefly owing to the natives taking the stones from the exposed portion of the rock, finding it more easy to work. If quarried from a proper depth, the stone would be found very good, but the difficulty of carriage is against any speculation in this article.

"A black claystone is also procurable; which, having a slaty fracture, would also do for flooring: the stone takes a very good smooth polish, and is much used by the natives for making their images of Seeb. Stone platters and cups, in large quantities, come down from thence; but they are made higher up the river, in the Maunbhoom district. Ironstone, of a good quality, is also in abundance in Shairghur: the manufacture of iron has, however, receded as the jungle failed, but it is still smelted in the Beerbhoom, Maunbhoom, and Bancoorah districts. Hotsprings have been found by the late Mr. C. Betts, in the bed of the Damooda, a little above Cheena Kooree, of the same kind as the famous hot wells in Beerbhoom.

"Of the agricultural products, rice and sugar-cane are the most abundant. Potatoes are also very extensively cultivated to the south and east. Mulberry is also grown there. Coffee has been tried, but has not succeeded. Indigo is very extensively cultivated along the Bhaugrutty, and is also cultivated in the inner part of the district, in the vicinity of the Damooda and Adjye, where it is used as a rotation-crop after sugar-cane: the cultivation is consequently very expensive to the ryots, who are generally obliged to irrigate, and are in consequence allowed to sow teel with their

indigo, which makes the indigo crop later, and much more precarious. Cotton is also cultivated, but only sufficient for domestic purposes. The different species of paddy, which are cultivated in the district are very numerous: very little broadcast, mostly transplanted during the rains,—mustard, linseed, teel, hemp, tobacco, &c. As in other districts, irrigation and manuring is generally used. There are numerous tanks and reservoirs, without which the crops would often suffer. When there is a scarcity of rain, irrigation is resorted to, in which the ryots are very industrious and indefatigable. The agricultural implements are very simple, and the plough very small; that, and the hoe or kodalee, and mohee or harrow, are the most used throughout the district."

Manufactures and commerce of the Burdwan district:—

"The chief commerce of the district is probably sugar; but Burdwan is also an emporium for most of the articles in the neighbouring districts of Beerbhoom and Bancoorah, in exchange for which, articles are brought from Cutwa, Culna, and Hooghly. Cotton, salt and tobacco form the chief imports.

"The moiras (confectioners, or sugar manufacturers) at Konchunnagore and Burdwan, are famed for the manufacture of Dobarrah sugar, which will vie with the finest refined sugar in the country. European sugar manufactories have been erected on an extensive scale, at Dhoba and Bowsingh, between Culna and Cutwa: there are also others across the river, in the Nuddea district, which depend for *much* of their goor on Burdwan; the quantity of sugar, goor, and molasses exported, is, as nearly as possible, as follows:—

"In 1839–40, thirty-six certificates, or passes, were obtained by different merchants from the Burdwan Collectorate, amounting to maunds

In 1839–40, thirty-six certificates, or passes, were obtained by different merchants from the Burdwan Collectorate, amounting to maunds	121,963
In 1840–41, eighty certificates, or passes, about	140,000

Total	261,963
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"It is supposed that much sugar, goor, and molasses, is exported without passes. Bonepass, a large village, about 10 miles to the north-west of Burdwan, has long been famous for its cutlery, equal in look and superior in quality to the Monghyr. The families of kamars, or blacksmiths, have however either died off, or emigrated to Calcutta, and other places.

"Much lac dye and shell lac has been made at Dignagur. Tussar cloths are also extensively manufactured there; and at Maunkore, cow and buffalo hides and horns are exported. Wood comes down the Damooda river to Kotgoloh, and large beams are brought from the jungles beyond Bancoorah by carts."

General remarks:—

"The value of this rich district would be incalculably increased, if water-carriage were procurable through its centre. The eastern extremity of the district alone is washed by the Bhagrutty, which, during the whole year, admits of small boats going up to Cutwa, and larger to Culna and Muggra Khaul near Hooghly. To these places, as has been mentioned, there are roads; but the carriage of the bulkier, heavier, and lower-priced articles over 30 or 40 miles of indifferent roads, adds too much to the price of most of them, to make them articles of export. The Damooda affords, for 3 months only, a most tedious carriage down to its mouth (where it also becomes dangerous, the river manjees being unacquainted with the management of boats in such strong tides), and from its mouth up to Calcutta. The rice and goor carried down the river are chiefly deposited at

Rajbulubhaut, an extensive mart for those articles ; and the coals are landed a little below that at Amptah, and Nowparah, a little lower down.

"To remedy this want of water-carriage, it has frequently been proposed to render the Curri, or the Banka, a navigable canal, by making some reservoir near their sources. The country below is so level, that little water would be wasted in lockage, and very few locks would be required to keep either of those rivers navigable, at least up to Burdwan. Bunds made across the Banka, for the sake of irrigation, a few miles below Burdwan, retain from 3 to 6 feet of water for 3 and 4 miles above the bund. A late collector of Burdwan proposed carrying a canal all the way from Culna to the Collieries ; or if the acclivity for the last 30 miles was found too much for the small supply of water in so arid a country, to carry the canal as far westward as was easily practicable, and to join this with the Collieries by a railroad, the iron of which might be furnished from Shairghur : thus holding out encouragement, and giving great assistance at the commencement, for the erection of iron works."

Further, as to the value of roads, and the ready advantage taken of them by the native merchants, we have the following : "The Moguls and other merchants who carried woollen cloths, piece goods, and other less bulky and lighter articles, to the upper provinces, have in great measure given up the more tedious voyage up the river, and now take those goods to Benares and Cawnpore by carts. The greater expense by this mode—a cart costing about fifty rupees (*5l.*) from Burdwan to Benares, and sixty more rupees to Cawnpore—is more than made up by the time saved. The carts go in one month and a half, while four and six months were consumed in the voyage by boats."

The next district we pass through is Beerbhoom :—

"The general appearance of the country is flat and interesting, but well suited for rice cultivation. To the northward, it is more diversified with hills, and undulating ground, and there is a range of hills, wooded with high trees and thick jungles, extending for some miles at the northern extremity of the district, visible from the station, which generally is called Soory. The soil in the north-east and south-east is sandy and clayey, and in other parts it is mixed with stone, and a kind of talc.

"The colour generally is black, grey, dark brown, and red—the latter two seem to be combined with iron. The crops are cultivated, sown, and reaped at the same season as in the neighbourhood of Calcutta ; manuring with old cow and sheep dung is generally practised, but very scantily.

"There are but two rivers of any size in this district—the Adjye and Moor-aky—and these are only navigable for a short distance during the rains. The remainder of the year they are little more than nullahs, or streams, with about 3 or 4 feet depth of water."

Amongst the natural products of this district, besides a variety of medicinal plants, are coals, iron, chalk, lime-stone, and sulphur (doubtful).

"Agriculture is at a low ebb throughout the district. The implements of agriculture are the common Indian plough, harrow, and hoes : the productions are rice, sugar-cane, mustard-seed, linseed, gram, sesamun, tobacco, turmeric, arrowroot, red pepper, ginger, onions, garlic, Indian corn, pawnleaf, brinjals, mango, jack, guava, lime, plum, custard apple, pine apple, water melon, cucumber, kudoo, yams and kullie of all kinds, &c.

"The articles of trade are caoutchouc, shell lac, lac dye, indigo, sugar, buffalo horns, buffalo and cow hides, rosin, gum arabic, ebony, sitsaul, toon, teak wood, silk tussur, and coarse piece goods."

The next district we come to on the main line is Mongheer, the principal natural products of which are cotton, rice, the sugar-cane, tobacco, indigo, cotton, hemp, &c. Of its commerce we are told—

"It chiefly exports grain, rice, wheat, gram, linseed, &c.; hides and horns are also a profitable mode of traffic with Calcutta, and the principal manufactures are various kinds of coarse cloth. Within the last three years, a flax factory has been established by an enterprising firm in Calcutta in conjunction with one or two European residents, which is found to answer very well."

The whole of the district round Patna, as is well known, abounds in similar products to those enumerated above, particularly rice and cotton.

The principal district which the branch to Sootee passes through is Moorshedabad, of whose products we read the following account:—

"*Commerce and Manufactures.*—The principal commercial mart is Jeagunge, situated about 10 miles north of Berhampore. A great quantity of cotton, saltpetre, and sugar passes into second hands here. Bogwangola is also a mart for up-country produce, and indigo seed. Rogoonathgunge and Belgutta are the chief places from which rice, the produce of the district, is shipped for the upper provinces. In the neighbourhood of Sooree, in Beerbhoom, a considerable quantity of iron ore is procured, which is carried across the country on bullocks, to Jeagunge and Bogwangola. It may be remarked that the inland trade in general has received a new impetus, from the abolition of the transit duties, in 1836. The tolls collected on boats at Jungypore, previous to that year, amounted to 50,000 rs.; the year following, the amount was 130,000 rs.; this branch of the revenue has progressively increased. The year ending 30th April, 1841, 150,000 rs. were collected, which is a certain indication of a healthy state of the inland trade. Of manufactures, raw silk and silk piece goods may be mentioned as the foremost. The annual quantity of silk made in the district is 2,000 maunds. The best silk corahs are made here: the village of Mirzapur is a good *joar* for them; the quantity is about 200,000 rs. a year.

"*Indigo.*—There are several indigo concerns: the largest are the Jungypur and Colly Gunge, and each is capable of making from 1,500 to 2,000 maunds a year.

"*Carved Ivory work.*—This is carried to incredible perfection; some of the productions would vie with those of China: the village of Mohemapore, near Jeagunge, is famous for them.

"*Sundries.*—Coarse cloth, dosootee, baftas, blankets, brass-ware, iron-ware, (chiefly of Beerbhoom iron) bamboo mats and baskets, paper, make up the catalogue of manufactures."

The whole of the above districts are extremely populous; but as passenger traffic is not as yet considered a matter worthy of entering into the estimate, we need not go into the figures.

We think we have now laid a statement of facts before the public which must convince them of the social and commercial importance of this subject. The political importance of a still more extensive scheme of railways we entered into at some length in our two former articles.

FOURTH ARTICLE.

WE have already, in our numbers for July, August, and September, written at some length in advocacy of the establishment of a system of railways in India, having particular reference to certain companies already established for the purpose of carrying such views into operation; namely, the East Indian Railway Company, the Great Western of Bengal, and the Great Indian Peninsular Company. The first and last named confine themselves in their immediate views to the establishment of lines of railway from Calcutta to the rich districts of the north and west bordering the rich streams of the Ganges and its tributaries. The commercial importance of these districts, the urgent claims which they present for participation in those facilities of transit, without which their natural treasures are comparatively valueless, and in great part lost to the world, is a subject which we have already urged at some length, and, we believe, with some little success. Indeed, in so saying we take no praise to ourselves in the matter, for the case we believe to be so plain and so strong a one, that it was only necessary to collect and state a few facts, facts open to everybody who choose to seek for them, to leave but one answer to the question;—shall India have railways like the rest of the world, or shall she be left to perish in the midst of plentiful natural resources for want of their aid?

Our purpose now, therefore, is not to comment upon this abstract question further, considering it to be conceded on all hands that the question of the establishment of railways in India has become only one of practicability,—of means and appliances to carry them into effect. Upon this point some very interesting papers have come to our hand since our last publication; some of the principal features of which we shall proceed to lay before our readers.

In the first place, we need hardly observe that it was very natural to suppose that the British public, with every desire to promote an enterprise of so vast a character as a system of railways extending over the entire Indian peninsula, a territory subject to atmospheric and other local influences of which they could form but an incomplete idea, should wait anxiously to hear the opinion of experienced men resident in India, before they took the matter seriously in hand.

This necessarily occasioned a pause, during which the shares in the companies referred to were but slightly supported. The arrival of a recent overland mail, however, has put a new face upon the affair. The Indian press, taken as a whole, has expressed itself in a very encouraging tone, and private letters fully bear them out, both in regard to the advantages and the practicability of the undertakings. The *Delhi Overland Gazette* says:—

“ We know of no measure more calculated to strengthen the power of the British Government in India, or more likely to exercise a beneficial effect over the people of Hindostan, than the introduction of railway communication. In Europe, the invention of steam power has been attended with the happiest results to large masses of people, and it is generally observed that indications of progressive improvement are nowhere so visible as in those places which are accessible to the immediate influence of steam communication. Thus, as in time of yore, by the application of the philosopher's stone, it was supposed that all things would be turned into gold, so in the present day, by the

happy introduction of steam, it is found that barbarism becomes converted into civilization, barrenness into fertility, poverty into wealth. What then may the philanthropist not hope for the people of India, when he learns that the Court of Directors are about to investigate the applicability of railway communication to this country? For this purpose they propose associating two or three eminent engineers, who are to report upon the subject, and who are to suggest some possible line of moderate length, as an experiment. If this first trial should prove successful, we may expect in a few years to see lines of railroads traversing the whole country; but if, on the other hand, it should prove a failure, India will sink back into lethargy still greater than that in which it now sleeps; and the march of civilization will be retarded instead of advanced. It is, therefore, most important that the first trial should be made under such circumstances as would most probably insure success; and too much care cannot be taken in selecting that line which holds out the greatest political advantages to Government, and which promises the best return to the capitalist."

The writer then goes on to compare the relative advantages of the two competing schemes proposed to the north and west of Calcutta; upon which point, as we have already in a former article suggested materials for forming an opinion, we shall not follow him at present.

The report of Mr. Simms, the Government engineer, will be looked to most anxiously, particularly in regard to the physical difficulties which the Board of Directors suggested in their minute of the 7th of May last. In the mean time, a despatch from A. S. Ayrton, Esq., to the chairman and deputy chairman of the Great Indian Peninsular Company, will be read with interest, though of course with some degree of caution, when we consider the active part which the writer takes in the prosecution of the project.

The opening paragraph we are about to quote is by far too sweeping and confident to bring conviction to the sceptical mind. With regard to the working of the engines, we must adhere to an opinion we have already expressed, founded upon good authority, that, for a long time at least, it must be done by British hands, and be therefore a very considerable item of expense. With this observation by way of caution, we proceed to quote very freely from this interesting document, which is dated Bombay, 19th July, 1845.

"I do not anticipate," says Mr. Ayrton, "any difficulties arising from the six points mooted in the despatch of the Court of Directors; an examination of the works, such as wooden bridges and buildings existing in India, will enable any engineer to answer the first four questions; the fifth has already been solved in America, and is not striking in its application, as guards at 5 or 7 rupees (10s. to 14s.) a month will not be a leading feature of expense; the demand for engineers for Government and private steam navigation and other purposes will soon ensure the presence of a body of engineers; but I may mention, that one of the steam boats plying between this and Surat is managed by one engineer only, at a salary of 150 rupees (15*l.*) a month, with the assistance of natives of the country, which shows that no difficulty will be experienced on this head.

"It will probably be supposed, from an opinion frequently expressed of the difficulty of changing the customs and habits of the natives of this country, that any attempt to open a new channel of traffic would be a failure; but I believe that no people would more readily avail themselves of any advantages in trade, especially if they could save themselves from trouble and annoyance, than the people of this country. The rise of cities and markets in India has been as great as elsewhere. Trade has changed its channels with a change of circumstances, as in Europe, and the enor-

mous traffic which now passes the Ghauts has sprung up within a few years, as also has the opium trade from Malwa. All classes are eager to a fault in the pursuit of commerce and of gain ; indeed, I believe, in the absence of any present great interests, and looking at the simplicity of the people's habits, that they would at once attach themselves to any new channel of trade, affording the inestimable advantages of speed, certainty, and security, combined with economy."

Mr. Ayrton refers to the eagerness of the natives of India "in the pursuit of commerce and gain." In this he exaggerates nothing. The Indian knows the value of money as well as anybody ; he has now only to learn the value of time, and the advantages of railway travelling will at once be acknowledged by him. We may observe in parenthesis,—that Blacky is a bit of a speculator at heart, and that if he takes to buying the scrip in these railways, they will take a very strong commercial position from being thus as it were secured in the sympathies and good graces of the native population.

The writer then proceeds to discuss the relative capabilities of the districts around Bombay :—

"It appears to me, that the three great districts, in relation to Bombay, are Malwa, Oomrawutty, and the Sholapore or Bursee district, Goozrath being omitted as having the advantage of water communication ; the first, exporting 2,000,000*l.* worth of opium, at a cost of transit, between Malwa and Bombay, of about 40,000*l.*, offers a guarantee of very considerable traffic, in addition to which it is at the edge of an immense territory wholly land-locked, without water communication. It is a question whether any railway can be carried east of the Ghauts, in a northern direction, across Kandeish and the Nurbudda valley, but should it be found practicable, each of those valleys would pour down their produce into the railway. Beyond doubt, a railway could be constructed along the northern Konkan, at a considerable distance from the sea, as it expands to a broad level in the Surat districts, but with by no means the same extent of profit from the districts between Malwa and Bombay, as would be derived from the inland route, in consequence of the water communication by sea along the coast of the Konkan.

"The cotton and other produce of the Oomrawutty and Nagpoor districts also offers a guarantee for a very considerable extent of traffic, so considerable, that it will probably be found to be a bad economy to make this a branch of any other railway, more especially when it is remembered that it is in the direct post road to Calcutta. The extent of the traffic of this district cannot be well estimated, from its being carried on through several different routes, and the difficulty of determining, without actual investigation, at what points it would travel to the Ganges, rather than come to the terminus of the railway.

"The traffic of the third district, that of Sholapore through Poonah, has been ascertained, if I should be right in assuming that the traffic over the Bhore Ghaut is chiefly from the district south of the latitude of Bombay. This traffic you will find in the report of the Committee lately appointed by the Government, of which you appear to be in possession, but it does not seem to be equal to that offered by the other lines."

With regard to the statistics of the district, Mr. Ayrton observes :—

"Bombay being a mere entrepôt of trade, its local demand for agricultural produce, being the food requisite for its population, is readily estimated. This is at present from the Konkan and Goozral, and is beginning to come from the interior, but there can be no doubt, that the foreign demand for the staple produce of the interior, except grain, would take off any supply which could be afforded, without a serious diminution of price. The extent,

therefore, of the traffic by the railway would be almost entirely regulated by the agricultural and other produce of the interior over and above its local consumption,—by its power of export.

“At the present time grain scarcely commands a price in some parts of the interior; but though no direct export of this commodity were to take place, yet any considerable increase in the production of cotton and other exportable produce would of course give a value to grain in those districts, as it would create a local market for it with the producers of other commodities, but who are now themselves engaged in the cultivation of grain. In short, it may be safely said, that if a market be opened, and a value be found for any one produce in the interior, every other class of the surrounding community will participate in the benefit derived from it; from whence it becomes expedient, that every kind of production should be made the subject of inquiry.”

Mr. Ayrton considers that the Directors of the East India Company have underrated the passenger traffic of a railway in India. He maintains that “the causes from which travelling arises in England are in existence, though not operating to the same extent here.”

“The trading classes of the community are in general migratory, and in the habit of visiting their native country, as well as other places, for commercial purposes; the merchants are in the habit of keeping up agencies about the country, or of employing travelling agents. The people migrate in search of employment; many travel to visit places from religious motives, and for change of climate, also to visit at particular festivals; and, as regards Bombay, probably three-fourths of the whole population are foreigners, visiting at intervals their native country. But if the means were at hand, and instead of journeying for a month they could reach their homes in a day, there would be no indisposition to travel there, for however small their earnings may be, it is not to be supposed that they have therefore no surplus wages. That they find money for occasion, is shown by their great expenditure on marriages and other ceremonials. It is their characteristic, to be thrifty for a year, that they may be extravagant for a day. Inquiry should, therefore, be made into the numbers of the travelling population, and the present state of travelling, its cost, and the delays and vexations that travellers are compelled to suffer.”

Taking leave of Mr. Ayrton's communications, we turn to that of Mr. J. G. Clarke, C.E., of Bombay, under date 18th July, 1845, in the course of which we find the following statistical details of the population and trade of Bombay, from which it appears that both are steadily on the increase:—

“The population of Bombay was, in 1830, 234,000 persons, and at this time is estimated at 328,000, and is supposed to be increasing at about 18 per cent. per annum, 2½ per cent. being the ordinary up-country increase.

“The general trade of Bombay, which in 1837-8 was valued at Rs 13,93,63,794 (13,936,879*l.*), was, in 1842-3, Rs 18,07,98,730 (18,079,873*l.*).

“The trade with the ports of the mainland, from Guzerat to Goa, at the same periods, rose from a value of Rs 5,17,52,289 (5,175,228*l.*) to Rs 6,26,72,544 (6,267,254*l.*).

“The tonnage of the coasting craft in which this trade is carried on rose from 567,915 tons to 738,809 tons.

“That part of the mainland trade carried on from Sangah and Kusseyloe northwards with Bombay, was in 1839-40 valued at Rs 2,07,19,842 (2,071,984*l.*), and in 1842-3 Rs 3,38,81,724 (3,388,172*l.*). This, however, included opium, which rose from Rs 1,12,40,765 (1,124,076*l.*), in 1837-8, to Rs 1,65,10,537 (1,651,053*l.*) in 1842-3.”

“These facts,” Mr. Clarke adds, “show the importance of the

northern trade to Bombay ;" and then he points out at some length how a great portion of this trade "has a tendency to reach Bombay by the way of Salsette ;" and proceeds to argue the propriety of taking up that direction for the establishment of a railway in the first instance. In an engineering point of view, it appears the line is an equally desirable one,—“the expenses of construction would be low, from the character of the ground, for the most part rice lands or salt pans, and therefore flat.”

Fortified by these communications, the Great Indian Peninsular Company appear to have resolved to take active steps for carrying out such part of their scheme as relates to the local accommodation of Bombay, and with this view have allotted a portion of their shares.

We may observe that we think this Company has done well in so restricting itself, for the time at least, to the west coast of India. The Bengal Great Western and the East Indian Company's project to Mirzapore sufficiently occupy the eastern coast so far as local accommodation goes ; and the question of uniting the extreme coasts, important as it is, and one which must ultimately be carried into effect, it would perhaps be too much for any single company to attempt at present.

We have now to call the attention of our readers to another line of Railway projected in a district remote from either of the above, namely, Madras, and which appears to offer strong claims to consideration, both on account of the advantages which it promises, and the forward state in which every arrangement requisite to its adoption appears to be. This line, which was surveyed in 1837 by Captain Worster, of the Artillery, at the special direction of Lord Elphinstone, the then Governor of the Presidency, is one of about 65 miles in length, extending from Madras, by Conjeveram, to Wallajanugger and Arcot. Captain Worster in his Report, a very able one, (dated November 24th, 1837,) after defining the exact course which he proposed to take, proceeds as follows to show the advantages to be anticipated from the construction of this line.

“It will be observed, that the line here selected deviates to some extent from a direct one towards the town of Great Conjeveram. The considerations which have induced me to adopt this route in preference to a more direct one are founded on the circumstance of Conjeveram being a town of some importance, containing a numerous and industrious population carrying on extensive manufactures in cloths, &c., having several large villages dependent on it, besides being a place of resort during particular periods of a large mass of people, (it is believed of upwards of forty thousand from the Presidency and environs alone,) independent of the many who proceed thither throughout the year for special or other purposes, which, on rough calculation, may be estimated at about the same amount.

“The favourable situation of Great Conjeveram as an entrepôt of trade was another inducement for my taking it in the line. The trade from the southward might be expected to fall into so favourable a channel, and from the proximity of the town of Wallajahbad, it would enjoy almost the same advantages as Great Conjeveram itself. The great convenience and comfort that would thus be conferred upon many thousands of persons, in enabling them to procure supplies at a cheaper rate, and the stimulus that would be given to the market, are among the many advantages likely to be derived from this direction. In the more direct route, there being no town of any importance intervening, the trade would be merely between the termini. The difference of distance in favour of a more direct line would be very small, since frequent deviations would become necessary, owing to large tanks intervening ; it is questionable, therefore, if the most direct

line which could be chosen would be less expensive than that now proposed, which is about sixty-four miles in length.

"It may not be out of place here to remark, that the subject is viewed with great interest by the inhabitants in this direction, and they appear to be quite alive to the advantages and facilities it would afford to the trade, and they are far from averse to the mode of travelling."

He then explains his estimates of expense, and the nature of the works which he proposes. It would be unnecessary to enter upon these details at present in these pages. It will probably be sufficient to state generally that the line is a very easy one; the steepest gradient, and that only for a short distance, being 1 in 180, and the soil generally favourable, with "abundance of fine stone and iron clay to be met with, both disintegrated and in blocks." The total outlay is estimated at 13 lacs of rupees, (about 130,000*l.*), which is at the rate of less than 2,000*l.* a mile; too low a figure, probably, though Captain Worster's experience as Government Superintendent of Roads would entitle his calculations, which are very minute, to much respect.

These are matters, however, upon which it would be vain to enter until we have some more definite information. With regard to the probable traffic, Captain Worster says: "the information I have been able to procure with regard to trade is necessarily limited, but it cannot be far from the truth to assume that 30,000 tons of goods, and 150,000 individuals pass between the termini annually." And from this he draws a deduction, showing a profit of 151,296 rupees, or in round numbers 15,000*l.*, being at the rate of 12½ per cent. Considering that this estimate is based upon present actual traffic, without speculative additions, it handsomely counteracts any inadequacy in the estimate of outlay; and leaves as the general conclusion a rational probability of a fair dividend of 8 to 10 per cent.

The line so surveyed by Captain Worster was strongly supported by Lord Elphinstone, in a Minute dated May 10, 1841, and by Mr. Sullivan, in a Minute dated September 24, 1840; (these documents, by the way, contain matters of practical interest so well put that we may probably hereafter recur to them;) but their enlightened views were opposed by the Government at home, and by Mr. Lushington and other members of the Council, on the ground of the outlay; and so the matter has remained in abeyance till the present moment.

What the Court of Directors, however, were afraid to venture upon in 1841, with the prospect of a dividend of 12½ per cent., a company of individuals (most respectable names both as men of honour and discernment) are now about to undertake; and the capital of 120,000*l.* or thereabouts, which Mr. Bird denounced as "enormous," will be cheerfully subscribed.

We shall return on a future occasion to the subject of Railways in India; both in regard to further details of the companies we have already treated of, and to several other schemes, more or less extensive, which have been formed more recently.

FIFTH ARTICLE.

THE MADRAS RAILWAY.

WE are happy to hear that accounts of a most favourable character have reached this country of the reception of the prospectus of this company in the Madras Presidency, and that the most influential parties, including the Marquess of Tweeddale, have given it their sanction and support. The line, it will be recollected, was warmly supported by his Lordship's predecessor, Lord Elphinstone, when it was first surveyed; but owing to some differences of opinion in the Council, its progress was stopped for the moment. Since then, as will be seen by the correspondence which we subjoin, the improved road from Madras to Wallajahnuggur, in conjunction with and along the line of which it was proposed to lay down the railroad, has been completed, and has led to the most valuable results in the increase of traffic which has taken place in the district. It is a gratifying fact, and one which gives the best earnest of the successful prosecution of the work, and of its eventual value as a means of civilization and a source of profit, that it has been most favourably taken up by the local population. Mr. Thomson, the president of the Madras Chamber of Commerce, in a letter to the chairman of the Company, under date the 23d September, 1845, writes, "The local feeling in favour of the project which your company has in view, seems to be very favourable to it; and affords every reason to expect that the shares allotted to India will soon be taken up." Another letter from the same to the same, gives the following interesting particulars:—

"I believe that your company will meet with cordial support in this presidency, and if a railway will pay anywhere in India, it should pay on the line which you have taken up. Within the last few years, since the new road has been constructed, there has been a great increase of traffic; but even with the increased facilities which the new road affords, the means of conveyance are short of the wants of commerce, and the greatest inconvenience has this year been experienced from the difficulty of procuring bandies. Mr. Norton, I believe, estimates the trade in salt at 4,700 garci, or about 19,000 tons, but I cannot speak as to the correctness of this estimate. However, some idea may be formed of the importance of the line by the fact, that it leads into the very heart of our principal sugar district, and that within the last two years there has arisen a trade in the article from the Chittoor district, and which would all come by the railway, of not less than 5,000 tons, and we may expect that in time this will greatly increase. Captain Worster tells us that he estimates not less than 700 bandies come in daily to Madras by the new road on an average, and this is equal to about 300 tons per day of imports, exclusive of exports. If the reality amounts to even one half of this it is great. To ascertain the precise traffic, the only correct means would be to station men on the road at different points to take down daily the bandies that pass to and fro. This has been done by Worster and by Captain Cotton, also, I believe; but I am not aware whether it has been done with that accuracy and for a sufficient time to enable one to draw correct conclusions. It would, I think, be worth while to do this again for three or four months, not in succession, but every third or fourth month, which would give a pretty close approximation to the averages. My own impression is that there will be a fair return from native passengers in time, if the passage-money is only kept sufficiently low to come within their means, and accommodation afforded so as to meet their

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peculiar and sensitive feelings as regards the female portion of their families. There will be a great saving in the expense of railways in this country as compared with those in England in the two items of *land* and stations, which at home form a proportion of thirty per cent. to the whole cost; and, besides, the same speed is not necessary here, and twelve miles per hour would answer every purpose required. Lieutenant Collyer has drawn up an estimate for the Wallajahnuggur line, and has taken a great deal of trouble in collecting his data. He estimates the construction of a single line at 10,19,000 *R.*, and with contingencies, such as engines, buildings, &c., at rather under 12 lacs. He, however, thinks that teak sleepers may be depended upon, and calculates the speed at about ten miles per hour. His calculations shall be made available to the committee, which I believe Mr. Norton is organizing in accordance with the views expressed in your letter to the chamber. He seemed to us the best person in the lists sent by you to whom to commit the interests of the company.

"Believe me, yours sincerely,
" J. THOMSON.

"J. A. Arbuthnot, Esq."

The Committee to co-operate in the presidency with the Company in London was readily formed, and Mr. Walter Elliot, who was appointed secretary to it, writes the following account of its earliest proceedings:—

"Our first act was to take steps for the delivery of the letter addressed by you to this Government. The deputation of the committee selected for the purpose met with the most cordial reception from the Marquess of Tweeddale, who not only expressed his own favourable wishes for the success of the undertaking, but offered various suggestions for promoting a readier communication between the constituted authorities and the Committee, and stated his readiness to afford them every assistance in his power. We accordingly resolved to address the Government, requesting to be furnished with all the information in the public records relating to the survey of the line of road between Madras and Wallajahnuggur by Captain Worster, and also with any information on the subject of railroads generally. Likewise that orders should be given to the local officers in charge of the country through which the line is to pass, to communicate with and afford to the Committee such information as they may require."

This gentleman then adds, that a sub-committee has been appointed to report upon the voluminous documents which might be expected to come into their hands; and that the prospectus had been generally issued. The deposit upon shares in the first instance is fixed at twelve rupees, about twenty-four shillings per share. Mr. Elliot concludes thus:—

"I trust these steps will serve to show the home Committee that we have taken up the matter in earnest, and that we are zealously bent on furthering, to the utmost of our power, a project so well calculated to develop the resources and promote the improvement of Southern India."

The following article, extracted from a recent number of the *Madras Spectator*, gives a good idea of the earlier history of this important project, and of the estimation in which it is held by men of experience in the presidency:—

"Long before Mr. Macdonald Stephenson commenced his laudable movement on behalf of Bengal, the desirableness of railway intercommunication, and its peculiar adaptability to the natural and commercial circumstances

of our presidency, had been pointed out and acknowledged by competent parties at Madras. It is not, therefore, on a dubious or an unknown field of enterprise, that speculation proposes now to make its venture. The most material facts necessary to a right estimate of the first outlay and probable returns of that line which best deserves attention, have been already drawn together, and should an English company determine on carrying out the plans for whose support those data were accumulated, but little more, we imagine, than a partial verification of them would be needed, preliminary to the commencement of the work. Judging from what we have above written, our readers will find no difficulty in discovering the line of road at which we point; since none other than that between Madras and Wallajah-nuggur presents the immediate facilities and recommendations insisted on. Situated within a short distance (some seventy miles) of the coast capital, and forming as it does a chief depôt for the produce of several districts while in transitu thither—the intermediate country being moreover a dead level the whole way, and therefore entailing no necessity for laborious tunnelings or cuttings,—Wallajahnuggur is perhaps *prima facie* the very best spot that could be selected for the terminus of an experimental railway; and when to these advantages we further add the collateral considerations before mentioned, viz., that a survey of the line has been already made, and the necessary statistical calculations entered into, it will at once appear that no project of the kind at this presidency could offer to capitalists an appearance so encouraging.

“With reference to what took place on the subject during Lord Elphinstone’s government, we may observe that the engineers’ estimates for the construction of the Wallajahnuggur Railway underwent a searching examination at the hands of another authority here; who, taking into account the cost of stone sleepers, and including various matters not fully allowed for by the original estimator, yet calculated the requisite expenditure at a rate no higher than that of one thousand pounds per mile*! The same party having also laboriously calculated from public data the present cost of carriage on bulky articles, and formed an estimate of the whole probable expenses of the railroad traffic, was brought to a conclusion that a net profit of between ten and twenty per cent. would be realized on the Wallajahnuggur line from salt alone! His estimate on the enhanced price of that article at the above station, as contrasted with the Government monopoly price at the coast, (and by which the profit on outlay arising from the comparative cheapness of railway carriage was calculated,) were derived, we believe, from an elaborate statement drawn up by Mr. D. Elliot, and submitted to the consideration of Government by the Revenue Board. Pursuing his investigations, the gentleman to whom we allude became satisfied of the feasibility and ultimate expedience of carrying on the railroad through the southern districts; so as to render it the great channel for conducting their produce to the capital, and eventually to open up new sources of traffic, by connecting sea with sea, or, in other words, Madras with Calicut.

“This was certainly a noble project, and one which, although not perhaps in our own generation, will most assuredly be accomplished; for so copious are the interior products of cotton, sugar, indigo, rice, &c., all of which must find carriage of some sort to the coast, that a judiciously chosen, fittingly constructed, and well governed line of railway, would amass such an amount of traffic as could not fail to render it a most lucrative speculation to the undertakers. Meanwhile, however, we must content ourselves with advocating, as an initiative step, the formation of the less magnificent and more easily effected Wallajahnuggur line. To this, in the event of a company being associated on behalf of our presidency, immediate attention will no doubt be drawn; and as it is the duty of the press to lend its utmost aid for the advancement of a scheme so fraught with benefit, both to those who

* 300*l*. per mile is the estimated cost for the Bengal Railway.—E. M. S.

govern and them that obey, no effort shall be henceforth wanting on our part to obtain such further information as may aid in elucidating the subject, and securing for it, both here and in England, the requisite amount of public favour."

The writer of the above article refers to some calculations made by a high official person upon the cost of traffic under existing circumstances in the Madras presidency; and the comparative cost of transit upon the railway system. The results of these calculations are extremely curious, and quite convincing in favour of the claims of steam power; and we have great pleasure in laying the following statement of those results before our readers:—

"In the Report of a Committee, dated March 1838, that had been appointed by the Madras Government to investigate as to the expenditure and capabilities of a railway and canal that had been constructed for the conveyance of road material from the Red Hills for the roads about Madras, the following paragraph occurs, from which some idea may be formed as to the emolument likely to be derived from the conveyance of heavy goods by a railway on a more extensive scale.

"Para. 60.—But perhaps the greatest obstacle of all with which the railroad has had to contend is the high degree of economy prevailing in the supply of road materials on the old plan, under which a heavy cart load of material weighing about 1,000 lbs. is conveyed more than 7 miles for 7 anas, the regulated hire for a cart from Madras to the Red Hill being *R.1 2a. 8p.* to convey 720 lbs. only; but this supposes a distance of 10 miles, whereas the average distance of bringing the material but slightly exceeds 7 miles; still the discrepancy between 7 and 18 anas remains in force, owing to the relative weights carried."

"From the above it will be seen, that notwithstanding the greatest possible reduction had been effected in the conveyance of road materials consequent on severe competition, yet a cart load, weighing 1,000 lbs. only cost 1 ana, or $1\frac{1}{2}d.$ per mile. But a ton of like material or other goods weighing 2,240 lbs. would, at the late reduced rates on the London and Birmingham Railway, be carried for $1\frac{1}{2}d.$ per mile, or one-third of the cost by cartage at Madras taken at the lowest contract price. This is the only competition with which railroads to the interior on the Madras Railway would have to contend.

"The hire of 24 coolies or porters, required to carry 35 dozen quart bottles of any liquid, or articles weighing 2,160 lbs., from Madras to Arcot, 73 miles, would be *R.37 12a. 0p.*, or *3l. 9s. 6d.*, whilst the carriage of the same quantity by 3 bandies or carts, would be *R.21*, or *1l. 18s.* But by the new rates on the London and Birmingham Railway, a ton weight in bottle, or 2,240 lbs., would be carried the same distance for *12s. 6d.* But suppose the Madras rates as above were reduced by one-third, in consequence of the construction of a railway, the charge for conveyance of a ton of such article from Madras to Arcot would be as follows: by coolies *2l. 6s. 8d.*; by carts *1l. 5s. 11d.*; and by the London and Birmingham rate *12s. 6d.*, as before; which would allow a wide margin for toll charges by the intended railway, and this too after making an allowance for competition.

"It has been stated, and generally believed, that the chief source of income likely to be derived from railroads in India would arise from the conveyance of merchandize. Such was the opinion first entertained on the construction of the Liverpool and Manchester Railway; but it was soon found that passenger traffic was the most lucrative; and although a like result could not be expected from railroads in India, at least for a very considerable time, yet the income likely to be derived from this source has probably been undervalued, for the inducements to travel by railway are so great as to economy, despatch, and comfort, that great numbers would, in time, be found to avail themselves of it. Two or three instances as to the great difference of

the difference between the usual mode of travelling in India and by railway may

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expense between the usual mode of travelling in India and by railway may be given. The hire of a set of palankeen bearers (laying aside the expense of palankeen) from Madras to Bangalore—207 miles—costs not less than 65 rupees, or 6*l.* 10*s.*, whilst the distance from London to Birmingham—112 miles—is completed by the common train, in five hours, for 1*l.* 3*s.*, and in a second-class carriage for 17*s.* The journey to Bangalore would occupy a week with one set of bearers. Travelling with posted bearers is quicker, but more expensive, than employing one set only. The saving of expense to a first-class passenger would not end here by the establishment of railroads, for his servants, baggage, and horses would also be carried at a very cheap rate. But one great object for constructing railroads in India would be accommodating second and third-class passengers. The latter are now carried on all railways in England for 1*d.* per mile, and yield a profit. The expense for the construction of fifty-two principal railways in England averaged upwards of 31,000*l.* per mile. But there is reason to believe that a third of that sum, or 10,000*l.* per mile, would be an ample average allowance for the construction of railroads throughout India. Should this be the case, a third-class passenger might be carried for one halfpenny, or 4 pice, per mile; so that the charge from Madras to Arcot—73 miles—would be 1 rupee 8 anas 4 pice, or 3*s.* 0½*d.*, and to Bangalore—207 miles—4 rupees 5 anas, or 8*s.* 7½*d.* Such charges as these would, in all probability, induce many travellers to go by rail who adopt any other means of movement than their own legs, as well as many of those who do. It may not be out of the way to observe, that as time and labour are more valuable under the Madras presidency than in Bengal, the people are better able to pay for railway accommodation in the former than in the latter presidency.

“In the absence of traffic returns, these details, short though they are, may not be without interest, as tending to prove that a railway to Arcot or Bangalore would successfully compete with the ordinary modes of conveyance at Madras, provided the amount of traffic be found sufficient to warrant the construction of a line to either of these places.”

SIXTH ARTICLE.

THE CALCUTTA AND DIAMOND HARBOUR RAILWAY AND DOCKS.

AMONGST the various projects for the extension of the railway system to India, there is scarcely one which offers stronger claims to immediate and serious consideration than the above named. We may observe before proceeding further, that this company has hitherto been known under the title of Calcutta and George's Point; but that the directors have, since the first issuing of their prospectus, resolved, wisely as we think, upon restricting their operations in the first instance to Diamond Harbour. It is at this latter named point that a most favourable roadstead exists, and it is there also that it is proposed to build the extensive docks which form an essential ingredient in this scheme. The extension to George's Point, though it might present the advantage of a landing place at a lower spot down the river, would not be accompanied with the important feature of a dock establishment; and considering the less favourable nature of the soil, would not perhaps afford an adequate increased return for the additional outlay. As it is, the line to Diamond Harbour will pass along the line of road already established, and which has been in existence for nearly half a century, tra-

versing a cultivated district; and the swamps which lie in the neighbourhood of George's Point will not be entered upon. We believe, also, that if the line had been extended to George's Point, it would have met with some opposition from the East India Company, which there will be no ground for at present.

With regard to the value and ultimate success of this project, we have not a single doubt. The commercial advantages which it will immediately afford—the traffic ready made, which it will at once take up, ensure, in our minds, its adoption sooner or later, with profit to the shareholders and the public at large. In a word—like the Madras Railway, which is also a local and commercial line—the Calcutta and Diamond Harbour project appears to stand upon peculiar grounds, of sufficient importance to distinguish it from the general schemes of railway transit in India, and to entitle it to be excepted from the rules of policy adopted by the East India Government on the subject, as set forth in their despatch of the 7th of May last.

The project for establishing a railway from Calcutta to Diamond Harbour is by no means a new one. It has been nearly ten years under the consideration of practical men, and in 1837 received the attention of Major J. T. Boileau, of the Bengal Engineers, who made a valuable report upon the subject, fully corroborative of the views of the directors as to an undertaking “which they conscientiously believe to be one that will contribute greatly to the prosperity of the trade in India, and be most beneficial in its results to the shareholders, shipowners, merchants, commanders of vessels, and all classes of the community whose interests may connect them with our possessions in this, the most important part of India.”

The passage just quoted is from a pamphlet recently issued, by Allen, of Leadenhall Street, on the subject of this project, and having ourselves some personal interests which connect us with India, and having a considerable acquaintance with persons of the various avocations named,—as shipowners, merchants, commanders of vessels, &c.,—we can fully bear testimony to the favourable opinion which they entertain of an undertaking, which will substitute for a dangerous, difficult, and expensive water-journey of two or three days, a land transit of as many hours; effecting a considerable saving, not only in time, wages, consumption of provisions, &c., but more important still, in the charges of assurance for sea-risks. From the Report of Major Boileau, already alluded to, we take the following extract:—

“It is generally allowed by those who are acquainted with the navigation of the Indian seas, that the serious dangers of a voyage to Bengal may be said to commence only on reaching the *Sand heads* at the mouth of the river Hoogly; these banks, the deposit of sand and silt brought down by the Ganges from the interior, and by the numerous rivers of Bengal proper, tributary to the Hoogly, extending a considerable way out to sea, form a natural barrier to the entrance of the river, which is not to be passed save by threading a difficult and dangerous way through one of the few navigable channels which intersect them, and which, ever varying, require the constant vigilance of the pilot, and the almost unceasing labours of the leadsmen, to secure even to those persons whose special duty it is, an accurate knowledge of their existing state.

“To clear a channel through these sandbanks which should be free from danger throughout the year, or what might be called *permanent*, would be a

work beyond the power of art, even in its present state of perfection. The system at present adopted, of ascertaining by soundings the channels most fit for navigation, must continue in force, as long as the causes which now operate in forming the sandbanks and in altering the channels continue to exist.

"But these dangers once passed, the navigation of the river becomes for a considerable distance comparatively safe; for it appears by the soundings, that from Kedgerie, passing Diamond Point and Culpee, Diamond Harbour, Buffalo Point, and nearly on to Hoogly Point, the breadth of the river at low water is about three-fourths of a mile, while the depth varies from four and a half to ten fathoms, but averaging seven fathoms."

From the above it will appear, which must be admitted, that the proposed railway from Diamond Harbour will not avoid all the dangers and difficulties of the voyage up the Hoogly,—but at the same time it will be found that it will avert by far the most considerable of them, both as measured by extent of space, and their intensity. As the river narrows at Hoogly Point, which is just above, forming as it were an elbow adjacent to Diamond Harbour, the current becomes more rapid, the eddies stronger, and the banks more dangerous, and more difficult to avoid, sometimes impossible to avoid, even with the aid of powerful steam tugs. In the words of Major Boileau :—

"At Hoogly Point the dangers again commence, and the sands between the Dumoda and Roopnarian rivers, particularly the celebrated '*James and Mary*,' and its parallel bank, the Scylla and Charybdis of the Hoogly, present a serious bar to the safety of further progress. These sands at low water are quite impassable save to small craft, and it is only at high water spring tides that ships drawing eighteen to twenty feet of water can be taken across them safely. The channel at low water here is barely 200 yards broad. The eddies too at this point of the river are particularly dangerous, rendering vessels even with the aid of a steam tug at times quite unmanageable; and one instance (no doubt among many others of a similar kind) has come to my knowledge, in which a large ship, with a valuable cargo on board, was carried some way up the Roopnarian river before she could let go her anchor, to the imminent risk of the ship and her cargo, and of the lives of the officers and crew. Instances are on record, too, which I have omitted to mention above, of vessels requiring to be careened, for the purpose of keeping their keel clear of the sands, and they were thus carried safely over the danger which might otherwise have proved fatal; and thus only could it have been done. We find the river onward full of sandbanks, with a rapid tide, and frequent dangerous eddies; indeed, as has been observed by Captain Andrews, in his valuable letter to the Calcutta and Sager Railroad Company, the dangers of kedging up the Hoogly are well known to every one at all acquainted with the state of the river,—and yet it is at present an ordeal, unless under the assistance of steam at an expense of from £90 to £120 sterling each way, which every ship has to go through before she can discharge her cargo at Calcutta, a port in point of trade, becoming, if it be not so already, one of the most important in the world. The number of ships obliged to go into dock in one year from accidents which happened to them in the river above Diamond Harbour, shows sufficiently the perils attending this part of the navigation; and any plan that can be suggested, tending to do away with the necessity of proceeding above Diamond Harbour, by the transport of goods thence to the Presidency *by land*, and by affording to ships a secure haven to lie in while in port, by means of docks, &c., would, I am of opinion, in a speculative point of view, be highly profitable; and as a work of great public convenience, and indeed of humanity, it would be well worthy the spirit of this great and enterprising nation."

Major Boileau then goes on to state that, although there is a safe anchorage in Diamond Harbour in seven to nine fathoms low water, yet that, as a port for the embarkation and landing of goods and passengers, it would be incomplete without the attendant feature of a dock establishment. The intelligent and gallant officer states his reasons upon this point at some length. The following, however, are the principal points of his argument, and to us, we must confess, they appear convincing:—1st, The rise of water at spring tides being fifty feet, a quay of no less than sixty feet in height would be required—a work, we need hardly say, of enormous expense, which could hardly be repaid by anything in the shape of pier-dues; 2ndly, The rapid and tumultuous currents at this particular point, would render the discharging of a cargo in an open roadstead a work of considerable risk and expense; whilst to bring the ship alongside the pier would expose both to shocks which no materials could long stand without injury. Some notion of this ingredient of danger may be gathered from the following account of the *bore* or tide-wave of the Hoogly, which prevails at and above the locality of Diamond Harbour:—“This is an almost perpendicular *bar* or *wave*, which, extending far into the river, runs from point to point with frightful violence, carrying everything away before it; the height of this tide-wave is variously stated, but it is not within my power just now to refer to any specific account of it; those who, hearing the roaring sound of its distant warning, have seen the boats lying in-shore hurry to the middle of the river, to avoid its strength, and who have seen it sweep along the beach like a huge surf, will understand better than I can attempt to describe, the effect of this violent and resistless agent. The wave ascends with the flood tide, and though it is only at particular seasons that it rises to an alarming height, still it is sufficient for my argument that even then its effects are very severe, and would be of most dangerous consequence to ships lying along a quay or wharf.”

Few beyond those actually engaged in the East Indian trade, are aware of the amount of traffic which goes or comes from Calcutta, and which is now impeded by the serious dangers and losses which we have above described. Too true it is, that our public writers are so occupied with discussing the probabilities of war with America and France, that they do not consider the importance of our relations in a quarter where we have little or no ground for such apprehensions—an enormous territory, abounding with wealth, where we have everything to gain and nothing to risk by improved culture of our resources, so much as even to affording an alternative market in the one important staple of cotton alone, should hostilities with America unhappily cut off our supplies from thence. How sad it is to reflect, which we fear, however, we must do, that our rule of government in regard to our colonies is studied neglect, and that we never value them till we have lost them!

In spite of neglect, however—in spite of dangers and obstructions unparalleled in any other passage, as it were, in sight of port—the Calcutta trade has increased in a remarkable degree. Major Boileau, writing in 1837, says—“The trade (export) is yet only in its infancy, and we may expect a great increase as British capital and skill are devoted to the full development of the vast and various resources of the country.” “The mind,” he states in another place, “is lost in any

attempt to grasp the limits to which, in the course of years not far distant, it may be extended." And this prophecy, in one article, that of sugar, has been fulfilled in a way and to an extent scarcely to have been contemplated by the writer himself. The exports to Great Britain of that commodity, in 1821, were about 5,642 tons, whilst in the year 1844-5 they were upwards of 50,692 tons, in addition to large exports to Bombay, Madras, the Gulf, Ceylon, New Holland, the Cape, &c.

The total amount of shipping entering and leaving Calcutta was estimated by Major Boileau, in 1837, at 1,000 vessels, averaging 300 tons each. Since then the traffic has considerably increased. But putting it still at the same number, and allowing only 100% each for the expense of steam tugs, provisions, assurances, &c., in the passage from Hoogly Point to Calcutta, the existence of a mode of land transit would afford a saving in these items of 100,000%, to say nothing of time, convenience, &c.

The line from Calcutta to Diamond Harbour will be about 30 miles long (the passage by the river is 63), and it is estimated that a double line of rails may be laid down upon the existing road at an expense of 6,000% a mile. But the directors estimate, in round numbers, an outlay of 300,000% for the railway, and 500,000% for the docks.

Of the facilities which the spot offers for the construction both of railway and docks, Major Boileau gives a detailed and encouraging account. In regard to the former, he says:—

"It appears from the sheet of levels referred to above, that the surface of the road at Diamond Harbour is 12 feet above the zero of the scale; whereas the level of the Birjee Talao, on the esplanade at Calcutta, to the S.E. of the Great Jail, is barely 11 feet; the fair inference, therefore, is that the surface of the road is level. From Birjee Talao to the bonded warehouses and Government Custom House, the distance being, say $2\frac{1}{2}$ miles, the rise taken at 2 feet above the highest rise of the Hoogly will be 4 feet, giving a gradient of 1 in 3,300. But though these may be taken as accurate levels of the extreme points of your line, the levels along the whole line from Diamond Harbour to Calcutta must be carefully taken before the work of forming the permanent way commences. The whole province of Bengal, however, is so flat, that a railroad might be carried through it in almost any direction, did not the various rivers with which it is intersected, form a barrier to such undertakings. There will not, therefore, be any reason to anticipate an unfavourable result as to the assumed levels, though it may be found that the surface of the road is not a dead flat the whole way. I am not of opinion that there will be anything to do, either in the way of embankment or excavation, which will require a special provision in the estimate; for I consider that when a causeway has had as many years to settle itself down in as the Diamond Harbour road has, it is in a state peculiarly fitted for receiving a railway, and that the less it is touched, further than in trimming its surface and slopes, the better. There will, probably, be a small expense on this account, which will be provided for as a separate item of estimate."

The estimated outlay being, in round numbers, 800,000%, the directors make, on the other hand, the following calculations of receipts:—

From tonnage per railway, 613,575 tons, at 2d.	
per mile	£153,393
Passengers, divided into three classes	7,500
Carried forward	£160,893

Brought forward	£160,893
From the docks, 300,000 tons, at 5s. per ton, including all fees	75,000
Profits from warehouses	20,000
	<hr/>
	£255,893
Deduct 40 per cent.	102,357

Total income	£153,536
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giving an average of 20 per cent. on the estimated capital.

Mr. Bagshaw, the chairman of the directors, whose long residence and connexion with India entitles his observations upon all matters connected with her trade to the highest weight, has addressed an able letter to the Honourable the Court of Directors of the East India Company, in which he urges the peculiar case of this project, and the reasons upon which he submits it should receive their immediate sanction; and we hope the appeal will prove successful. Two important circumstances to induce them are—first, that “the company is formed and complete, its shares subscribed by influential and safe parties, and *does not seek any pecuniary assistance whatever at the hands of the Court;*” and secondly, that “the difficulties inseparable generally from railways in India, from periodical rains and inundations, do not exist “in the one now under consideration,” a road having been constructed nearly half a century ago, but now in a neglected state, “which has withstood both rains and inundations.” The following reasons, which are also amongst those urged by Mr. Bagshaw, we entirely concur in :—

“Because in a short line of 30 miles, and where the whole work may be done by night, if desirable, and either by locomotive or atmospheric traction, for which the shortness of the distance affords the greatest facility, persons would be less exposed to the influence of hot and violent winds, tropical rains, or a vertical sun (so injurious to Europeans), than on a line of greater length.

“Because, by adopting the *atmospheric* system of traction, the necessity of *employing Europeans, except under shelter*, would be rendered unnecessary; experience having shown, that in the management of stationary engines, if superintended by one competent engineer to direct it, the natives of India—from the fact of so many of them having been already employed—have acquired a good knowledge of the working of steam engines.

“Because, the road being already formed, a trial of the system in India could be more readily tested by it than in any other locality—more especially by the atmospheric plan; while it would be much retarded were locomotive engines to be used, from the fact that no manufacturer could deliver engines in less than two years from this period; while, in the other case, both engines, boilers, tubes, and all appurtenances could be procured in a much less period, during which the works and buildings could be constructed.”

In addition to the name of Mr. Bagshaw, the Chairman, we may mention those of several others of the first shipowners of the country, amongst the warm supporters of this project. Mr. Duncan Dunbar, of Limehouse, and Mr. Richard Green, of Blackwall; Capt. Charles Mangles, Capt. Denny, Capt. Probyn, of the Trinity House, and other shipowners connected with the India trade, are on the Committee of Management.

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SEVENTH ARTICLE.

THE DIRECT BOMBAY AND MADRAS RAILWAY COMPANY.

WE have to express our thanks to the members of the Provisional Committee who have undertaken this great enterprise, for the map explanatory of the scheme which they propose to carry out. It appears that this project is well founded, and that a respectable and influential body of men have been entrusted with its management, and that a large proportion of the shares has already been subscribed for. The line will intersect the most wealthy and industrious provinces of the continent of India, the Carnatic and the Mysore, which abound in natural productions, in manufacturing industry, and in agricultural wealth.

The two great presidencies of Madras and Bombay will be brought within a few hours' instead of months' journey of each other; and instead of vessels sailing round the coast some hundreds of miles, as heretofore, with their costly cargoes, the latter can be easily transported to Bombay for shipment, and at infinitely less cost—a matter of first-rate importance.

The district traversed by the Direct Bombay and Madras Railway contains upwards of twenty millions of inhabitants; and the wants and industry of this large body already yield a considerable tonnage, although in a comparative state of barbarous communication. In the report of the Bombay Chamber of Commerce we find that the traffic to and from that city amounts to 187,343 tons annually, consisting chiefly of cotton and salt. These two items form merely a fraction of the requirements of the Indians. Bombay is unapproachable except by a dangerous and expensive sea-board, and a cheap and safe communication can alone render available her internal resources. Cotton has now to be transported 500 miles to the coast, to reach Bombay for shipment. A railway would naturally obviate so circuitous and expensive a route. Some idea may be formed of the destruction and delay occasioned by these journeys, when we state that the cotton is carried on the backs of oxen, at the rate of ten miles per day, which enormously augments its shipment price. The present cost of conveyance from Nagpore to the port of shipment is from 14*l.* to 20*l.* a ton, and the charge by rail of twopence a ton per mile would amount to 4*l.* 3*s.* 4*d.*—a considerable difference. The same facts prevail in regard to silk, and other commodities which are of the first importance to our manufacturing interests.

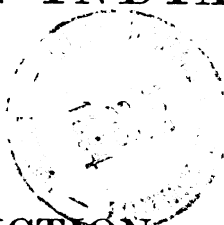
This line will also bring nearer to us the fine island of Ceylon, with all its rich productions, commencing as it will at Madras, and taking in in its course Arcot, Bangaloor, Serar, Darwar, Mundapoor, Raybough, Muchandergar, Conoor, Sattara, Pandoo, Poonendar, Poonah, Junnere, Badlapoor, and through the Nunny Gaut to Bombay; thus absorbing the interests and traffic of upwards of thirty first-rate cities, and from 400 to 500 towns, in the most densely populated part of India, facilitating the conveyance of cotton, coffee, tobacco, opium, sugar, silk, senna, gum, cassia, dye-woods, hides, furs, lac, betel-nut, saltpetre, spices, fire-

wood, charcoal, coal, corn, and various kinds of grain, indigo, &c., &c., and the imports of treasure, manufactured and other goods, salt, ice, &c.

We must, however, defer to a future occasion any remarks of our own. We have received assurance from the promoters that they are determined to act with energy, and to evince their anxiety to carry out the plans they have devised.

RAILWAYS IN INDIA;

WITH



AN INTRODUCTION,

ILLUSTRATIVE OF THE PRACTICABILITY OF RENDERING AVAIL-
ABLE EXISTING WORKS IN DIMINUTION OF THE COST OF
SUCH UNDERTAKINGS, WHEREBY THEIR PROFITS
MAY BE GREATLY INCREASED.

By JOHN BOURNE, C.E.,

ONE OF THE ENGINEERS OF THE EAST INDIAN RAILWAY.

SECOND EDITION.

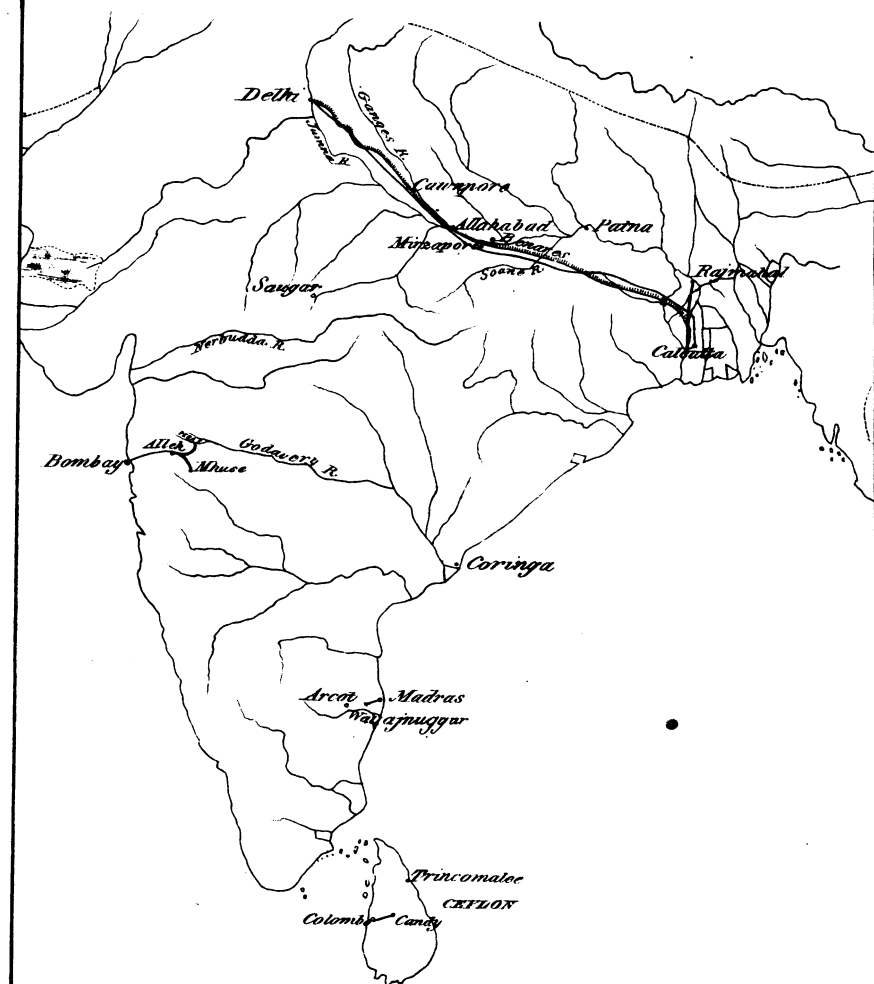
WITH A PLATE OF PROJECTED LINES.

LONDON:

JOHN WILLIAMS AND CO., 141, STRAND.

1848.

PROPOSED INDIAN RAILWAYS.



Railways —————
Trunk Road - - - - -

RAILWAYS IN INDIA;

WITH

AN INTRODUCTION,

ILLUSTRATIVE OF THE PRACTICABILITY OF RENDERING AVAILABLE EXISTING WORKS IN DIMINUTION OF THE COST OF SUCH UNDERTAKINGS, WHEREBY THEIR PROFITS MAY BE GREATLY INCREASED.

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1848.

LONDON:
DRURY, XXXI, BARTLETT'S BUILDINGS, HOLBORN.

INTRODUCTION TO THE SECOND EDITION.

ABOUT twelve months ago I undertook, at the desire of Mr. Macdonald Stephenson, to investigate the traffic and probable profits of the East Indian Railway, for although the project had long been before the public, no very definite conception had yet been formed of the dividend it was likely to yield. The undertaking had consequently been commended to the public attention, not on the ground of its own intrinsic merits, but on the strength of a guarantee of 4 or 5 per cent, which the Indian government had agreed to give upon the shareholders' investments, and the sufficiency of the guarantee was thus made the pivot on which the success of the undertaking was to turn. The papers from which I had to deduce the extent of the traffic, though very heterogenous and entangled, were for the most part of a very trustworthy character—many of them being official documents, the accuracy of which did not admit of doubt;—so that they formed a basis upon which the pretensions of the enterprize might have been safely rested, and nothing which has since been ascertained has contributed to shake my confidence in them. I subsequently extended my investigations to the other Indian lines of railway which were then attracting the public attention, and I published the result of my inquiries anonymously, under the title of "Railways in India, by an Engineer," judging that it was needless to avow the authorship of a production, all the facts of which rested upon the authority of other persons. This incognito, however, I can no longer preserve with propriety. I have had occasion lately to visit India, professionally, on behalf of the East Indian Railway Company,

and have to add the results of my own experience and observation in confirmation of the views previously propounded ; but although anonymous arguments, or deductions from the statements of others, are entitled to all the weight their cogency can claim, I feel that anonymous facts can have but a slender title to confidence or acceptation. I decline, moreover, to use the accident of my incognito as a means of evading any responsibility which the apparent inconsistency of my statement of the merits of Indian Railways with the adverse judgment practically recorded by the defaulting shareholders may be considered to involve. The statement I put forth anonymously at a time of prosperity I am willing, in the hour of adversity, publicly to repeat and vindicate, and with this view I shall briefly recapitulate its principal allegations.

In the first place, I instituted a comparison between the East Indian line extending from Calcutta to Mirzapore and Delhi, and the Great Western of Bengal line, extending from Calcutta to Rajmahal—a town at the head of the Delta of the Ganges. I showed, that if these two railways were to be regarded as alternative projects, the East Indian line was the one which was to be preferred, though indeed this question might be considered to be set at rest by the decision pronounced by the government railway commission, which was, “*that politically, socially, and commercially, the East Indian line was the most important in India,*” and consequently that which should be first undertaken. The Rajmahal line, it was plain, could not accomplish the political ends which the East Indian line was designed to fulfil—unless indeed it were to be continued by way of the valley of the Ganges on to Mirzapore ; but the circuit thus occasioned would not only increase the expense of construction and prevent the realization of rapid communication between the termini, but the additional expense of working the line in consequence of its increased length would amount to upwards of £500,000 a year. The expectation that vessels navigating the Ganges would un-

load their cargoes at Rajmahal for transmission to Calcutta by railway, I showed all analogy to establish as completely visionary, for that whatever might be the impediments caused by the shoals of the Bhagarutty, or the sinuosities of the Sunderbunds, the impediments incidental to a transshipment at Rajmahal would be still more grievous, so that, even though a railway from Rajmahal to Calcutta existed, merchandise shipped upon the Ganges for Calcutta at Meerut or Cawnpore, would still follow its ancient course. Subsequently to the publication of these remarks, the Rajmahal scheme was abandoned, and the Great Western of Bengal was incorporated with the East Indian Railway Company ; but as this last company has in its turn proved unstable, the Rajmahal scheme may possibly be revived. It has recommended itself in some quarters on the ground that a railway to Rajmahal is necessarily a less formidable and expensive work than a railway to Mirzapore, and therefore more suitable as the commencement of such undertakings—a conclusion in which there might be some weight if both projects were equally eligible in other respects ; but it will be seen in the sequel that even this temporizing distinction is now taken away.

The traffic at present existing in the districts traversed by the East Indian Railway I spent much labour in ascertaining correctly, and I showed, on the evidence of official documents, that the passenger traffic is twice greater than the passenger traffic upon the London and Birmingham Railway during the first year of its establishment, and the goods traffic eighteen times greater ; but in order that this traffic might be attracted to the railway, I maintained that the charges must be as low as the existing charges by the river, and that the railway must be carried in an unbroken line from Calcutta to Mirzapore. The present average cost of carrying goods by the road is $3\frac{1}{4}d.$ per ton per mile : by the river the average cost upwards is $1.59d.$ per ton per mile, and downwards $1.15d.$ per ton per mile, or on the average $1.37d.$ per ton per mile, including interest and insurance ;

and it appeared to me a fair presumption that an average charge of 1*d.* per ton per mile would secure the existing traffic to the railway: for passengers I proposed a charge of $\frac{1}{2}$ *d.* per head per mile, which, if we include time and food, is less than the present charge of proceeding on foot. Inasmuch, however, as the road traffic formed but a small portion of the total traffic, (and the road traffic would alone be available for the support of any PIECE of railway proceeding from Calcutta in the direction of Mirzapore, without reaching that place,) it was quite clear that any such segment of the line as was then proposed to be constructed would, in a commercial sense, be a failure, and that between the construction of the whole line to Mirzapore and none of it, there appeared no advisable alternative. The construction of a double line of railway, however, between Calcutta and Mirzapore, would cost several times the amount on which a guarantee had been given; but I pointed out that a single line would suffice to accommodate the traffic, even if greatly augmented, inasmuch as a second line of rails was rendered necessary, not by the largeness but by the frequency of the trains; and in India, however large the trains might be, there would be no need of frequent departures. Single lines, too, appear to be more exempt from collision, and to be altogether safer than double ones, as is proved by the impunity from accidents of the Belgian and American lines, which are for the most part single; and a single line of railway could, I estimated, be carried from Calcutta to Mirzapore, with branches to Patna and Benares, for about five and a half millions sterling. The risk involved in a guarantee upon three millions to be expended upon pieces of a double line as was then intended, I showed to be greater than the risk of a guarantee upon five and a half millions to be expended upon a single line, extending from Calcutta to Mirzapore; for whereas my computations showed that the through line, if made with a single track, would return a dividend of 24 per cent, the projected piece, with a double track, would occasion a *loss* of

£98,194 per annum, or a loss of $3\frac{1}{2}$ per cent upon the capital invested. Nor can this great disparity be attributed to any error in the computation, for the details of the computation are given, so that every one has the means of satisfying himself of their correctness; and even supposing the existence of error, yet, as the data, whether wrong or right, are *in both cases the same*, the numbers deduced must at least represent the relative merits of the two projects. I suggested that the government guarantee should be extended to seven millions, so as to comprehend the Bombay and Madras Railway Companies in its provisions, inasmuch as it did not appear either equitable or politic to restrict any aid the government thought fit to render to one presidency or one project; and a capital of seven millions, it appeared, would enable a railway in each presidency to be prosecuted to a successful conclusion. The traffic and probable profits of the Great Indian Peninsula Railway, extending from Bombay up the Ghauts to Alleh, 109 miles distant, and branching from thence to Mhuse and the Pera river, had been investigated with much patience and ability by Mr. Chapman, and he estimated that it would yield a dividend of 11 per cent: the merits of the Madras Railway, extending from Madras to Walajnuggur, had been similarly investigated by Mr. Heath, and it was considered that the existing traffic would yield to the railway a profit of 6 per cent. These deductions appeared to me entitled to the utmost confidence, but I suggested that it would be expedient to construct the Bombay Railway with a single track, after the manner I had recommended for the East Indian line, and Mr. Robert Stephenson has, to a considerable extent, confirmed the recommendation by suggesting the same thing as regards the continuations of the line from Alleh to the Pera river and to Mhuse. I strongly urged upon the East Indian Railway Company the ineligibility of the pieces of railway they proposed to undertake, and the absolute necessity that any line proceeding from Calcutta towards Mirzapore should be com-

pleted through the whole distance, instead of stopping short midway. I also represented the perfect sufficiency and great economy of a single track, but the directors probably found themselves too far committed with the government to the segments of a double line to make retraction easy or graceful, and they persisted, therefore, in their previous intention, and reposed their trust in the virtue of the guarantee. To this fatal determination the failure of the project is attributable, for as it was impossible to show any reasonable chance of profit upon the segments proposed to be constructed, the guarantee had to be presented to the proprietary as the only prominent attraction, and possibly it might have accomplished its object if money had been very abundant at the time; but what prospect was there of getting money upon a 5 per cent guarantee for a limited term, when it was worth 8 per cent in the market, with security for full repayment? Of course shareholders under such circumstances could not discern any sufficient inducement in the undertaking to warrant them in persevering with its prosecution. The intrinsic merits of the project being kept out of sight, and everything being rested upon the guarantee, it necessarily followed that when the guarantee broke down, the scheme took such a position, that without the introduction of some new element it could not be prevented from falling to pieces.

I was at Mirzapore when the news arrived in India that the £100,000, which was to be paid into the East India House by the East Indian Railway Company against a prescribed day, could not be collected. Perceiving that unless very vigorous measures were immediately adopted the enterprize would inevitably miscarry, I submitted to Mr. Stephenson a plan of procedure which I conceived suited to the emergency, and which, if promptly carried into execution, would, I believe, have been completely successful. Every person connected with the railway had become convinced, upon arriving in India, that any line between Calcutta and Mirzapore must be an unbroken one, and

that a single line was the best adapted to the circumstances of the country. In these views all now acquiesced, though the conversion came too late to be of much utility in practice ; but the difficulty still remained, that there was only a guarantee existing upon three millions, whereas five and a half millions appeared from my computations to be the sum required on the most economical scale. I had found, however, on my way up to Mirzapore, that the bridges, embankments, and other works of the road, were of so elaborate a description as to be suitable for a railway, and I ascertained that a single line of railway could, without inconveniencing the road traffic, be carried along one side of the road through the whole distance, whereby the cost of the railway would be so much further reduced that even less than the three millions would suffice to complete it. Here, then, was a solution of the difficulty caused by the inadequacy of the guarantee, and I suggested to Mr. Stephenson the expediency of making application to the government for the required accommodation upon the road, adducing the reasons which I conceived might be the most operative in leading the government to grant the request. The letter containing this suggestion is dated December 3rd, 1847, and I may here cite that portion of it which bears upon the question.

Extract of a letter from J. BOURNE, dated Mirzapore, Dec. 3rd, 1847, (laid before the Commissioners of the East Indian Railway).

“I arrived at Benares on the 1st of December. As the road approaches Benares there are all the signs of an increasing traffic, but the traffic upon the other parts of the road did not come up to my expectations, and all that I have observed, and all that I have been able to learn from road superintendents and others, confirms the view I have from the first maintained, that a rail-

way dependant altogether upon the road traffic, could not be successful, and of any isolated piece of a railway, which must necessarily fail to attract to itself the Ganges trade, the road traffic can be the only dependence. This doctrine is either a fact or not: if it be not a fact its unsoundness can no doubt be exhibited, but if, on the contrary, it is a fact, it must be as inexorable as any other natural law, and it appears to me very desirable that the consequences of so momentous a truth should be well weighed before they are finally accepted. In my mind, circumstances have provoked the enquiry whether the works of the trunk road could not be made available in abatement of the railway expenses, and after a survey of the road throughout its length, with this question continually presenting itself, I can see nothing, supposing the assent of government to be obtained, to hinder the adaptation. The grand trunk road is carried on an embankment all the way from Hoogly to Benares, and is so smooth and level, and altogether so expensively constructed, that it is just a railway without the rails. Would the government refuse to permit a single line of rails to be put down upon the one side of this road throughout its length? The road is about 30 ft. wide altogether, but of this width only a strip in the centre, 15 ft. or 16 ft. wide, is metalled, leaving an unmetalled strip of cutcha road, as it is called, upon each side, to serve as foot paths. These unmetalled portions, however, are not only of no use, but are a positive inconvenience. Whenever fresh metalling is put upon the central strip of the road, the carts, to avoid it, deviate to the cutcha portions, and cut up the unmetalled surface into such ruts as to make it impracticable for foot passengers, though professedly designed for their accommodation: on the other hand, if the metalled part of the road be so smooth and so well consolidated as to afford easy transit for carts, the foot passengers prefer to use it also, and the cutcha portions become covered with grass and weeds. I observed at various points persons employed in uprooting this grass, and all such trouble

and expense would obviously be saved if the width of the road were contracted by the railway.

“It appears quite clear from these facts, that the road is of a superfluous breadth for its present purpose, and if it were narrowed to the extent of the cutcha portions, which would be sufficient for the use of the railway, the remaining width would afford as effectual accommodation as at present for the ordinary road traffic, and would be capable of being kept in repair more easily. The railway would save, by this arrangement, the construction of 400 miles of embankment, and of about 150 bridges, some of them of large size ; but the most important consideration of all is, that the acquisition of these works would enable the £3,000,000 of capital which has been guaranteed, to open up the whole line from Calcutta to Mirzapore. In England, the knowledge of the fact that you had obtained the concession of a *railway ready made, all but the rails*, would assuredly tell favourably upon the shares ; and the success which would inevitably attend the opening of the line—the certainty of a large traffic from the acquisition of the Ganges trade, and the smallness of the capital by which these large returns would be realized, could hardly fail, I conceive, to raise Indian railways to a high position in the public estimation.”

Shortly after the despatch of this letter I returned to Calcutta by way of the Ganges, and I had several conferences with the commissioners in Calcutta on the subject of my letter. Mr. Stephenson thought the suggestion a most important one, but it did not appear to me that his coadjutors regarded it with equal favour, though the objections they brought at first against the measure I showed them were wholly groundless. Of course, however, I declined to press my views where they did not appear to be acceptable, but at Mr. Stephenson's request, after having again weighed the subject in my own mind, I sent him another letter to the following effect :—

Calcutta, January 11th, 1848.

DEAR SIR,—Since the despatch of my letter of last month from Mirzapore, suggesting the expediency of applying to government for leave to lay down a single line of railway upon one side of the grand trunk road,—which could be done, I stated, without injury or inconvenience to the road traffic,—I have carefully reconsidered the subject in all its bearings, and am confirmed in the belief, that the course suggested is, under existing circumstances, the most eligible both for the railway company and for the government. It has always been my impression,—and my recent journey up the trunk road has contributed to confirm it,—that a piece of railway, extending from Calcutta towards Mirzapore, could not be commercially successful, as any such segment would fail to attract to itself the trade of the Ganges, which river is at present the great artery through which the commerce of the country circulates; and the construction of any unprofitable railway would, among other evils, produce this mischief, that it would so damage Indian railways in the public estimation, that it might be impossible to collect the capital necessary to carry them to a satisfactory completion. It is impossible, however, to construct an independent railway of efficient construction all the way from Calcutta to Mirzapore, with a capital of £3,000,000; and in this dilemma, therefore, the East Indian line stands, if the use of the road be rejected:—it must either obtain a guarantee upon a larger sum than £3,000,000, or undertake a work which cannot be commercially successful. By laying the rails upon one side of the road, however,—and the government, it may be presumed, would accord this permission if it were clearly shown that the traffic of the road would not thereby be incommoded,—the railway may be carried to Mirzapore for a less sum than the £3,000,000 with which the company has to work, and the success of the undertaking would be put beyond conjecture. The Mirzapore differs in this respect from most other lines, that at the outset, at least, it cannot be sup-

ported chiefly by the short traffic, for a large part of the country through which it passes is jungle, and unless it be carried to Mirzapore it cannot receive the traffic of the Saugor road, which is many times greater than that of the grand trunk road, and which is poured into Mirzapore to be conveyed upon the Ganges. The railway can no doubt carry more cheaply than the river, if both have the same starting point, so that they compete upon equal terms; but if the railway is to have the impediment of an intermediate land carriage, and an intermediate transshipment,—as any severed piece of the line must have,—it is impossible that a competition with the river can be maintained with success, and without the river traffic the line must be a failure. There is no other means, therefore, of constructing a successful railway under the existing guarantee, than by laying rails along the road in the manner suggested; and unless this plan be adopted, the whole of the benefits expected to result from the introduction of railways into this country must be set in abeyance for some years.

The objections which present themselves to the course proposed resolve themselves into these:—that the reduction in the width of the road would incommode the existing traffic, and that the locomotives in passing would frighten the horses. In regard to the first point it is only necessary to say, that, even for the present traffic, the road is of a superfluous breadth, which will be still less necessary when its traffic has been reduced by the formation of a railway. The width of the road is about 30 feet, of which only 15 or 16 feet in the centre is metalled, leaving unmetalled strips about 7 feet wide upon each side to serve as footpaths. The unmetalled strips, however, are not only of no service, but are a positive source of mischief, as they occasion expense without contributing to the road accommodation. When fresh metal is put upon the central part of the road, the carts, in order to avoid it, pass over to the unmetalled portions, and so cut up the surface into ruts as to make it impracticable for foot

passengers ; whereas, if the centre of the road be good, the passengers confine themselves to it, and the unmetalled parts become covered with vegetation. In some parts of the road where fresh metalling had recently been applied, I observed rows of bushes placed transversely across the unmetalled portions of the road, to compel the carts to keep the centre. In other places I observed men clearing away the vegetation which had sprung up upon the unmetalled portions, and which, with the comparative abandonment of the road the railway must occasion, would, without the labour of continual uprooting, probably rear itself into jungle. It cannot surely be reckoned a deprivation to take from the road a breadth equal to those unmetalled strips which it virtually alienates at present ; for margins choked with bushes, or covered with grass, might as well be absent altogether.

The second point of objection, namely, that the locomotives in passing would frighten the horses or cattle upon the road, involves no impediment which could not easily be surmounted. Even in England very little inconvenience has been found to result from the circumstance of a road and railway running in contiguity ; but on the roads of India there is scarcely a horse to be seen ; and the bullocks, by which alone the transport of merchandize is maintained, have in general too little strength and vivacity to be readily stimulated into restiveness. The line, moreover, being a single line, could dispatch but few trains in the day—one probably at night and another in the morning ; and as the time would always be known at which these trains passed any given point, it would be an easy thing, by a deviation similar to that which is now made to avoid elephants and camels, to avoid the trains altogether. It would be expedient, nevertheless, to place a high and impervious fence all along between the railway and the road. A fence of this kind formed of saul branches woven together is usually carried around the native huts in the jungle, to protect the cattle during the night from the attacks of tigers ; and as it is the quality of the saul

that the leaves do not fall off when they wither, the fence cannot be seen through even after the lapse of years. Such a fence is very cheap and very strong, and it is as effectual a screen as a high wall.

I refrain at present from saying any thing of the engineering features of the present question, as Mr. Rendel will of course be consulted upon these points if any steps be taken, and I should be unwilling to anticipate his decision. I may state, however, generally, that with the exception of a few miles at the Dhunwa Ghaut, the road is so smooth and level, and is so elaborately constructed, that it needs little else than the laying down of rails to make it an efficient railway. A few of the bridges being suspension bridges, will require suitable expedients to adapt them to railway use, and in a few places some deviation from the road must be made; but, taking these contingencies into account, it appears to me practicable—if the use of the road be granted—to complete a single line of railway from Calcutta to Mirzapore, with stations and a sufficient carrying stock for a commencement, for something less than the three millions guaranteed. In this opinion such of our engineers concur as I have consulted on the subject; but before submitting any more detailed estimate, I should wish to examine more carefully the levels, the scantlings, and foundations of the bridges, and other technical points, respecting which the military board will, I have no doubt, be willing to afford every information in their power. The road is carried nearly the whole way on an embankment, and this embankment is not only such as would be suitable for a railway, but it has been consolidated by time. The cement of the bridges and culverts has had time to become firm, while the effect of the inundations upon the bridges and embankments has been ascertained by experience, and such imperfections corrected from time to time as had been found to exist. Not only is an important economy attained, therefore, by making the road the basis of the railway scheme, but a security is acquired

for the stability of the works and the rapid completion of the undertaking, such as no other conceivable course of procedure affords.

Such, then, are a few of the most prominent considerations which present themselves to me in connection with this subject, and I would beg to submit to you the expediency of bringing the question under the early consideration of Lord Dalhousie, who no doubt fully appreciates the advantages to be derived from the railway, and who will hardly fail to discern whatever value there may be in the foregoing suggestions. If the railway be fraught with half the benefits which are manifest, the government clearly sustains a corresponding loss every year its completion is suspended; and as the present position of the railway company is no doubt in a great measure owing to government delays, it has certainly a reasonable claim in the present emergency for government indulgence. Possibly Lord Dalhousie might feel himself justified in recommending to the home authorities the acceptance of the money which is to be paid into the India House against the end of March, in instalments, according as it can be realized; and if he could further recommend the concession of a strip of the trunk road for the use of the railway, the benefit would be so palpable in the eyes of the shareholders, and the temptation to proceed would be so stimulated by the acquisition of ready-made bridges and earthworks, that there is little doubt the enterprise would be prosecuted with spirit to a successful conclusion. In this view the concession of the road has a double value; for its effect would not only be to diminish expense, make the amount guaranteed sufficient for a through line, and bring the railway into speedy operation, but it would probably prevent the abandonment of the scheme, which appears to be inevitable if divested of this suasive to perseverance.

I am, &c.

JOHN BOURNE.

To R. Macdonald Stephenson, Esq.

The effect of this representation was to confirm Mr. Stephenson's opinion in the expediency of the course suggested, and he proposed to write to London recommending its adoption ; but I submitted, that in an emergency of this kind, and as he was now the only person since the retirement of Sir George Larpent, who had taken a prominent part in the formation of the company, or who was much known to the proprietary, it would be better if he *went* to London, laid his views before the proprietary, and requested them to subscribe the £100,000 required to be lodged in the hands of the government, so as to keep the scheme alive, and enable it at least to wait for more favourable times. It was clear from the turn affairs had taken, the undertaking could not be commenced for two or three years ; and I recommended a compromise to be come to with the persons engaged for a term, with the view of extinguishing the current expense ; and if it were clearly shown to the shareholders that no farther call would be made upon them than that requisite to lodge the £100,000, until times so far mended that the works could be prosecuted without creating inconvenience, and if at the same time the current expense were made so low that the project could be kept alive at scarcely any additional cost, I had the strongest conviction, I stated, that the undertaking, improved as it now was in its prospects, would not be abandoned. Mr. Stephenson consequently made up his mind to proceed to England ; but this intention was frustrated by his coadjutors, who, after a good deal of time spent in deliberation, deemed it more expedient that Mr. Beeston, who represented their views, should go, and I, with some others, proceeded to London at the same time. I attended the meeting of shareholders held in London on the 20th of April : at that meeting the proposed acquisition of the road was never mentioned, and it appeared very clear to me, that the call intended to be made would not be responded to ; for no new element of success was set before the proprietary to raise their hopes or induce them to look better upon the undertaking, but

a question was merely repeated, which had been practically answered before, by their very limited response to the first call of £1 per share. A few of the larger shareholders of my acquaintance who were cognizant of my proposal respecting the road, urged upon me the expediency of bringing the question under the attention of the directors,—representing the probability that by some accidental omission the directors had not yet heard of the suggestion, and that etiquette should not stand in the way of a useful service in such an emergency. Yielding to these representations I sent the following letter to the chairman:—

To H. Aglionby Aglionby, Esq., Chairman of the East Indian Railway Company.

London, April 24th, 1848.

SIR,—The critical position of the East Indian Railway Company, and the conviction I entertain that a suggestion which I am enabled to lay before you is calculated materially to amend its prospects, will, I trust, constitute a sufficient apology in your estimation, for any breach of etiquette in thus presenting myself unbidden to your attention.

About a year ago, I investigated, at Mr. Stephenson's desire, and in considerable detail, the traffic and probable profits of the East Indian line, and I was subsequently selected by Mr. Rendel as one of the engineers who were to proceed to India, and from whence I have recently returned. I had found, in the course of my investigations before leaving this country, that, although a line connecting Calcutta with Mirzapore would in all probability be a most successful undertaking, that a *piece* of that line, if such a work were undertaken, would, on the contrary, most probably be a failure; and inasmuch as a double line of railway would be a more expensive undertaking, perhaps, than could be accomplished,

I advocated the construction of a single line, which I maintained would afford adequate accommodation for the existing wants of the country. It appeared to me, moreover, that it would be more expedient to carry a line all the way to Mirzapore, than to carry a line to Rajmahal, inasmuch as I did not anticipate that merchandise brought from the upper provinces by the Ganges would be disembarked at Rajmahal, even if a railway thither were made, but would be carried on to Calcutta, as at present; the risks of damage and peculation by transshipment being more than equivalent to any benefit that a railway in this situation could confer. These views I find to be entirely confirmed by the information I have since been enabled to obtain upon the spot, and I believe all the engineers now concur in the opinion, that a *piece* of railway would be an unprofitable work, and that a single line is the most appropriate for the circumstances of the country. These *past* confirmations of my views you may possibly consider lend some weight to the *present* suggestion, but however this may be, I feel that I should fail in the performance of my duty to the company, if I neglected to bring under your notice a conception which I deem of such material consequence to the company's interests as the one I have to mention.

The suggestion to which I refer is this:—The grand trunk road, connecting Calcutta with the north west provinces, is throughout so smooth and level, and is so elaborately constructed, that it is already a railway all but the rails; while its width, which is 30 feet, is such, as to enable a single line of railway, properly fenced off, to be carried along one edge of the road all the way from Calcutta to Mirzapore, without incommoding the road traffic. As the bridges, embankments, and other works of the road would thus be rendered available for the reduction of the railway expenses, a very efficient line could be opened between Calcutta and Mirzapore complete, with locomotives, carrying stock, &c., for less than £3,000,000 sterling; while there would be sufficient room for a second line of rails, if the traffic

should afterwards require it, the ordinary bullock traffic—if any then remained—being accommodated by a small addition to the present width of the road. The East India Company have many inducements to lead them to the concession of a strip of the road for the use of the railway: it would save them the cost of the land which they have to present to the railway company, and would reduce the risks of the guarantee, in consequence of the amended prospects of the undertaking due to the diminished cost of construction. It would further turn to beneficial use the works of a road which the railway must render nearly superfluous, and give to India in the shortest possible time the benefits of railway communication.

As regards the shareholders, they would be placed in much the same position, by the acquisition of the road, as if the permanent way of the line had been already completed, and it would be impossible that a railway, requiring merely the addition of the rails to perfect it, should nevertheless be abandoned. I would therefore beg leave respectfully to suggest, that the question of the eligibility of the road works for the use of the railway, and the expediency, under existing circumstances, of adopting a single line of rails, be referred to Mr. Rendel, to report to you his opinion upon the subject, after the examination of such persons who have returned from India as are capable of giving useful information upon these points. I do not apprehend that the East India Company would refuse to grant the necessary time for this investigation, as the whole question is put upon a new basis by the present proposal, and the East India Company is as much interested in the supercession of the existing difficulty as any other party.

I remain, Sir,

Your most obedient servant,

J. BOURNE.

Of this letter no notice has ever been taken, and its receipt even has never been acknowledged. Here, then, my responsibility ended : for it was clear nothing further could be done by me. The anticipation that the £100,000 would not be collected against the 1st of May, on the basis previously adopted, has been confirmed by the result ; and any agreement respecting the guarantee concluded with the East India Company has consequently been rescinded.

It is clear from this recapitulation, that the disasters which have overtaken Indian railways are not attributable to the existence of fallacies in the estimates of profit originally put forth, but are rather to be imputed to the existence of a guarantee which has been held out as the only prominent attraction to the public, but which lost its virtue so soon as money rose to a higher price in the market than the guarantee secured. The acquisition of the road, however, would have remedied this mischief, by virtually cheapening money, inasmuch as it made a smaller sum sufficient, and twice the dividend might be expected if the railway were rendered only half as costly. Supposing the use of the road to be obtained, the prospects of the East Indian Railway are now more than twice as good as they were at any former period, inasmuch as a smaller capital will suffice, and the undertaking be rendered much less formidable than before. In this respect, indeed, it has now the advantage of the Rajmahal scheme which commended itself to attention solely on the ground of its less formidable dimensions ; for whereas the Rajmahal line, it appears, was calculated to cost £4,000,000 sterling, the line connecting Calcutta with Mirzapore could be completed for less than £3,000,000 by the method suggested, the disparity in expense arising partly from the absence of any road in the direction of Rajmahal, the works of which could be rendered available for a railway.

The following is an estimate I have made of the cost of executing the line to Mirzapore :—

Estimate of the Cost of forming a single line of Railway along one side of the Grand Trunk Road, between Calcutta and Mirzapore.

Permanent way.

450 miles of rails of 80 lbs per yard, at £15 15s. per ton delivered on the ground	} £871,200
Chairs and spikes 19,800 tons, at £12 per ton, delivered on the ground	} 237,600
792,000 sleepers, 11 feet long, impregnated to resist dry rot and white ants, at 4s. each	} 158,400
Keys for chairs	9,900
Ballasting at 7s. per yard forward	277,200
Plate laying at 1s. per yard forward	39,600
Hedging and ditching at 2s. 6d. per yard forward	} 99,000
15 stations, with sidings quarter of a mile long, and water cranes, turn tables, &c.	} 60,000
Strengthening bridges and contingencies, 20 per cent.	} 350,580
	<hr/>
	£2,103,480.

Carrying Stock.

50 locomotives at £3,000 each	150,000
Waggons, carriages, and trucks	300,000
Workshops, and tools	25,000
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	475,000.
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	£2,578,480.
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The surface of the country adjacent to the road is much more free from jungle than at a greater distance on either side, and there are bungalows, or station houses, at intervals along the road, for the accommodation of travellers, which might be rendered available for the railway if the track of the road were adopted. The line of the road seems to have been chosen with great judgment, so that in few instances only, I believe, anything would be gained by a deviation from it; and I consider that by the adoption of the road the railway could be opened all the way from Calcutta to Mirzapore, within two years from the time of commencing the works.

In closing these miscellaneous observations on the subject of Indian railways, I have only to add, that it would be contrary to my wish, and would be the occasion of regret, if in vindicating my own views I should be supposed to attribute blame to any other party. No doubt the rejection of the measures I suggested was justified by reasons satisfactory to the minds of the persons by whom that course was adopted, but as none of the reasons which have reached me appear to have much cogency, I must be content to maintain and justify my former opinions. The views I formed and expressed before I had any official connection with Indian railways at all, I cannot abandon, after those views have been so fully confirmed by more extended enquiry, and by a personal examination of the localities themselves; and if I was careful to make my anonymous representations as exact as possible, it is not to be supposed that I should be less careful now, when the responsibilities of professional character have been added to the other motives to a strict fidelity. It is hopeless to contend with physical fact, for however disguised it may be, it will sooner or later assert its supremacy; and my attempts have been restricted to the enquiry of what the facts are, in order that a course consonant with their operation might be adopted. - Whether the deductions I have drawn be sound or

otherwise, the shareholders in Indian railways may at least be assured that the facts I have stated are *true facts*, and cannot be controverted, and the importance of the conclusions they involve—the saving of millions of capital, and of years of time—may well dispense with the observance of common punctilios, even if such stood in the way of the realization of the benefits displayed. — /

JOHN BOURNE.

11, SAVAGE GARDENS,
June 1st, 1848.

RAILWAYS IN INDIA.

CHAPTER I.

RAILWAYS IN BENGAL.

OF the various railways projected in Bengal, the East Indian Railway and the Great Western of Bengal are now almost the only survivors. The East Indian line runs from Calcutta, through Mirzapore, Allahabad, and other great commercial marts in the interior, to Delhi, in the North-west provinces, and is with its various branches above 1,000 miles long; the Great Western of Bengal is about 180 miles long, and extends from Calcutta to Rajmahal, a town at the head of the Delta of the Ganges. The East Indian line will open up the most important districts of India, many of which are now inaccessible to commerce, and will, moreover, in consequence of the facilities it will afford for the rapid transport of troops, constitute a most powerful political engine for preserving the tranquillity of the country. The Great Western of

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Bengal, on the contrary, aspires to do nothing more than to lend some new aids to the Ganges trade ; but, as the formation of the East Indian line appears to be inevitable, and as it must, when completed, attract to itself the best portion of the Ganges trade, the Great Western of Bengal appears to be providing for a want that must be on the eve of extinction, before that line could even be opened to the public. Apart however from this consideration, it is doubtful whether a railway, extending from Calcutta to Rajmahal, would become the medium for the transmission of any material proportion of the Ganges trade ; for though the shoals of the Bhagarutty and the sinuous channels of the Sunderbunds would be avoided by the use of such a railway, yet a transshipment of merchandise would be the inevitable concomitant of the proposed mode of transport, and experience has shown that transshipment is a greater evil than any of the ordinary impediments of navigation. The Glasgow and Greenock, Dublin and Kingston, London and Blackwall, and several other railways in this country, were constructed chiefly with the view of receiving the cargoes of ships at a point of easy access, and transmitting them expeditiously to their several destinations ; and it was expected that ships would avail themselves largely of the facilities thus placed at their disposal to escape the difficulties incidental to the navigation of the worst parts of the Clyde, the Liffey, and the Thames. But in no one instance have these expectations been verified

by the result. Ships still persist in passing up to Dublin, instead of stopping short at Kingston harbour; they pass on to Glasgow or the Tower, in spite of the shallows of the Clyde, or the obstructions of the Pool; and there is no reason to believe that in India they would manifest a greater docility. All analogy assures us that cargoes of merchandise, when once embarked upon the Ganges, would not be disembarked until they reached their destination at Calcutta; but, as the East Indian railway extends unto the districts from which the Ganges cargoes are received, it is equally certain that, instead of being embarked upon the river, they would be embarked upon the railway, provided the railway could carry them as cheaply and as well. In such a contingency, the Great Western of Bengal railway, though it might be used for the transmission of parcels, and a few light wares, would obviously be a superfluity so far as regards the general Ganges trade; while, on the supposition that railway cannot be rendered as cheap as river carriage, the increased expense of the railway must be added to the evils of transshipment in discouragement of this hybrid reticulation of transport. It may no doubt be the fact, that the local traffic of the districts around Rajmahal is sufficient of itself to support a railway, but the same thing might be predicated of many other districts of India, and it is impossible to raise a claim for priority of construction on the strength of such pretensions. The most important lines must obviously be the first that are underta-

Railways
dependent
on the car-
goes of ships
have never
answered.

The most important lines must be the first undertaken, and Government virtually pledged to the trunk line.

ken. At the institution of railways in this country, nobody thought of opening a railway to Beverley, before undertaking one to Birmingham; and still less would any such proposal have been countenanced, if the formation of the more important line had rendered the existence of the other superfluous for all its professed objects. The railway commission, which must be regarded as the official organ of the Indian Government, has decided that politically, socially, and commercially, the East Indian line is the most important in India, and the government has certified to the public their acquiescence in this judgment, by the offer of a guarantee of 4 per cent. for a limited period upon the capital to be invested. It is impossible, after this public recognition of the superior claims of the trunk line to select a branch line of inferior importance, as the first to be undertaken. The government is not pledged to any particular company, but it is pledged to a particular scheme, and it is bound to carry that scheme into effect under the best guarantees for the public accommodation that are obtainable. To substitute another scheme now, for that which has been already selected, would only be to stultify the government in all its past proceedings; it would be to declare that either its first choice was precipitate, or its proposed substitution indefensible; and to encourage the belief, that its decisions rest upon some other basis than is afforded by those fixed and equitable principles which disclaim changes without a cause. There is, indeed,

no probability that the government is disposed to pursue such dangerous courses ; but it is important to understand that the vaccillations are impossible, upon which some persons appear to rely. The government, by its acts, is virtually pledged that the trunk line shall be the one first constructed ; many persons have bought or retained shares in that line on the strength of the government declaration, and the public voice, which at the present juncture the Indian government cannot afford to despise, would certainly swell the cry these persons would raise, if the government were to deceive them by abandoning its engagements or changing its policy without the advent of any new lights that were capable of changing its faith.

The government cannot adopt a subordinate line for a commencement with either credit or safety.

The East Indian Railway had its origin in the exertions of Mr. R. Macdonald Stephenson, who, after acting as secretary of the East Indian Steam Navigation Company, and devoting many subsequent years to subjects connected with the development of the resources of India, proceeded to Calcutta, and, after conferring with the government there on the subject of Indian railways, and collecting a large amount of important information bearing upon their commercial and engineering features, returned to England to press the subject upon the consideration of the authorities at home. Of course his communications were received at first with much apathy and scepticism, but by degrees his doctrines were endured and finally embraced ; and a company, numbering some of the

Origin of the East Indian line.

Origin of the
East Indian
line:

chief merchants of London, and with a capital of £10,000,000 sterling, was formed with the concurrence of the Indian government, to carry his views into practical effect.

The Court of Directors of the India House, in a despatch to the Governor-General, dated May 7th, 1845, intimated that they had appointed a civil engineer to proceed to India, with whom some engineer officers in the Company's service were to be associated, in a commission which was to ascertain the practicability or benefit of introducing railways into India; and the opinion of the Indian executive was requested upon the conclusions at which this commission arrived. The engineers reported "that railroads are not inapplicable to the peculiarities and circumstances of India, but on the contrary, are not only a great desideratum, but, with proper attention, can be constructed and maintained as perfectly as in any part of Europe." In this opinion all parties now appear to acquiesce, though at the outset doubts were raised and difficulties magnified, as is the fashion in such cases; but practical investigation has dispelled the mists in the impenetrability of which such scepticism confides.

It was one of the functions committed to the engineers to report upon the best line for connecting Calcutta with the north-west provinces. Several lines were examined, but the one to which a preference was given may be traced by the help of the following indications: leaving Calcutta at its

northern extremity the line would pass along the eastern bank of the Hoogly so as to escape the effects of the inundation when the Damooda bursts or overflows its banks—near Cossipore, Barrackpore to Goonpalla, Ranaghat, crossing the Matabhanga river, crossing the road to Kishnagur near Dinagur, curving to the north-west and crossing the Hoogly at Panchilla factory, through Singalee to Baljooree and Balkishun 10 miles north of Burdwan. From Balkishun the line would proceed to Kagsa, thence along the left bank of the Damooda to Raneegunge collieries, pass near the junction of the Barrakur river with the Damooda, up the valley of the Barrakur, near the Dhunwar Pass where the gradients would be severe, across the plains of Behar to Shahurghatee, Nourungabad, crossing the Soane river 2 miles and 3 furlongs in breadth, where the substratum is an unknown depth of sand, thence along the foot of the hills to Saseram, to Chunar and thence along the foot of the Hills circuitously to avoid bad ground to Mirzapore. In this section, which is 448 miles long, there are two branches which it appears expedient to execute—one leaving the main line 5 miles east of Shahurghatee, and passing through Gyah and Patna to Dinapore, the length being 80 miles; and the other leaving the main line 9 miles before reaching Chunar, and proceeding to Rajhgate, opposite Benares, the length of which is 17 miles. The total length of the section extending from Calcutta to Mirzapore with its branches would therefore be

Course of the
East Indian
line.

Course of the
East Indian
line.

545 miles. Patna, Dinapore, Benares and Mirzapore, are all upon the Ganges.

The section of the line extending from Mirzapore to Delhi would cross the Tonse river to Allahabad, near which it would cross the Jumna, thence pass to Futtehpore, Cawnpore, Mynpooree and Allyghur on to Delhi. The chief branches recommended are one from the main line, at a point 60 miles north-west of Cawnpore to Ferruckabad, the length of which is 32 miles; from Secundra on the main line to Agra, 40 miles; and from Delhi to Meerut, 36 miles. The length of the line from Mirzapore to Delhi is 452 miles, and of the branches 108 miles, making a length of 560 miles for this section of the general scheme, or 1,105 miles for the length of the whole line from Calcutta to Delhi, with its principal branches.

Whatever be the merits of this enterprise as a commercial undertaking, it is clear, that its accomplishment would be productive of great advantages to the Indian government. Not only would such a railway make the government of the country more easy, and its tenure more secure, but by bringing neglected land into cultivation for the productions of which a profitable market could be found if easy access to a seaport were provided, it would be the means of increasing materially the public revenue, of which the land-tax is in India the principal source.

As the Indian government would be the first recipient of the benefits the railway would confer,

and would reap those benefits whether it was profitable or not to the projectors, the Railway Company has required from the government a guarantee that if the profits do not reach four per cent. the government will make them up to that sum ; and has further suggested, that inasmuch as many persons would be deterred from the investment of their money in Indian lines, by the length of time which must elapse before they become profitable, if the guarantee only comes into operation when the lines are completed, it is expedient that the four per cent. should become payable from the time the money is invested, which it is clear, unless by dividing the capital, the government alone can make possible.

Benefits of
the under-
taking to the
government.

The Court of Directors of the India House at first thought a guarantee of any kind very objectionable, yet they ultimately agreed to give one for 15 years ; but this proposal the Railway Company is said to have declined—representing that it was indispensable to the prosecution of the undertaking, that the guarantee should be made perpetual, or at least be materially extended. There is very little doubt that the India House will accede to this requisition, as the refusal of a moderate guarantee, once demanded, would be fatal to the undertaking by disseminating the belief that those best qualified to judge of its success, apprehended that there was a risk in giving a guarantee upon it of four per cent. ; for a refusal is inexplicable without the supposition of such an apprehension.

Question of
a guarantee.

It has been objected to the plan of dating the guarantee from the time the money is invested, that instead of being a plan for making railway investments safe, it is an attempt to make the capital of the company yield in two ways—immediately from the payment of government interest upon it, as if government were employing it, and prospectively from the profits of the railway, in the construction of which it is actually employed. It is clear, however, that no person would think of investing capital in railway works in India, unless a fair return is to be got from it during the *whole* time of the investment ; and if for a certain number of years the capital is to remain unproductive, a return large enough to make up this deficiency, must be obtainable from it in the years succeeding. The government may either grant this return in money, which obviously merely alters the form of the arrangement, without affecting the substance ; or they may grant it in privileges, perquisites, and monopolies, which is of all payments the most impolitic and expensive ; but they must grant it *in some shape or other*, to justify the investment of the capital. In the one case the government by the imposition of a tax, or by the loan of its credit makes an advance, to enable the railway company to give some return upon their capital while it lies unproductive ; in the other case it gives no intermediate interest but empowers the company, by way of equivalent, to tax the public for themselves in the shape of railway charges ; and this

power must be accorded to so large an extent, as to indemnify the railway company for all the risks, expenses, and blunders of the operation. People will be content with none other than exorbitant gains, where they are to be paid in chances; especially when they know so little of the country in which their capital is to be invested, as to be unable to estimate duly what those chances are; and are beset by all the doubts and jealousies of a little knowledge. An enterprise that is dark is as unpopular as one that is dangerous; and in dealing with the question of introducing railways into a country, of which the English public in reality knows nothing, the railway company has acted with a wise moderation, in seeking to gain for the shareholders, not enormous possible gains, but sure moderate profits. Nor can the company be accused of attempting unfairly to appropriate both the immediate and prospective advantages, if in asking for the one they are willing to surrender a fair proportion of the other; and certainly the requisition in question must be supposed to be suggested by the desire to make railways more safe, rather than to make them more productive. The money to be invested by the railway company is virtually a loan to the government; and if the government in raising the money would have to pay 6 per cent. in India, and the railway company lends the money in India at 4 per cent., the company manifestly saves the government 2 per cent. of risk by the transaction. If, then, the

Question of
a guarantee.

Railway investments virtually a loan to the government, part of the interest on which is paid by way of guarantee, and part by chances of additional gain.

prospects of the railway are sufficiently uncertain to make the 4 per cent. guarantee of any value, the 2 per cent. of risk incurred by the company can only be repaid by chances of gain many times exceeding that amount; for if, at 4 per cent., the risk of the railway dividend be taken at par, it is many times more likely that it will not reach 6 per cent. than that it will exceed 8 per cent., and the railway company would not therefore be indemnified for its 2 per cent. of risk, by the power to receive 2 per cent. of profit; the chances of any increase in the profits diminishing with every rise in the rate of dividend.

Whether, at 4 per cent., there is the same chance of an excess in the returns as of a deficiency, is of course only to be determined by comparing the probable cost with the probable traffic of the line; but the supposition of a risk is necessary, to give a value to the guarantee proportionate to the concession demanded in the limitation of the fares. The case we have taken sufficiently illustrates the fact, that the risks of a railway returning 6 per cent. are infinitely greater than that it will return nothing; and inasmuch as the chances of an excess rapidly diminish in number with an increase in the rate of dividend, that it requires those chances after passing 6 per cent., to be such as will authorise the gain of a large amount, to be equivalent to 2 per cent. of certainty.

Possibly the chance of realising 4 or 6 per cent. for a period of years over and above the 4 per cent.

of interest, might be an equitable recompense for the 2 per cent. of reduction in the interest the railway company achieves. This is equivalent to a limitation of the railway dividend to 10 or 12 per cent., which the railway company would probably hardly regard as a sufficient indemnity; but the design of these remarks is rather to exemplify the principle, than to fix the amount. It is clear, however, that such a dividend affords nothing more than simple interest of money, and insurance of the risk, and operates neither in redemption of the capital, nor as a commutation of the interest, until the capital becomes productive; and it is absurd, therefore, to suppose that a forfeiture should be submitted to on these portions of the general account.

The capital invested in railways should be recoverable when the government takes the railways into its hands.

Nor does it in any way affect this argument, that the use of the land for the railway is granted by the government without any payment; for if it were necessary that the land should be bought or rented, a guarantee on a larger capital would have become indispensable, and the amount of the guarantee must also have been increased, in consequence of the diminished prospect of profits incidental to the increased cost of the line. It does not, therefore, appear inequitable, that the railway company should look for a moderate return upon their capital, from the time of its investment and its ultimate redemption, when the proprietorship of the railway is assumed by the government, combined with the power of realizing such a rate of dividend

Virtual identity of different modes of agreement which require only a fair return upon the capital.

for a period of years, as will be a fair equivalent for the risk and trouble incurred in the undertaking. There is, in truth, no real difference between this demand and that involved in the offer to construct the railway without any intermediate payment of interest, and to surrender it without redemption after a period of years. In the latter case the powers of exaction must be so great, and the period of the lease so protracted, as to more than balance the benefits conceded ; and if the two proposals be substantially the same, it certainly behoves the government to adopt that form which will be most acceptable to the public, because most easily comprehended by them, and which will best facilitate the collection of the capital, and the satisfactory working of the scheme.

But while justice, as well as sound policy, requires that the companies adventuring their capital in Indian railways should be dealt with in a considerate and liberal manner, it is necessary to remember that it is for the benefit of the public, and not for the profit of companies, that railways should be established ; and every precaution should be taken against the introduction of a railway monopoly into India, such as prevails in this country. Of course duplicate lines should not be sanctioned, as that would have no other effect than to occasion a needless waste of money ; but it is worthy of consideration whether the government, or any other parties it might depute or permit, should not have the power of running engines upon the rail-

way, on the payment of a fixed toll to the company. This plan, indeed, has the obvious objection that the risk of accidents might be increased, and in India, perhaps, there are no parties fit to be trusted with so great an experiment; but the public must be protected in some way or other, and either this or some other expedient must be devised for the purpose, unless a sufficient guarantee is afforded, by the appropriation of the surplus above a fair dividend to the reduction of the rates of charge to the public.

Checks against monopoly and proposal to make the dividend permissible, dependent upon the rates charged for transport.

The common mode of limiting the dividend, however, has not been found to operate satisfactorily in other cases, for any excess has generally been squandered or jobbed away; and even in this country it has been impossible to impose an effectual check upon such practices. It appears, therefore, to be the more judicious course to make the amount of dividend permitted contingent upon the rates charged for transport; so that there would be a perpetual temptation to reduce the railway fares, inasmuch as a large dividend would be obtainable on no other terms. Taking, for example, the rates of charge upon the London and Birmingham Railway as a standard, a dividend of 12 or 15 per cent.—10 per cent. being the current rate of interest in India,—might be permitted with those charges, if such a dividend could be realised; or twice the dividend might be permitted, if the charges were reduced one half, and so on in all other proportions.

Rates of
charge on
different
lines.

In this country railway companies have generally fixed their fares so as to realise the maximum of profits, without any regard to the interests of the public; 30 per cent. has been added to fares, to gain an increased return of 1 or 2 per cent., the difference having been lost by the diminution of traffic, but by the plan proposed, the maximum of profit could only be realised by giving the maximum of benefit to the public. Every increase of dividend would necessarily bring with it a diminution of charge; and an increased prosperity would hardly be grudged to the company which was both the measure and the fruit of the increased public accommodation. Economy would no doubt be promoted, and activity secured, when the product of those virtues was divisible as profits; whereas, by confiscating any excess of profits above a certain sum, this necessary stimulus would be taken away, and an eternal suasory be presented to profligacy and supineness.

The rates of charge for passengers on the London and Birmingham Railway are—1st. class, 2*d.* per mile; 2nd class, 1½*d.* per mile; and 3rd class, 1*d.* per mile. On the French railways the charges are—1st class, 1½*d.* per mile; 2nd class, 1¼*d.* per mile; and 3rd class, ⅔*d.* per mile; which are lower than the London and Birmingham rates by ½*d.*, ¼*d.*, and ⅙*d.* per mile respectively. But on the French lines passengers are not allowed to carry so much luggage, are not carried so fast, and do not enjoy the benefits of day tickets; and with

these adjustments the fares are in reality brought very nearly to an equality. Fish on the French lines is charged 8.37*d.* per ton per mile. Goods, 1st class, 3.03*d.*; 2nd class, 2.69*d.*; and 3rd class, from 2.35*d.* to 1.67*d.* per ton per mile. Bullocks are charged 1.66*d.* per mile each; calves, 0.56*d.*; and sheep 0.34*d.* per mile each. On the London and Birmingham Railway goods not classed are charged 2.5*d.* per ton per mile; goods, 1st class, are charged 2*d.* per ton per mile; 2nd class, 1.47*d.*; and 3rd class, 1.25*d.* Oxen are charged 0.83*d.* per mile each; calves, 0.19*d.*; sheep, 0.15*d.*; and pigs, 0.15*d.* per head per mile. These rates, it will be remarked, are all much below those of the French railways, and should therefore be accepted in preference by the government, as the basis for the tariff of the Indian lines.

Rates of
charge on
different
lines.

The line selected by the government engineers for connecting Calcutta with the north-west provinces presents very few engineering difficulties, and may be constructed at a moderate cost: it passes through cities nursed into importance by the facilities of transport afforded by the Ganges, and between which and Calcutta a large traffic is already maintained, so that its commercial prospects have not to be created; while its political and military benefits, in tying the distant ends of the empire together, and enabling troops to be concentrated with a magical rapidity on any desired point of the frontier, are so numerous and momentous, that it needs an effort of the imagina-

- Military and agricultural uses of railways.

tion to comprehend all their value. But the military advantages of railways, though necessarily great in a country such as India, are probably inferior in value to the services they appear capable of rendering to agriculture. Not only will they be the means of bringing waste land into cultivation, by affording an outlet for its produce, and of stimulating production—which in India may be rendered illimitable if the necessary demand be only created—but they will enable land at present under cultivation, to be cultivated far more perfectly, by the new facilities afforded for the transport of lime, manure, and other materials necessary to agricultural improvement. Lime is one of the necessities of agricultural life; and it may be reckoned that every acre of land requires 6 cwt. of lime, per annum, to keep it in good condition. Supposing the lime to be only from 15 to 20 miles distant, the mere saving in the cost of carriage upon this one article would be equal to 1s. 6d. per acre per annum; and even in localities not more than from 15 to 20 miles from the port at which the produce was shipped, the saving accomplished by the formation of a railway would be equivalent to not less than 4s. per acre, per annum.

In the transport of draining tiles, railways would also prove of material service; but the chief benefit must lie in the transport of articles of current consumption or production. It appears very important that ramifications from the trunk line, constructed on the cheapest possible principle,

should be so led as to afford effectual agricultural accommodation; and many of these branches could be made without iron rails, the wheels, which would require to be rather broader than usual, running merely on the longitudinal wooden sleepers. Such railways would be perfectly effectual, would give vast accommodation, and be very much cheaper than roads. It is desirable, too, that, where practicable, the railway tracks should be made available, as far as possible, for conducting the water required for the supply of towns, or for the purposes of irrigation, as well as for the accommodation of the pipes carrying gas into towns, and sewerage water out of them.

Agricultural
uses of rail-
ways.

Concurrently with the introduction of railways, the government—which is in India the chief owner of the land—must be prepared to grant leases sufficiently long to induce the investment of capital in agricultural improvements; with an undertaking, that an allowance shall be made for all unexhausted improvements at the expiration of the term. With these impediments to amelioration removed, and with the markets of England open, and inviting the approach of Indian productions, who shall undertake to specify the rate at which India will advance to greatness? In sugar, cotton, and other tropical productions a large export trade already exists; and in grain—of which very little has hitherto been brought from India to this country—a large trade will probably spring up, so soon as the railways enable it to reach the coast, by diminishing the expense of transport. It is true

Operation of
Indian rail-
ways upon
the trade in
grain.

some doubt has been thrown upon this anticipation by the allegation that the grain is liable to heat and become deteriorated in quality, in consequence of having to perform so long a voyage; but the validity of this objection is disputed, and who, in these days of practical science, can suppose it to be insuperable, even if existent? It has yet to be ascertained whether the grain would heat if more thoroughly dried, or if carried in iron ships, or if penetrated by perforated air pipes, to give an effectual ventilation. There can be very little doubt that the difficulty can be overcome, if, on further experiment, it is proved to exist; provided only there be sufficient temptation to make the attempt; and the amount of this temptation may be judged of from the following official return of the relative prices of grain in India and England in 1845:—

Comparison of the prices of Wheat, Flour, and Split Peas, in Bengal and Mark Lane.

BENGAL. Averages for July, 1845, for 53 towns.			ENGLAND. Averages, November, 1845, Mark Lane.		
Quantity of Wheat pro- curable for the rupee of 2s.	Quantity of Flour pro- curable for the rupee of 2s.	Quantity of Dhall pro- curable for the rupee of 2s.	Quantity of Wheat pro- curable for the sum of 2s.	Quantity of Flour pro- curable for the sum of 2s.	Quantity of Peas pro- curable for the sum of 2s.
About 62lb.	About 47½lb.	About 57½lb.	About 17lb. at the average market quotation of 57s. per quarter.	About 11lb. at the average market quotation of 52s. for the sack of 280lb.	About 19lb. at the average market quotation of 52s. the quarter.

The average weight of English wheat is 60lb. to the bushel: 8 bushels, or 480lb. to the quarter. The weight and price of the Indian grains are reduced to avoirdupois and English currency.

These loose and general remarks are probably sufficient to show, that the introduction of railways into India would add stability to the government, and greatly stimulate production ; and these results would re-act upon the railways by giving a new activity to commerce. Nor would passengers be wanting, though merchandise must be the chief support of the Indian lines. Independently of the persons travelling for the purposes of business, there are a large number of pilgrims continually proceeding from every part of India to the holy cities of Gyah and Benares, and other sacred spots, which would largely swell the number of passengers proceeding by the railway trains. It has been doubted, indeed, by some persons, whether pilgrims in India would avail themselves of a railway, inasmuch as the act of proceeding on a pilgrimage was supposed to be an act of mortification, which required the devotee to proceed on foot. That a pilgrimage may be regarded in this light by a few persons is probable enough, but that it is generally so regarded is confuted by the fact, that pilgrims almost invariably proceed by some species of conveyance or other whenever they can afford it.

Passenger
traffic on the
East Indian
line.

Mr. Higgenson, in a letter printed in Mr. Stephenson's Report upon Indian railways, says,—“ I think the number of passengers would soon become very great ; no native walks from *choice*, pious pilgrim though he be, at least there are very few who do, and I am confident nearly all would take

Pilgrims
would travel
by railway.

advantage of a very cheap and quick conveyance if it were offered to them." The question, however, being of importance, has been formally submitted to the Dhurma Subha, the highest ecclesiastical authority on such points, and it has been declared by that authority, that it is perfectly permissible for pilgrims to travel by railway. In Mr. Stephenson's Report, (p. 35,) there is an admirable letter given, from Messrs. Kelsall and Ghose, written by Baboo Ram Ghopaul Ghose, which illustrates this question so clearly that we here transcribe some passages from it :—

"The relation between the people and the seat of power and government are by no means unimportant. The government itself, for the conveyance of its mails and troops, would not afford a trifling support. Their servants, to whom time is valuable, would prefer expeditious travelling; the growing class of intelligent natives would freely resort to it; and lastly, the religious connection between the Hindoos and the holy cities of Benares, Gyah, Allahabad, and others, would alone fill the trains with hundreds of the better class of pilgrims. This brings us to consider the extent of religious prejudices. As a native of the land the writer feels some confidence in stating his opinion, that he believes they may be overcome by a few simple arrangements. Let there be three divisions of the people, namely, Mahomedans, and high and low caste Hindoos. If any female passengers offer, let them be accommodated in separate carriages; and

do not let the travellers be required to make a run of more than 12 hours at a time (which of course would never be necessary). We feel sure, with these easily effected arrangements, railway travelling would be generally and eagerly availed of by all classes of men—except, perhaps, by a few—very few—old antiquated Hindoos, who look upon every innovation with feelings of horror. The only serious objection would be on the part of the females; but even this stronghold of native prejudice we hope to see successfully undermined by the civilizing influence of steam.”

Railway arrangements proper for pilgrims.

Baboo Mutty Loll Seal, another intelligent native merchant, says, “If an industrious and thriving population, numbering about 100,000,000,—a large, active, and daily expanding internal traffic—cheap land and labour, with most of the necessary materials for construction on the spot, at prices equally low—and perfect security for person and property, are elements that will command success,—then it is certain that a more promising field than Bengal for the investment of railway capital, could not be found.”

In spite of these favourable judgments, however, doubts have been raised in India as to the applicability of the railway system to that country, inasmuch as in England railways have been chiefly supported by the passenger traffic, which would not be sufficient to support a railway in India, on account of the poverty of the people; and it is judged doubtful whether a railway could be supported

Indian rail-
ways will be
chiefly sup-
ported by
merchandise

chiefly by the transport of merchandise. There is no doubt, however, in the matter, provided only the railway gets merchandise enough to carry. If it is profitable to carry ten tons of goods, it is certainly more profitable to carry ten thousand ; and it is obvious enough, that by increasing the quantity of merchandise sufficiently, the passengers might be eliminated with impunity. It is no doubt the fact, that the people in India are for the most part too poor to pay for expensive travelling. A Bengalee ryot is deemed comfortable if he can afford to live up to 3 rupees a month, though in the Upper Provinces 4 to 5 is the average. Mechanics earn from 5 to 8 rupees a month ; a Sepoy receives 7 ; police peons 5 to 7 ; domestic servants of Europeans 5 to 8 ; and labourers 4 to 5 rupees per month. Whatever be the poverty of the people, however, they need not be prevented from availing themselves of the railway, if it carries them more cheaply than they could proceed on foot ; and this, as will presently appear, it is perfectly able to do, with a profit on the transaction. Taking the lowest cost of subsistence at $1\frac{1}{2}$ anna per day, the cost of a journey by foot from Calcutta to Benares, which will occupy about a month, will, with ferries, tobacco, and other extras, amount to from $3\frac{1}{2}$ to 5 rupees, *without reckoning anything for the time* ; and it would obviously be more profitable, even for a labourer or blacksmith, to pay 6 rupees, or $\frac{1}{3}$ rd of a penny per mile, to be carried in 12 hours to his destination, than to spend 4 or 5

rupees in money, and a month's time, amounting to 4 or 5 more in performing the journey on foot. In England passengers can afford to pay higher fares, and the passengers' traffic is there the chief support of a railway; because the sea offers such facilities for the transport of merchandise that railways cannot compete with it. The prospects of a railway, however, cannot be supposed to be damaged by the absence of such a competitor, and in this predicament the East Indian line stands; for its only competitor is the Ganges, the dangers of navigating which are so great, that the insurance to Mirzapore from Calcutta is greater than it is to England. To say, therefore, that English railways are supported chiefly by their passenger traffic, which cannot be the case in India, is tantamount to saying, that in India railways will have the advantage of the transport of merchandise, of which, from geographical peculiarities the English railways are deprived.

Rates to be charged for passengers, and absence of competition of Sea navigation.

It is necessary, however, before the expenditure of capital in the construction of a line of railway can be justified, that some more precise estimate of its merits should be possessed, than can be afforded by a vague conception of eligibility. It is necessary to see, not only that it will realize profit, but that it will pay a dividend large enough to warrant the prosecution of the undertaking; and this conclusion can only be arrived at after a careful investigation of the extent of the traffic, and of

Necessity of
a more pre-
cise estimate
of profits,
and method
of arriving
thereat.

the existing rates of charge, and by the discovery of the relation which the return thus deduced has to the cost of construction. It may fairly be assumed, that the railway will monopolize the whole of the existing traffic, if it carries at a lower rate than is at present possible, and an increase of traffic may also be anticipated from the new facilities afforded ; but it is impossible to reckon this increase in any estimate of profits, without quitting the domain of fact for the region of conjecture, and introducing into the investigation the element of doubt. The amount and cost of the existing traffic on the East Indian line, can be ascertained by an appeal to facts that are unquestioned ; the expense to which it is determined to go in the construction of the line, and to which the engineer must be required to adapt his plans, can also be settled ; and then the minimum dividend can be ascertained with sufficient accuracy to warrant the confidence of the public. To this investigation we shall now proceed, assuming as our only postulate that the railway, if it carries more cheaply as well as more expeditiously than the existing modes of conveyance, will attract to itself the traffic now carried on in the line of country through which it passes.

CHAPTER II.

TRAFFIC OF THE EAST INDIAN LINE.

THE traffic of the districts lying between Calcutta and the north-west provinces, available for the support of a railway, may be supposed to be made up of—1st., the export and import trade passing through Calcutta; 2nd., the local trade, or trade between different places on the proposed line; and, 3rd., the passenger traffic. It is not very easy to distinguish in every case between the export, and import, and the local trade; but we may arrive at a tolerably near approximation though the distinction is by no means essential.

Export and
Import trade
of Calcutta.

By Wilkinson's Tables of the External Commerce of Bengal, it appears that in the years 1844-5, the export tonnage of vessels proceeding from the port of Calcutta, was 255,323 tons, and the total import tonnage during the same time, was 275,939 tons. It appears, moreover, from the actual quantity of goods on which duty was paid, that the vessels could not to any considerable extent have sailed in ballast, and that they must have carried considerably more than their register tonnage of cargo. Of 57 articles of *export* enumerated, 24 articles, of which the quantities are the most considerable, make up the weight of 62,08,854 maunds, or about 230,000 tons, although there are among

Export and
Import trade
of Calcutta.

the articles unenumerated, as their weight could not be readily ascertained, about 6,000,000 gunny bags, 21,323 pieces of gunny cloth, and 3,127,250 hides. The following are the 24 articles referred to :—

Enumeration of some of the Chief Articles of Export from Calcutta, and the Quantities of each Exported in the years 1844-5.

Opium, 18,793 chests	.	.	say	47,000	maunds.
Indigo	.	.	„	1,29,444	„
Sugar	.	.	„	15,39,117	„
Saltpetre	.	.	„	5,86,976	„
Rice	.	.	„	23,77,565	„
Wheat	.	.	„	1,64,022	„
Grain	.	.	„	59,278	„
Dholl and peas	.	.	„	45,520	„
Flour	.	.	„	12,532	„
Raw cotton	.	.	„	2,01,874	„
Raw silk	.	.	„	22,343	„
Country cotton pieces, about 12,00,000,			„	85,000	„
Castor oil	.	.	„	22,701	„
Ginger	.	.	„	13,970	„
Hemp	.	.	„	12,127	„
Jute	.	.	„	3,52,705	„
Lac dye	.	.	„	22,352	„
Shell lac	.	.	„	42,626	„
Linseed	.	.	„	2,44,785	„
Molasses	.	.	„	35,992	„
Mustard seed	.	.	„	61,671	„
Rum, 6,32,563 gallons	.	.	„	92,448	„
Safflower	.	.	„	11,323	„
Turmeric	.	.	„	35,482	„

62,08,854 maunds.

Or about 230,000 tons.

Adding one third for unenumerated articles, we have for the total exports 306,666 tons. Vessels generally carry one-third more than their register tonnage, so that the register tonnage being 255,323 we shall have a capacity of 340,431 tons for cargo, or room for about 34,000 tons more than were actually carried, which shows that our estimate is not in excess.

Of 145 articles imported into Calcutta, the 39 of which the quantities are largest, are as follows :—

Enumeration of some of the chief articles of import into Calcutta, and the quantities of each imported in the years 1844-5.

Alum	.	.	.	say	65,680 maunds.
Betel nut	.	.	.	„	23,764 „
Brimstone	.	.	.	„	23,027 „
Bottles (empty), 2,37,723 dozen	.	.	.	„	17,400 „
Buffalo horns, number 4,82,185	.	.	.	„	11,760 „
Coffee	.	.	.	„	17,270 „
Coke	.	.	.	„	13,028 „
Coal	.	.	.	„	2,64,552 „
Chalk	.	.	.	„	15,981 „
Coral	.	.	.	„	3,37,164 „
Cochineal	.	.	.	„	10,374 „
Coir rope	.	.	.	„	18,238 „
Cheese	.	.	.	„	1,91,331 „
Dates	.	.	.	„	38,533 „
Earthenware 2,33,973 rps. value	.	.	.	„	57,070 „
Haberdashery, &c., 21,04,409 rps. value	.	.	.	„	50,000 „
Hardware 8,47,267 rps. value	.	.	.	„	4,900 „
Hides, about 4,00,000 rps. value	.	.	.	„	80,000 „
Copper (slab)	.	.	.	„	83,176 „
— sheet	.	.	.	„	52,839 „

Export and Import trade of Calcutta.	Spelter	.	.	.	.	say	1,42,744	maunds.
	Tin	.	.	.	.	"	10,441	"
	Lead	.	.	.	.	"	53,531	"
	Lead shot	.	.	.	.	"	15,018	"
	Iron	.	.	.	.	"	5,04,154	"
	Steel	.	.	.	.	"	26,226	"
	Paddy	.	.	.	.	"	4,92,328	"
	Pepper	.	.	.	.	"	50,977	"
	Piece goods, about 60,00,000 pieces	.	.	.	.	"	4,27,800	"
	Ratans	.	.	.	.	"	19,615	"
	Rice	.	.	.	.	"	66,394	"
	Sandal wood	.	.	.	.	"	18,390	"
	Sapan wood	.	.	.	.	"	24,554	"
	Salt	.	.	.	.	"	9,70,595	"
	Ale and Porter 17,228 hds.	.	.	.	.	"	1,29,420	"
	46,763 dozen	.	.	.	.	"	25,000	"
	Twist and yarn	.	.	.	.	"	1,77,800	"
	Woollens 22,64,889 rps. value	.	.	.	.	"	36,000	"
	Sundries 19,15,597 rps. value	.	.	.	.	"	40,000	"

46,07,074 maunds.

Or 170,632 tons.

As in the returns of the Customs department, the value or number only, and not the weight of some of the articles enumerated has been given it, has been necessary to reduce these values to their corresponding weights, which has been done, according to the following proportions:—

Hides, 100 rp's. worth	.	.	.	1 ton.
Earthenware, 1 rp's. worth	.	.	.	20 lbs.
Opium, 1 chest	.	.	.	205 lbs.
Bottles, 1 doz.	.	.	.	6 lbs.
Buffalo horn	.	.	.	2 lbs.
Rum, 1 gall.	.	.	.	12 lbs.

Oil, 1 gall.	.	.	.	.	11 lbs.	Export and Import trade of Calcutta.
Beer, 1 hhd.	.	.	.	.	5½ cwts.	
Hardware, 120 rp's. worth	.	.	.	.	57 lbs.	
Piece goods, 100 pieces	.	.	.	.	4 cwt.	

Among the unenumerated articles are about 2,000,000 chanks, and £12,000 worth of hams. Adding here again one-third for the 106 unenumerated articles we have 227,509 tons, as the total quantity of goods imported. This, it will be remarked, is 48,439 tons less than the register tonnage, but it probably represents very nearly the quantity of goods entering Calcutta for transmission into the interior, for some of the imports are re-exported, and some of the exports are paid for in money and not in goods. The treasure imported into Calcutta in 1844-5 was of the value of 1,60,57,069 Co's. rps., or about £1,605,706 sterling. The treasure exported was 29,15,434 Co's. rps., or about £291,543 sterling, and the greater part of this treasure passes through Calcutta, towards the Upper Provinces. The total value of the imports, was 6,08,69,229 rps., or £6,086,922; of the exports, 9,60,77,561 rps., or £9,607,756; and of the re-exports 43,24,917 rps., or £432,941, or $\frac{1}{4}$ th of the imports.

It appears then that the total quantity of merchandise, both import and export, passing through Calcutta, is $306,666 + 227,509 = 534,175$ tons per annum, the register tonnage of the vessels conveying this merchandise being $255,323 + 275,939 = 531,262$ tons per annum. The quantity

Destinations
of the Cal-
cutta im-
ports.

of treasure is 1,89,73,503 rps., or £1,897,350. Of the merchandise thus transported, which amounts in value to about £16,000,000 sterling per annum, a small quantity is consumed in Calcutta, and the districts intervening between it and the sea; but by far the greater part is carried into the heart of the country, either by the road leading towards the north-west provinces, or by the Ganges. The precise amount of imports and exports passing between Calcutta and Mirzapore, is at present very much a matter of conjecture: some persons assert that the quantity is not considerable, but the prevailing impression is, that it is very large. In Mr. Stephenson's report* (p. 28), Mr. Kettlewell says that Mirzapore is "the great mart for Bengal raw cotton, British cotton goods, woollens, metals, and more recently for twist, from or through which the countries to the north, east, and for a considerable distance to the west, are chiefly supplied with goods." He also says, that "to Mirzapore, and through Mirzapore to the north, a large proportion of the metals, probably three-fourths of all the woollens, and at least two-thirds of the aggregate of the cotton goods and yarn imported now pass." At p. 30, Messrs. Allan, Deffell and Co. say "that the vast traffic between this city (Calcutta) and Mirzapore (the great central mart for our imports

* Report upon the practicability and advantages of the introduction of Railways into British India, &c. &c., by R. Macdonald Stephenson, 1844-5.

and exports) would, alone, give an immense and valuable traffic.”

Destination
of the Cal-
cutta im-
ports.

At p. 33, Mr. Higginson says, “I cannot doubt the success of a railroad between this place (Mirzapore) and Calcutta: the traffic is very great, and is yearly increasing;” and Baboo Mutty Loll Seal at p. 35 says, “my decided opinion is, that lines connecting our great interior marts with this city (Calcutta), could hardly fail to yield a large return on the original outlay.” By an estimate supplied by Mr. Chambers, on behalf of Baboo Mutty Loll Seal, and printed in Mr. Stephenson’s Report, (p. 48), it appears that, by enquiries among the chief merchants engaged in the Mirzapore trade, it had been ascertained that *not less* than 10 or 12 lacs of rupees worth of goods imported by sea, were taken every month from Calcutta to Mirzapore only, without reckoning what was carried direct to the places above it.* This is from 120 to 140 lacs worth per annum, carried by the principal merchants; and if half the quantity of imports be supposed to be carried direct to places above Mirzapore, we should have from 180 to 216 lacs worth of imports carried to Mirzapore or places above it—the total imports into Calcutta being but 600 lacs. It is immaterial however, what the import and export trade is supposed to be, as the absolute traffic, whether import and export, or local, is ascertainable. In England, and, indeed, throughout Europe, the local traffic of

* A lack of rupees is £10,000.

Trade of the
Ganges.

a railway is found to be the main support ; and it does not appear probable that the Indian lines will furnish an exception to this general rule, so that the total traffic cannot be measured by the *through* traffic, however great it may be.

In the Report of the Rajmahal Canal Committee, drawn up in 1841 by officers of the government, it is stated at page 25 in reference to the trade upon the Ganges, that in the dry season when two of the Nuddea rivers (which are branches of the Ganges) were only passable for dinghees—the smallest description of country boat—and the third only navigable for the minor class of cargo-boats—the annual collection of toll which is charged at the rate of 1 rupee per 100 maunds, amounted to 150,000 rupees, which gives a tonnage passing through the Nuddea rivers of 1,623 tons per day, or 592,600 per annum. As this, however, is not the total tonnage even in the dry season, and as the tonnage in the dry season is not the average tonnage, the committee consider that if the Rajmahal canal were made, the amount of tonnage passing through it from the Ganges to Calcutta would not fall short of 3,000 tons per day, or 1,095,000 tons per annum.

The results obtained from other sources add weight to these deductions. It appears from the official statement of the collector of tolls at Jungypore, on the Bhagarutty river, that in the years 1844-5, the following boats passed through that branch of the Ganges :

1113 Boats laden with Firewood, Straw, Coals, &c.		
tonnage in maunds,	10,68,050	Trade of the Ganges.
7,311 Boats laden with Grain, Vegetables, Indigo, Seed, and Mangoes,	40,29,675	
24,329 Boats laden with Salt, Sugar, Saltpetre, Cotton, Indigo, &c.	1,64,00,025	
Total tonnage in maunds,	<u>2,14,97,750</u>	

or, taking 27 maunds to the ton, the tonnage of the laden cargo boats which passed through the Bhagarutty in 1844-5, was 796,213 tons. Between five and six thousand empty boats also passed during the same time, but they need not be taken into account. It is only during the rains, however, that boats of any size can pass down the Bhagarutty branch of the Ganges : at other times, large boats have to pass through the sinuous rivers of the Sunderbunds, or down the main stream of the Ganges to Commercolly and thence proceed through the creeks of the Sunderbunds to Saugor Island at the mouth of the Hoogly, from whence they pass upwards to Calcutta.

To catch the vessels coming through the rivers of the Sunderbunds, a toll is imposed on the vessels navigating Tolly's Nullah, and the Circular Canal at Calcutta. This toll is charged at the rate of 8 annas or $\frac{1}{4}$ rupee for every 100 maunds of tonnage—boats of less than 100 maunds not being counted ; and in the years 1844-5 it yielded 177,791 rupees, showing that 35,558,200 maunds of tonnage had passed through it, which at the rate of 27 maunds to the ton is 1,316,970 tons, and adding

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this to that which passed through the Bhagarutty, we have 2,113,183 tons for the yearly traffic on the Ganges. From this, however, several deductions are to be made. The boats are for the most part without decks, and cannot with safety be laden to the extent of their register tonnage: some of the articles of transport come from places so low down upon the Ganges, that they could not be available to swell the traffic of a railway to Mirzapore, while others it may be supposed come from places which are not on the Ganges at all, though the number of such cannot be considerable. It appears from the statement of M. Larruleta, the toll collector at Jungypore, given in Mr. Stephenson's Second Report* (p. 34), that boats do not carry on the average more than two-thirds of their register tonnage, and two-thirds of 2,113,183 are 1,408,789 tons. Deducting from this one-fourth for the local trade of the Sunderbunds we have 1,056,592 tons per annum as the Ganges traffic, independent of the steamers, or 1,059,294 in all; instead of 1,095,000 tons as estimated by the Rajmahal Canal Committee. The general estimate of the Ganges trade at the present time is 1,200,000 tons, but it will be safer to take the smallest estimate. In the returns from which this estimate is derived, the opium passing down the Ganges from Patna and Benares, and the ammunition, provisions,

* Report of the Managing Director to the Chairman, Deputy Chairman, and Board of Directors of the East Indian Railway Company, London, 1846.

&c., transmitted for the use of the troops are not included, as no toll is exacted for the conveyance of those articles, and there is therefore, no ready means of ascertaining their amount.

Trade of the
Ganges.

It appears from the returns of the Jungypore toll office for the years 1840-1, given in Mr. R. M. Stephenson's Report on Indian railways (p. 71-2), that the number of passengers proceeding from Benares and other places above that city to Calcutta by way of the Ganges and Bhagarutty was 26,428 per annum; and that the number of passengers proceeding from Calcutta to Benares and other places above that city by the way of the Bhagarutty and Ganges was 31,950, making a total of 58,378 passengers per annum.

This statement agrees very nearly with another return from the same office for the years 1844-5, recited in Mr. Stephenson's Second Report, which shows that in that year the following passenger boats had passed through the Bhagarutty, viz., 17 pinnaces, averaging 2 passengers each; 28 pinnaces, 5 passengers each; 137 budgerows, $1\frac{1}{2}$ each; 103 budgerows, 5 each; 9 cutters, 1 each; 195 bawleahs, 1 each; 149 baggage boats, 3 each; 10,229 pansways, 5 each; 583 palwars, 4 each. These numbers will be found to give 55,022 as the total number of passengers, instead of 58,378 as ascertained by direct enumeration. These returns, however, cannot be expected to give all the passengers travelling on the Ganges, as *some* of these passengers in the deeper boats may be expected to have been

Trade of the
Ganges.

conveyed by way of the Sunderbunds : but the number of passengers proceeding in country boats by this route cannot be considerable, and as we have no official return of the number, the allowance to be made for them must be a very small one. Bearing in mind, however, the probable increase between 1840 and 1845 upon the general Ganges traffic, as well as reckoning the number of passengers who proceed from the Ganges to Calcutta in country boats otherwise than through the Bhagarutty, we shall be within the truth if we take the number of passengers between Benares, or Mirzapore and Calcutta who travel by the Ganges as 60,000 in 1845, instead of 58,371 as ascertained by the toll collector on the Bhagarutty, to have passed through that river alone in 1840-1.

It appears from a statement of the quantity of freight and passengers carried in the government iron steamers plying on the Ganges between Calcutta and Allahabad, given in Mr. Stephenson's Report on Indian railways (p. 63), that in 1840-1 those vessels carried *upwards* to places on the Ganges of which none were lower than Patna, 57,160 cubic feet of cargo, besides 393,179 pounds weight. The treasure carried upwards during the same period amounted to 11,034,198 rps. or £1,103,419, and downwards to 800,375 rps. or £80,037. The passengers carried upwards were 302, and downwards 151. A subsequent return for the years 1844-5, printed in Mr. Stephenson's Second Report (p. 37), shows a great increase. In that year 7 vessels per-

formed 39 trips upwards to Allahabad, carrying 1,673 passengers, 112,765 measurement feet of cargo, 1,156,909 lbs. weight of cargo, and 17,588,855 rupees, or £1,758,885 in specie. The return voyages were not nearly so productive. About half the number of passengers appear to have been carried downwards by the steamers that were carried upwards, and less than half the cargo and specie. The number of downward trips made in the year and the total revenue from them is not given in the return from which we have quoted ; but the number of downward trips must of course have been about the same as the number of upward trips ; and from the returns of several downward trips which are given, the proportion of goods and passengers carried downwards appears to be what we stated. Taking the downward goods and passengers at one-third of the upward goods and passengers, we have 2,231 for the total passengers ; 150,353 for the total feet of goods, and 1,542,545 for the total lbs. weight of such goods as are estimated by weight, as the returns of the traffic maintained by the steamers on the Ganges. A cubic foot of goods is reckoned as weighing 30 lbs. The total weight of the goods conveyed in the steamers will therefore be 2,702 tons 6 cwt. An examination of the destinations of the different articles of cargo shows that they nearly all proceed to Allahabad, or to places above it : we shall therefore reckon them all as being available for the support of a railway between Calcutta and Mirzapore.

Trade of the
Ganges.

Traffic on
the Mirza-
pore Road.

These developments give us the aggregate trade upon the Ganges ; we have next to ascertain what is the average amount of traffic upon the Mirzapore road. That road passes through Burdwan, from whence 20,000,000 maunds, or 74,064 tons of coal, are carried yearly to Calcutta. The coal, however, is not carried by the road, but proceeds down the Damooda river, which empties itself into the Hoogly, many miles below Calcutta. Of the traffic by the road, it appears to be difficult to form a precise estimate, but all accounts concur in representing it as being very great. The 'Englishman' Calcutta paper states that "there is a greater traffic upon the Mirzapore road than upon any road in Europe;" and the following extract from the Bengal and Agra Gazetteer for 1842 (p. 421), seems to bear out that assertion:—"The chief roads of the Burdwan district are from Burdwan to Soory (Beerbhoom) by Koyrapore, Gobindpore, Soopore, Soorool, &c.; from Burdwan to Culna, and from Burdwan to Cutwa. These roads are in very bad repair; but an amazing deal of traffic is carried on by them, especially by the Culna road, which is at times partially repaired by the Rajah. Besides these, one runs from Burdwan to Midnapore, and one from Burdwan to Bancoorah; this last road was at one time to have been a portion of the great trunk road, but that intention was afterwards given up, and the present road made. The great trunk road passess from Hoogly through Burdwan. In the western parts of this

district there are fine cunkry materials for roads. The line of road westward is highly spoken of, and is certainly the best in Bengal.

Traffic on
the Mirza-
pore Road

“The soil in Burdwan is not adapted for roads, and between Burdwan and Hoogly the road is further liable to be broken up by the Damooda, when any breaches in its embankments below Burdwan take place. No road in India is probably more frequented than this portion : not only is it the commencement of the great road to the Upper Provinces, but it may be said to be the chief outlet of all the articles of commerce, not only of Burdwan, but of Beerbhoom, Bancoorah, and the jungly districts beyond them. As there is no other metalling for this road but coah or gooten, a species of calcareous nodule, the metalling is rubbed to dust from the great thoroughfare of carts, as soon as laid down ; and during the dry weather, the road is consequently deep in dust, and in the rains is in many places a perfect quagmire, in spite of all the care and expense continually incurred.”

By some statistics of the traffic on the road leading through Burdwan, given in Mr. Stephenson's Report, (p. 65), and supplied by one of the government collectors, it appears that the yearly traffic may be taken as 73,000 foot passengers, 7,360 hackeries, 3,650 laden bullocks, 730 private palankeens, and 335 public dawks. About ten days before and ten days after the Doorga Pooja holidays, about 300 persons and 30 palkies daily travel the road,—say 1,000 persons per annum ;

Traffic on
the Mirza-
pore Road.

and in December and January, one, two, or three gangs of 50, 100, and 150 pilgrims also pass daily. This statement of the number of foot passengers varies so largely from that given in an official return by Mr. Thompson, of the number of persons passing over the Annabad bridge in 1837-8, as to make it probable that 730,000 is meant instead of 73,000 per annum. The number of foot passengers passing over the Annabad bridge in 11 months was found to be 435,242, and of passengers proceeding in conveyances of various kinds 33,176, making a total of 468,418 in the 11 months, or 507,453 per annum ; and this number may be supposed to have increased considerably in the 10 years which have since elapsed. The number of hackeries specified appears from other data to be near the truth.

A hackery load is 12 maunds, but as the whole number of hackeries would not probably be fully laden, we may take the load of 10 maunds for each, which gives 73,600 maunds, as the weight carried per annum by hackeries ; and as 12 bullocks will carry about a ton, we have 304 tons of merchandise annually carried by the bullocks. Besides this, however, we have 500,000 maunds of sugar and goor ; 350,000 maunds of salt ; 10,000 rupees worth, or say 1,000 maunds of cotton ; and 100,000 rupees worth, or say 50,000 maunds of rice, and other miscellaneous articles. A good deal of grain comes down the Damooda, following the same route as the coals ; and grain from Sherghur also

descends the Damooda, and salt and cocoa-nuts in considerable quantities are carried up both the Damooda and Adjye; but we have no means of estimating the extent of this trade, and cannot therefore reckon it.

Traffic on
the Mirza-
pore Road.

The greater proportion of the merchandise passing through Burdwan is carried to places far beyond it, and most of the merchandise proceeding upwards to Cawnpore is now transported by the road. The Bengal and Agra Gazetteer states—"Since the opening of the New Burdwan, or Mirzapore road, a curious change has been made in the carriage or conveyance of one branch of the internal commerce of this country. The Moguls and other merchants who carried woollen cloths, piece goods, and other less bulky and lighter articles to the Upper Provinces, have in a great measure given up the more tedious voyage by the river, and now take their goods to Benares and Cawnpore by carts. The greater expense by this mode,—a cart costing about 50 rupees from Burdwan to Benares, and 60 more rupees to Cawnpore, is more than made up by the time saved. The carts go in 1½ months, while 4 and 6 months were consumed on the voyage by boats."

This statement of the large transmission by carts of the merchandise intended for the Upper Provinces, is confirmed by various authorities cited in Mr. Stephenson's Report, and is moreover known by every person acquainted with India to be a just representation of the fact. The circumstance goes

Traffic on
the Mirza-
pore Road.

to show that much of the traffic passing through Burdwan is not local traffic, and we shall probably not err widely if we consider the traffic existing on the Burdwan road, as extending in undiminished quantity all the way to Mirzapore. The Raneegunge collieries are situated about as far beyond Burdwan as Burdwan is from Calcutta, and the Annabad bridge, over which so large a traffic has been shown to exist, is not far from Benares. Most of the salt entering Burdwan from Hoogly, and the places adjacent, passes on to Behar and the districts beyond it. All the pilgrims travelling on the road pass as far as Gyah or Benares, and as the road approaches Benares, which is only 28 miles in a direct line from Mirzapore, a large accession of pilgrims from the intervening and circumadjacent districts fall in to swell the general stream. To these must be added the pilgrims to Birjonauth, Deogurh, and other places, and carriers of Ganges water, for the service of the numerous temples in the southern provinces.

These water carriers, who travel in large troops, use only the upper end of the road, and branch off at various points between the Saone and Burdwan ; so that the road, though it loses some of its traffic at Burdwan, gains other traffic which compensates for the loss. The railway will pass through or beside the districts of Beerbhoom, Ramghur, Palamow, Behar, and Monghyr, in parts of which there is a good deal of jungle and uncultivated land, and the direct line to Mirzapore has been objected to

on that account; yet, although there is neither the same productiveness nor activity of commerce which distinguishes the valley of the Ganges, there is nevertheless a large amount of intercourse, and all the elements necessary to increase it.

Traffic on
the Mirza-
pore Road.

The valley of the Damooda is rich in villages, and is without jungle from Burdwan to its sources. Chota Nagpore is so populous that there is every year an emigration of the inhabitants into the plains to find subsistence, and there cannot be a doubt that these industrious people would settle in the jungle districts, and speedily reclaim them, provided the operation could be made profitable by affording an outlet for their produce.* Iron is mined and worked by the natives at Belliah, 30 miles above Ramghur, and is sold for the use of the surrounding districts at the rate of 3 rupees per maund. Lead mines have been discovered in Ramghur, and coal exists in great abundance in Palamow and Behar. Palamow, it is believed, does not raise grain enough for its own consumption, and has to import grain from Shahabad and other districts, sending in return its own productions.

The districts of Sirgoojah, Palamow, and Chota Nagpore carry on a considerable traffic with the great marts upon the Ganges, and all these contributions of local trade would go to swell the traffic of a railway; so that, although the railway dropped

* The charge for clearing a beegah, or 16,000 square yards of jungle in this district, and taking out the roots, is 8 rupees, or 16s. sterling.

Traffic between Calcutta and Mirzapore.

at Burdwan the trade pertaining to that locality, it would gather a new local traffic as it proceeded further on. The outline of the country to be accommodated by the railway is triangular, of which Calcutta forms the apex, and the area of feeding surface expands into a greater breadth as the line advances towards the north. Taking, then, the number of travellers ascertained to pass over the Annabad bridge as the mean passenger traffic, and the merchandise passing from Burdwan to Calcutta as the merchandise traffic available for a railway, we have of passengers 507,453 per annum ; and of merchandise, reckoning 27 maunds to the ton, 106,754 tons per annum.

With these developments, it becomes easy to determine the total amount of traffic at present subsisting between Calcutta and Mirzapore, which will be as follows :—

Traffic per annum reckoned both ways between Calcutta and Mirzapore,

Merchandise.

Carried by the river in native boats	.	1,056,592 tons.
Carried by the river in steamers	.	2,702 „
Carried by the road and Damooda	.	106,754 „
Total number of tons		<u>1,166,048</u>

Passengers.

Carried by the Ganges in native boats	.	60,000
Carried by Ganges' steamers	.	2,231
Travellers by the road	.	507,453
Total number of Passengers		<u>560,684</u>

At page 70 of Mr. Stephenson's Report on Indian Railways the following return is given by J. Weller, Lieutenant Engineer, late superintendent of the Allahabad and Cawnpore road :—

Traffic on
the Allaha-
bad and
Cawnpore
Road.

Registry of traffic at four stations on the Allahabad and Cawnpore road, from the 1st to the 31st of January, 1841, inclusive.

Transport.

		Daily average at each point of the road.
Hackeries . . .	11,959	964
Camels . . .	4,649	375
Bullocks, &c. . .	14,504	117
Coolies . . .	7,080	114

Travelling.

Carriages . . .	3,159	33
Palkees . . .	653	52
Dhoolies . . .	479	77
Elephants . . .	441	35
Camels . . .	226	36
Horses . . .	12,972	104
Foot passengers at one station	29,562	953

The second column of figures in this table is manifestly erroneous, as it is not consistent with the first one ; the error arises chiefly from the omission of the decimal point, but there are also some mistakes of arithmetic. The first column represents the total number of hackeries, &c., passing four points of the road in 31 days ; and the second column, which represents the daily average, should, therefore, be $\frac{1}{31}$ th of the first line. The numbers in the

Traffic between Mirzapore and Delhi.

second column should be, 96.4 ; 37.5 ; 117 ; 57 ; 25.6 ; 5.2 ; 3.8 ; 3.5 ; 1.7 , 108 ; and 953. The carriages used in the Upper Provinces are a species of omnibus, and reckoning each of these to carry 6 passengers, and all the other conveyances to carry 1 person each, we have 56,804 travellers per annum by carriages ; 1,959 by palkees ; 1,437 by dhoolies ; 1,323 by elephants ; 668 by camels ; 38,916 by horses ; and 334,744 passengers on foot, making a total of 446,851 travellers, per annum, by the road.

Reckoning a hackery to carry 10 maunds, a coolie to carry 100 lbs., and 6 camels, or 12 bullocks, to carry a ton, we have, for the total quantity carried in hackeries, 13,285 tons ; on camels, 2,324 tons ; on bullocks, 3,626 tons ; and by coolies, 948 tons, making a total of 20,183 tons carried by the road per annum.

This, however, does not by any means represent the total traffic of the district that would be available for a railway. At Allahabad the Ganges divides into two great streams, the Upper Ganges and the Jumna, which proceed in a nearly parallel direction, through the district the railway would traverse—the Ganges passing through Cawnpore, Ferruckabad, and Hurdwar ; while the Jumna passes through Humeerpur, Agra, Muttra, and Delhi. The road traverses the district between the two rivers from Allahabad, through Cawnpore, Mynpooree, Allyghur, and Meerut, on to Suharunpoor ; between which and Delhi there is a canal

called the Doab Canal, which, although only newly opened, passing through a district *above* Delhi of only subordinate importance, and running parallel for the whole length of its course with the Jumna, realizes, after paying all expenses, between 8 and 9 per cent. on the money invested, as appears by page 28 of the Supplement to Mr. Stephenson's Second Report.

Traffic between Mirzapore and Delhi.

There does not appear to be any statistical returns whereby the amount of traffic on the Upper Ganges and the Jumna can be specifically determined; the shoals and rocks present impediments to the navigation which must make the traffic much less than that of the Lower Ganges; nevertheless, as there are official returns to show that the traffic of the districts through which those rivers flow is very great, and as this large amount of traffic does not appear in the road returns, it must be carried on by water; so that, by deducting the road traffic from the total traffic, as ascertained by official returns, an approximation to the river traffic may be arrived at. At page 39 of Mr. Stephenson's Second Report, Major Munro, late of the Bengal Army, makes the following estimate of some of the elements of the traffic that would be available for the support of a railway in the north-west provinces:—

“After comparing the various estimates which have been made as to the amount of sugar imported into Calcutta from the Upper Provinces, I am inclined to fix the medium at 100,000 tons; some

Traffic between Mirzapore and Delhi.

estimates exceed, and others fall short of that amount ; in the article of cotton, also, the various estimates show a like discrepancy, but the medium may be taken at 50,000 tons. We have better data to enable us to form an accurate estimate as to the amount of salt exported to the Upper Provinces, and we cannot err if we adhere to the returns of salt put up at the public sales of government. We may, therefore, safely fix the amount manufactured and brought for sale at 50 lacs of maunds, which, at the rate of 20 maunds to the ton, gives the enormous amount of 200,000 tons of salt ; from this, however, we must deduct what is consumed in the Lower Provinces, and, computing that consumption at 75,000 tons, we have still 125,000 tons for exportation to the Upper Provinces ; and, if the government should decide on forming dépôts for the sale of salt at different large cities and towns under the superintendence of the collector—as suggested long ago by a distinguished member of the Court of Directors—there is every probability that the whole of the salt so exported will be despatched by rail.”

This estimate gives 275,000 tons of salt, sugar, and cotton, as at present carried between Calcutta and the Upper Provinces ; and as the road returns gives only about 20,000 tons of merchandise, of every kind, as carried by land, it is clear, if this estimate is to be accepted, that the great bulk of the traffic must be carried on by water. By a return of the Jungypore toll office, given in Mr. Ste-

phenson's Report (p. 71-2), it appears that the total amount of goods passing that toll to or from Benares, or places above it, in 1840-1, was 178,866 tons, which may be taken at about one fourth of the total quantity passing the toll altogether; so that, of the total traffic of the Lower Ganges, about one-fourth, or 264,823 tons, may be reckoned as *through* traffic from Calcutta to Benares, and places higher up. If, then, this quantity of merchandise proceeds to or past Benares, it is very certain that the amount of local traffic must many times exceed that amount, even in the case of articles which form the staple exports of the country. If 100,000 tons of sugar proceed from the Upper Provinces towards Calcutta, more than half must be consumed by the way; for the total quantity of sugar exported from Calcutta was, in 1844-5, only 57,004 tons, showing that there must be a large local consumption, and a large local traffic to satisfy it.

Traffic between Mirzapore and Delhi.

On the English railways the amount of *through* traffic is so small in comparison to the local traffic, that the average distance travelled by 1st class passengers is only 26½ miles; and the average distance that 2nd class passengers travel is only 13½ miles—a proportion which, if applied to the traffic between Calcutta and Benares, would make the local traffic from 17 to 34 times greater than the *through* traffic. But as the average distance travelled appears to increase with the length of the line, the proportion which obtains in England will not

Traffic between Mirzapore and Delhi.

apply to a line 1,000 miles in length, though there is no doubt that in every country the local, or short traffic, must be the chief support of a railway. If, then, it appears that any large quantity of merchandise is carried from the north-west provinces to Calcutta, it is certain enough that there must be a much larger quantity circulating to and fro in the districts intervening ; and if, in the districts above Mirzapore, the *through* traffic be as great as is asserted, it is certain that the total traffic must be very large, as the local traffic will be still more important. It is necessary, however, to proceed to a more specific method of determination.

It appears by a return printed in Mr. Stephenson's Report (p. 72), that the sugars which passed the customs line of the north-west provinces in 1841, was 22 lacs of maunds ; in 1842, the quantity was 34 lacs of maunds ; and if the increase be supposed to have gone on in the same ratio, the quantity would have been, in 1845, about 57 lacs of maunds ; but, say that the quantity was 38 lacs of maunds in 1845. By a table showing the amount of duty paid at the four stations of Kurnaul, Delhi, Hodul, and Agra, in the north-west provinces, in 1845, printed in Mr. Stephenson's Second Report (p. 26), it appears that the quantity of salt passing those stations in that year, was 17,00,811 maunds ; of cotton 2,67,871 maunds ; and of sugar 11,56,927 maunds ; or, in round numbers, 17 lacs of maunds of salt, $2\frac{1}{2}$ of cotton, and 11 of sugar ;

so that the quantities of salt, cotton, and sugar transported in those districts may be assumed to be on the average in these proportions. If this be so, and there were in 1845 about 38 lacs of sugar carried in the whole district, there must have been 8 lacs of cotton and 59 lacs of salt, or in all 105 lacs of those articles. By the return of Bhagarutty tolls, printed in Mr. Stephenson's Second Report (p. 34), it appears, that of the total number of 214 lacs of maunds of merchandise carried by the boats on that branch of the Ganges in 1844-5, only 79 lacs were salt, sugar, and cotton ; so that the carriage of 79 lacs of maunds of salt, sugar and cotton, seems to represent the carriage of 214 lacs of maunds of the general merchandise of the country. As the trade above and below Allahahad is very much alike, we are warranted in extending this analogy to the traffic subsisting between Mirzapore and Delhi; and the transit of 105 lacs of maunds of salt, sugar, and cotton must be regarded therefore as representative of the transit of 284 lacs of maunds of the general merchandise of the place. 284 lacs of maunds are 1,051,881 tons. This result differs somewhat from that involved in the statement of Major Monro; for if the total quantity of salt, sugar, and cotton proceeding between Calcutta and the Upper Provinces be 275,000 tons, the total quantity of merchandise, being in the proportion of 214 to 79, or 2.7 times that of the salt, sugar, and cotton, will be 742,500 tons. The difference is explicable on the suppo-

Traffic between Mirzapore and Delhi.

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sition that, in Major Monro's return, he has neglected some of the local traffic; and from the terms of his estimate, which speaks of the traffic as between the north-west provinces and Calcutta, this appears to be the case. The larger estimate, in addition to being the best supported, agrees most nearly with the conjecture, that the traffic above Mirzapore would be found to be very much the same as the traffic below it—a coincidence which many considerations render probable. To leave no room for doubt, however, we shall take the mean of the two quantities, which is 897,190 tons. With these determinations, the traffic between Mirzapore and Delhi, available for the support of a railway, will stand thus :—

*Traffic per annum, reckoned both ways, between
Mirzapore and Delhi.*

Merchandise.

Carried by river and road, export, import, and local 879,190 tons.

Passengers.

Total passengers by the road . . . 446,851

Having now ascertained the amount of traffic, it only remains to determine its cost, whether carried on by the river or by the road.

Cost of Transport by Road.

The expense of conveyance by land is equal to
between 3*d.* and 4*d.* per ton per mile.

Cost per ton
per mile.

3*d.* to 4*d.*

G. ASHBURNER.

Cost per ton
per mile.Present cost
of transport.

A hackery and two bullocks, carrying 12 maunds for a distance of 40 miles, costs 2 rps. 8 as. The rate of travelling is from 12 to 14 miles a day. The journey between Burdwan and Calcutta, a distance of 70 miles, occupies between 4 and 5 days.

3½d.

J. SHAW.

[This is 40 annas for 40 miles, or an anna a mile for 12 maunds, which is about 3½d. per ton per mile.]

A hackery for 40 miles, carrying 12 maunds, costs 3 rupees.

Collector in Stephenson's Report, p. 66.

4d.

[This is 12 maunds, carried 40 miles for 72d., or 1 mile for 1.8d., which is 4d. per ton per mile.]

The contract price paid by the Erskines for the transportation of sugar from Soonamooke to Hoogly, a distance of 90 miles, is 4 rupees 12 annas, for a cart load of 12 maunds.

Collector in Stephenson's Report, p. 67.

3d.

[This is 76 annas, or 114d. for carrying 12 maunds, 90 miles, or 1.26 of a penny for carrying 12 maunds 1 mile, which is 2.86, or very nearly 3d. per ton per mile.]

From Calcutta to Mirzapore, a hackery carrying 12 maunds costs from 35 to 40 rps., besides 8 rps. for a chaprassie.

M. RUSTOMJEE.

4½d.

[12 maunds carried 450 miles for 40 rupees, or 960d. is 2.13d. for 12 maunds carried 1 mile, or 4.8 equal to 4½d. per ton per mile.]

Present cost
of transport.

From Calcutta to Mirzapore, the cost of conveying a hackery load or 12 maunds is 36s., which is about 1s. per maund.

J. B. HIGGINSON.

[This is 432d. for conveying 12 maunds 450 miles, or 0.96th of a penny for conveying 12 maunds 1 mile, which is 2.179, or rather more than 2d. per ton per mile.]

Cost per ton
per mile.

2d.

The cost of carrying stone from the quarries at Roopbass to Agra, a distance of 33 miles, is on an average 20 rps.; to Muttra, a distance of 36 miles, 17 rps.; to Bindrabun, distance 41 miles, 15 rps.; but the prices vary with the scarcity or plenty of carriage. There are a greater number of return carts passing to Muttra and Bindrabun than to Agra, and the road is harder and better: this accounts for the cost being less for the larger distances.

J. H. ROBINSON.

[This is 100 maunds, carried 110 miles for 52 rps. Taking 82 lbs. to the maund, 100 maunds is 3.66 tons, and 1 ton would therefore be conveyed through the 110 miles for about 14 rps. or 336d., or 3d. per ton per mile.]

3d.

Average cost of transport by road.....3½d. per ton per mile.

Cost of transport by river in native boats.

The expense of the river route, including insurance and interest during the time occupied in transit, amounts to about 2d. per ton per mile on goods of the value of £40 per ton.

G. ASHBURNER.

2d., with
interest
and in-
surance.