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"Routes of Communication with India"

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LECTURE.

Friday, March 2nd, 1866.

GENERAL SIR JOHN F. BURGOYNE, Bart., G.C.B., R.E., &c., &c.,
in the Chair.

“ROUTES OF COMMUNICATION WITH INDIA.”

By Captain H. W. TYLER, R.E., Railway Department Board of Trade.

CAPTAIN TYLER: The Council of this Institution have done me the honour to ask me for two successive years to lecture in this theatre on the routes of communication with India. I have ventured to accept the invitation, but not without a strong feeling that there were many members who would, with greater local knowledge, higher attainments, and more leisure for study, be better able to deal with the subject than myself.

The development of science and of steam-power has already done much to improve the communication between this country and India. For instance, the Duke of Wellington, when he was first ordered with the 33rd Regiment to the East Indies, being unable to proceed with them from ill-health, followed them in a fast sailing frigate, and overtook them at the Cape of Good Hope, and then went on with them to India. Again, on his return from India, he embarked at Madras in the year 1805 for England, and was five months on the voyage, one month of which he spent at what he called “the beautiful and salubrious island of St. Helena,” destined afterwards to be the prison and the burial-place of his great rival. He almost lived long enough to see troops sent out in as many weeks by what is called the Overland route to quell the great mutiny in India.

But this route from England to India is not only a way for the thirty millions of the United Kingdom, and the two hundred millions of India, to pass from one to the other, but it is a highway between Europe and Asia—between all the nations of Europe, except perhaps Russia, and all the countries of Asia. And whatever amount of traffic may exist upon that highway at present, there can be no doubt that as greater facilities of communication are afforded, an increase will occur which at the present time we can hardly contemplate.

It is my task now to show how those facilities can be afforded.

In the first place, I will ask you to allow me to quote a few statistics. They are rather *wearisome* things to an audience, but I will not give you too many of them, or more than is necessary to compare the actual traffic of 1864 with that of 1860. The figures in my hand have been taken out by my friend, Mr. H. R. Lack, of the Board of Trade, from Board of Trade Returns, and are a summary of imports and exports between the United Kingdom and France, on the one hand, and India, Ceylon, Singapore, China, and Japan, on the other.

It appears that in the year 1860 the value of the total imports from India to the United Kingdom was £15,000,000; but it rose in 1864 to £52,000,000. In 1860 the exports were £17,000,000; in 1864, £20,000,000. The former were carried in 527,000 tons of shipping in 1860, as against 731,000 tons in 1864. From Ceylon our imports increased from £2,274,000 in 1860 to £3,173,000 in 1864, while the exports to Ceylon from the United Kingdom increased from £711,000 in 1860 to £822,000 in 1864. From Singapore and the Eastern Strait settlements the imports have increased from £1,000,000 in 1860 to £2,000,000 in 1864; while the exports to those settlements decreased from £1,718,000 in 1860 to £1,230,000 in 1864. The imports into the United Kingdom from China increased from £9,323,000 in 1860 to £15,548,000 in 1864; but the exports decreased from £5,000,000 in 1860 to nearly £5,000,000 in 1864. There was very little traffic from Japan in 1860, the imports from that country amounting to only £127,000; but they rose to £1,500,000 in 1864. The imports from Egypt have nearly doubled themselves, having increased from £10,347,000 in 1860 up to £19,602,000 in 1864. I should, however, explain that the increase of imports from the East and from Egypt during those years has been owing, in a great measure, to the importation of raw cotton, in consequence of the American War, while the decrease above referred to, occurred from diminished manufacture of cotton goods. Then, again, to give an idea of the trade of France with those regions, I may state that the imports into France from the British East Indies rose from 57,000,000*f.* in 1860 to 117,000,000*f.* in 1864; while the exports from France to the British East Indies fell from 10,000,000*f.* in 1860 to 9,000,000*f.* in 1864. The imports into France from China rose from 2,800,000*f.* in 1860 to 21,000,000*f.* in 1864; while those from Egypt rose from 23,000,000*f.* in 1860 to 101,000,000*f.* in 1864.

The principal, or almost the only, articles brought from India, and through Egypt, by the overland route, up to the end of 1864, were precious stones, bullion, raw silk, and silk goods; the raw silk being worth about £2,240 a ton, and elephant's teeth about £600 per ton. But great quantities of raw cotton have since been carried along that route, and it cannot be doubted that both the number of articles and the quantity transported will, as I have already said, very much increase as greater facilities for communication are afforded.

All this merchandize, then, between the East and the West is carried by two main routes—the nine-thousand-mile route round the Cape of Good Hope, and the six-thousand-mile route by the Mediter-

anean, a large proportion of that by the shorter route, being conveyed in the vessels of the celebrated Peninsular and Oriental Company. To show the magnitude of the operations of that company, which has been established for a quarter of a century, I may say that it has a total capital of £3,248,000, with a surplus, which is its Reserve Fund, of £458,000. The gross receipts for the twelve months ending the 30th September, 1865, amounted to £2,186,000. The insurance, wear and tear, and depreciation, for the same period, amounted, in round numbers, to £1,976,000, leaving a net profit of £159,000; and the Chairman stated at the last half-yearly meeting of the Company, that which gives a very good notion of the extent of their operations, viz., that the rise in the price of food had affected them very materially, because they had no less than "ten thousand stomachs to fill every day." The navigation of the Company for the twelve months extended over 1,500,000 miles, and they possess altogether a magnificent fleet of 63 vessels, with a Customs' measurement of 92,353 tons, and 18,270 horse-power. Some idea also may be formed of the increase of traffic which we may expect from Eastern countries if I state what is now occurring on the railways in India. There are as yet in India less than 3,500 miles of railway. The two principal lines are the East Indian Railway, running from Calcutta to Delhi, with a branch under construction to Jubbulpore; and the Great Indian Peninsula Railway, running from Bombay to Jubbulpore in the north-east, and from Bombay to Madras in the south-east. Of the East Indian Railway from Calcutta to Delhi, which has cost about £20,000 a mile, 1,200 miles are completed, and the traffic has reached from £38,000 to £40,000 a-week. The Great Indian Peninsula Railway from Bombay to Jubbulpore and Madras has only been half completed, about 624 miles being open for traffic; but that line is being constructed at the lower figure of £13,000 a-mile, while the weekly traffic upon it has amounted to as much as, and in one case has even exceeded, that on the East Indian Railway. In fact, the traffic on the Great Indian Peninsula Railway has nearly trebled itself as between some of the first few weeks of last year and the corresponding weeks of this year; and if the receipts go on at the present rate, it promises to be not only one of the best paying railways in India, but one of the best paying railways in the world.

When this line is completed to Jubbulpore on the north-east, and to the Madras Railway in the south-east, and when the East Indian portion is completed to Jubbulpore also, there will be complete railway communication between Bombay and Calcutta, and between Bombay and Madras, and these lines being main routes, Bombay will necessarily become *the* port of India. In dealing with my subject, therefore, I shall consider the two ends of my grand route as being England and Bombay. That route naturally divides itself into two parts, the one part being from England to the east of the Mediterranean, and the other part from the east of the Mediterranean to Bombay.

Of the different routes between England and the east of the Mediterranean, the first which claims our attention is that by sea from Southampton to Alexandria, which is 3,000 miles long, and which

occupies about thirteen or fourteen days. There can of course be no shorter sea passage than this to Egypt. The only question is, whether the ports of Plymouth or Falmouth might not be used with advantage instead of Southampton. There are strong opinions in the minds of many upon that point. Another question to which I shall have hereafter to refer, is that of the Suez Canal. When the Isthmus of Suez is once cut through by a navigable ship canal, there can be no doubt that it will complete an excellent sea-route between Bombay and England, by which merchandize may be carried in steamers without transshipment, and with a saving, as compared with the route round the Cape, of 3,000 miles.

The next route is that by Marseilles. The distance from London to Marseilles is 853 English miles, and from Marseilles to Alexandria 1,460 nautical miles, in all about 7 days and 18½ hours. Whatever route we take we can hardly take one which has a much shorter mileage, though we might take one, as I shall presently point out, which will be more advantageous in point of time.

The first question on that route is how we can get over, or under, the straits of Dover. One scheme has been brought forward even this year for a tunnel under the Channel—from Dungeness to Cape Grisnez. Extravagant as the idea may now appear, I have no doubt that a tunnel will some day be carried out. There are eminent engineers now working upon it. It is believed that the whole of the ground under the sea is composed, if not of chalk, of materials, at all events, which will not be anything like so tedious or so expensive to bore through, as the tunnel which is now being constructed through the Alps, though the length is 20 miles against 7½, and there might be difficulties as to water which in the Alps have not hitherto been encountered. Another scheme was brought forward this year, of employing very large boats for crossing the channel. The trains were to run from the pier to those boats, and to be ferried across in a complete state. I applaud the idea of larger boats than we have at present, for having made the passage frequently in rough weather, I can speak from experience as to the disagreeables of it; but if I am to have a big boat at all, I should prefer to walk about it, rather than to sit in a railway carriage during the passage. At the same time these large boats may be very useful, in transporting waggon-loads of merchandize for saving transshipment.

On this route occurs, also, the very disagreeable passage across the Gulf of Lyons, between Marseilles and Malta, and it is now proposed to avoid that passage by the route *viâ* Brindisi, or some other Italian port. Three years ago, the Government of Italy entered into a convention for the employment of steamers from Ancona* *viâ* Brindisi to Alexandria; in May last the railway was opened to Brindisi; and Brindisi has thus become the nearest accessible port to Egypt. If you look at the map, you will see that 638 nautical (or 734 English) miles of sea may thus be saved, by substituting for it 651 miles additional of

* These steamers, of the *Adriatico-Orientale* Company, now run between Brindisi and Alexandria only.—H. W. T.

land-journey; and inasmuch as we may travel more than twice as fast by railway as by steamer, it is obvious that an important saving of time may thus be effected. But it is as yet undecided whether Brindisi, which is out of the line of steamers from Marseilles to Egypt, would be upon the whole the most convenient port from which to embark, and there is a break in this journey at present, where the Alps lie across the railway. The diligence takes in summer eight or nine hours, and in winter ten and a half hours, when the weather is good, for crossing the Mont Cenis; but at times, during bad weather, the diligence is not able to go at all, and at other times, as many present are no doubt aware, the journey is made in sledges. To obviate this delay in the means of communication between France and Italy, the "grand tunnel of the Alps" is now being constructed. This tunnel, which was commenced in 1857, is seven miles and a half long, of which distance headings have been driven through less than three miles and a half, while upwards of four miles remained at the latest accounts to be pierced. The whole line from Saint Michel, on this side, to Susa, on the other side, will be about 42 miles long. It is from beginning to end a difficult line, in an engineering point of view. There are many other tunnels on it besides the "Grand Tunnel," which it has not yet been thought worth while to commence. The gradients are as steep as 1 in 28 in places; and even half through the "Grand Tunnel" the gradient is 1 in 45½. The summit of this tunnel will be at an elevation of 4,500 feet above the sea, and the total cost of these 42 miles of railway will be £5,376,000.

The excavation in the tunnel is carried on by machinery, worked by means of compressed air. Outside the tunnel, and a short distance from it, there are half-a-dozen large water-wheels, by the action of which the air is compressed to a pressure of five atmospheres; and the compressed air being taken into the tunnel through a pipe, is used at the face of the excavation to work a most ingenious machine, which was originally contrived by Messrs. Sommeiller, Grattis, & Grattoni, and which has now been working there for some years. There are nine jumpers working against the rock, kept in motion each by two cylinders, the one cylinder causing the jumper to twist round, and the other propelling it forward. They thus imitate the action of jumpers worked by hand, and bore holes ten, or twenty, or thirty inches deep, according to the nature of the rock. Then other holes are bored; and when a sufficient number have been made, the machine is run back 200 or 300 yards, and powder is inserted, tamped, and exploded in the usual way. As soon as the explosion has occurred, the material is thrown into waggons, and run back as rapidly as possible; and the machine is brought up again, and set to work as before.

But there are some difficulties with regard to ventilation. About 200 yards behind the machine there is constantly a dense column of smoke and the products of combustion; and in walking into and out of the tunnel you find practical experience on this point by the way in which your clothes, face, and hair are blackened. It takes as much as two days to clear the tunnel out, and purify the air, when no work is going on. It did so, at least, when I was in the tunnel last

spring. They were then progressing at the Modane end at the rate of as much as one metre and a-half per day; but since that time they have come, as was then expected, to very hard, solid, quartz rock, and they find great difficulty in getting through that rock. I believe their progress lately has been at the rate of half a metre a-day. There is believed to be about 500 mètres of this quartz rock, followed by compact limestone, which will, it is expected, be more easy to deal with. Looking to the quantity and quality of rock to be bored through, and to the rate at which the work will probably progress, it may be estimated that this tunnel will not be completed, perhaps, for six or seven years.

In consequence of the time which it will take to complete this tunnel, the idea has been conceived of constructing a temporary railway over the top of the Mont Cenis. There is a very good road over the mountain, along which it is proposed to lay this railway. The total elevation of the pass is 7,000 and of the mountain 11,000 feet. When Mr. Fell went three or four years ago to examine it, with the view of taking a railway over it, he found it too steep for any ordinary railway worked in the usual way, and he was therefore obliged to adopt a new system, the principle of which I will now explain. In ordinary railway working we trust, as you are aware, to the adhesion between the vertical driving wheels of the engine and the bearing rails of the permanent way, as the means by which the steam-power is applied to propel a train. And in order to get extra adhesion to take heavy loads up steep gradients, we are obliged to increase the weights of our engines, and the number of their driving wheels, in proportion to what we require. But in mounting a gradient of 1 in 12, with bad adhesion, such as you are liable to on the Mont Cenis, sometimes not more than one-tenth, or even one-fifteenth, an engine, ever so heavy, would only be able to take itself up, with perhaps a very light train. So Mr. Fell has thrown off extra weight, and made an engine partly of steel; and he has employed for extra adhesion, a central rail, laid in the centre between the other two, with horizontal wheels on the engine to bite upon it, and so pinch their way up the incline. His second engine weighs 17 tons, which, added to 24 tons of pressure between his horizontal wheels and middle rail, affords a total adhesion of 41 tons; and it will do the work, therefore, on steep gradients and slippery rails, of an ordinary engine weighing 36 or 40 tons, without being killed—so to speak—by its own weight.

Mr. Fell first tried this system,—which was patented so far back as 1830, but had never been reduced to practice,—at Whaleybridge, with the assistance of Mr. Brassey, in this country, and the experiments there were so successful, that he then constructed an experimental railway on the Mont Cenis, which has been worked now for many months with great success. About 20 minutes' walk above Lanslebourg, where the ascent of the Mont Cenis commences, he has constructed a mile and a quarter of railway, on the zig-zags of the steepest part of the mountain. The steepest gradient on it, is 1 in 12, the average gradient 1 in 13. The curves are very sharp, with a radius of only 40 mètres, or 131 feet, round the corner of the zig-zag. On this experi-

mental line, with his second engine, he has taken up a weight of 16 tons, which is equal to 50 passengers with their luggage, at the rate of 8 miles an hour; and there is no doubt he will be able to run without any difficulty for the 48 miles which he has to traverse with his railway, in four hours; whereas it takes twelve by the diligence in bad weather, and eight hours in the best of weather.

There will be nine miles and a half of covered way on the mountain, to avoid any risk from the action of snow and avalanches, and that the traffic may be worked punctually and with safety in the worst of weather. One very important element in the system, is the greatly increased degree of safety that may be obtained. The central rail, properly applied, will prevent the possibility of a train running off the line; and you may easily conceive that it is most important to have this extra means of safety round very sharp curves, and at the edges of precipices, on the slopes of the Mont Cenis. In fact, the engine wheels have on more than one occasion mounted the bearing rails on the experimental line when the permanent way was not in good order; but the action of the middle rail was sufficient to bring them on to the rails again. In running down this railway at first, it feels—so to speak—rather like sliding down the roof of a house; but the breaks acting upon the middle rail afford a powerful means, in addition to the ordinary breaks, of stopping the train; and I have seen the experimental train, travelling at the speed proposed to be employed, brought to a stand within a dozen yards on the steepest part of the slope.

Another advantage of the system is its great economy. This summit railway will be constructed at a cost of only £8,000 a-mile, in the place of £128,000 a-mile which the tunnel line will cost; and it will be constructed in two years instead of—say fourteen or fifteen years, which will probably have been expended altogether before the tunnel line can be finished. But even if a permanent line were constructed over the mountain at a cost of £20,000 a-mile, or twice and a half as much as this temporary line will cost, and if you add an extra amount to cover the working expenses, which will of course be additional in carrying the traffic of the summit railway over a super-elevation of 2,500 feet above the highest point of the tunnel line—if you capitalise that extra cost of working at the rate of 6 per cent.—you will even then save as much as £4,000,000 out of the £5,376,000 which, as I have already stated, the tunnel line will cost. But the economy is still better shown in this way;—that summit railways might be constructed over all the Alpine passes,—over the Mont Cenis, over the Simplon, over the Saint Gothard, and over the Luckmanier or the Splügen, for the same money as this one tunnel line will cost.

Many other systems have been advocated for taking trains up steep inclines, amongst which I may mention the screw system of Signor Grassi. He proposed to place under his engine, connected with the crank-axle, an Archimedean screw, which was, as it twisted round, to work upon rollers fixed between the rails of the permanent way; and the adhesion of the screw upon the rollers was intended to take the place of that between the wheels and the rails as the engine screwed itself up the incline. I may mention also the pneumatic

system, which has many advocates, both in England and on the Continent, who suppose it to be suited for very steep gradients. This system may probably be used with advantage for underground lines, of more moderate gradients, where you are obliged to have tunnels, but it is not so well adapted for very steep gradients on account of the loss of power, and therefore greater expense of working, under increased pressure.

Then, again, there is the system of Signor Agudio, which is in great favour with the Italians, and is entirely a system of ropes. He places a stationary engine at the top of his incline, and a second stationary engine at the bottom. He has one double endless rope passing between them, which is continually worked, the ascending portion by the upper, the descending portion by the lower engine; and a second rope between the two portions of the endless rope, called the cable of adhesion, which is fixed at the top and weighted at the bottom of the incline. He employs, also, a machine which he designates as the "*locomotive funiculaire*" at the head of his train. The endless rope works upon this "*locomotive*," and turns certain wheels upon it, the rope running about two and a half times as fast as the "*locomotive*" goes with its train up the incline. The wheels turn certain drums upon the "*locomotive*," which have two and a half turns round them from the cable of adhesion; and by the rotation of these drums in the cable of adhesion, the "*locomotive*" machine winds itself and draws its train up the incline.

There would be serious difficulties in the application of this system to very high mountain passes, in consequence of the difficulty of working when the ropes are enveloped by snow and ice; and you have not the safety in such a rope system that may be derived from the central rail. Another important point is that under the system of Signor Agudio the very sharp curves which are necessary on the railway over the Mont Cenis are impossible.

Another route which we must now consider is the Trieste route. This is 260 miles shorter by sea, but 369 miles longer by land than the route by Marseilles; and, therefore, it may be rather a quicker route. But now that railways have been constructed down to Brindisi, few people will be inclined to embark at Trieste or even at Ancona.

Two other routes have been proposed which are, perhaps at present, hardly worth considering. The one is from Belgrade to Constantinople, which will be a difficult railway route to construct, and the other is by Avlona, opposite Brindisi, and so by land to Constantinople. Another difficulty about both of those routes at present is, that even when you reach Constantinople, you have a very difficult country again to cross through Asia Minor; and it will probably be some time before railways are made through those countries.

The route, then, by Italy is the quickest route which we have any immediate chance of using. The railway over the Mont Cenis will probably be brought into use in the course of next year; and I may say that it is under the consideration of Government to send the Indian mails by Italy if they can make proper arrangements for it, as regards the railways and harbours.

I now turn to the other side of the map, to the route from the east of the Mediterranean to Bombay.

The sea route from Suez to Aden and Bombay is about three thousand miles long. The navigation is difficult, and at times very disagreeable. By way of improvement to this route, the Suez Canal is, as every one knows, now being constructed. M. Lesseps proposes to make across that isthmus a ship-canal seventy-two miles long. He neglects the routes taken by the Pharaohs of old, which were connected with different branches of the Nile, and goes straight across from Port Said in the Mediterranean, to Lake Timsch (which was dried up until very lately) half way, and so on to Suez. The channel of this grand ship-canal is to be twenty-six feet deep, one hundred and ninety feet wide at the top, and one hundred feet wide at the bottom. He has already constructed a *rigole*, or small canal, about six feet deep from Port Said to Lake Timsch. The part from Lake Timsch to the Red Sea has hardly been commenced, or at all events very little has been done upon it. But a sweet water canal has been constructed from a place called Zagazig, from a branch of the Nile towards Lake Timsch and near it, and from thence nearly parallel to the line of the permanent canal to Suez. This sweet water canal is nearly finished, sixty feet wide and six feet deep; but it is about nineteen feet higher than the salt water canal; and he has by means of locks connected the two together. He is able thus to convey boats, by using the *rigole* to Lake Timsch, and the sweet water canal to Suez, all the way from the Mediterranean to the Red Sea. There is little doubt, I think, that the great energy of M. Lesseps, and the credit of the French Government, who are backing him up, will lead to the completion at *some* time of this canal. But there are still great difficulties to be encountered on parts of it. The foundations are in some places very bad, and as fast as he digs out the mud and sand, so fast does the excavation fill up again. He proposes to make walls all along the sides; but to get foundations for those walls will be exceedingly troublesome, and they will take a great deal of time and money. He has also, which are less difficulties, very high hills of sand to excavate. He is evidently going about this in a very energetic way, for I heard not long ago of a hundred steam-dredges having been ordered to Egypt for the excavations. With these he intends, no doubt, to compensate as well as he can for the want of the forced labour, of which at first he had the advantage, but which he has since been deprived of. One gentleman told me the other day that he had himself seen twenty of these steam-dredges landed from a ship that was obliged to put back into Falmouth Harbour in distress. They were constructed to work to a depth of about twenty feet, with portable engines, so that when the dredges had done their work the engines might be employed for other purposes.

There has been much political feeling on the subject of this canal, which has been supposed to be hostile to British interests. But it will certainly, if it is completed, be of much more use to us than to any other nation; and I, myself, think that we ought to feel very much obliged to M. Lesseps and the French Government, for expending

so much money in the hope of making it for us. As long as we have command of the sea it will be entirely at our mercy at both ends; and it will, if it is completed, give us a most excellent ship route to the East, by connecting our Southampton and Mediterranean route with our Suez and Bombay route. But it is a question whether it will ever be of much use to sailing vessels in consequence of the difficult navigation of the Red Sea.

The Egyptian Government also have an idea of making a railway 1,700 miles long, from Suez to Capo Guardafui. Such a railway may be important for Egypt, but I doubt whether it would ever be of much avail for British traffic, because it is a long line, about twice as long as another and a better, to which I shall have directly to point; and because it would bring us out at the wrong side of the Arabian Sea.

The next and last, but by no means least important route which I have to consider, is that by the Euphrates Valley. The first discoverer of that route may fairly be said to have been Alexander the Great, who marched from Egypt to the Valley of the Euphrates, and so on to Bagdad, wintered at Bokhara, conquered Persia, took possession of India, sighed for more worlds to conquer, and returned with the remnant of his sickened army, after a march of nearly 20,000 miles, to die in the Lamlum marshes. Many others have since followed or attempted to follow his example; and it is well known that the Great Napoleon, when he went to Egypt, had an idea of doing the same,—of wresting India from us, and conquering the East; and he would, no doubt, have endeavoured to carry out the project, if we had not nipped it in the bud in Egypt.

This route was reconnoitred by General Chesney in 1830, when he made a most enterprising and interesting voyage of 700 miles, with an interpreter and a servant, down the Euphrates. He gave us a highly valuable lecture on the subject, in 1857, at this Institution; and the map before you on the wall is the same which he used on that occasion, though a little altered. I daresay many who are present will remember how he told us of his great enthusiasm; how he feared, when he saw a flight of birds in the distance, that it was the smoke of a steamer; and how he thought that the route about which he was so anxious, and which he intended to introduce to the world as his own, had been discovered and utilized by some previous explorer. £20,000 was afterwards voted by Parliament for a regular survey of this route, which was made, under General Chesney's command, by Sir John Macneil and others. I have been glad to learn recently from General Chesney, that the Treasury have authorized the publication of another volume of his proceedings. The result was a proposal to make a harbour about three miles to the south of the Orontes river, as shown in the diagram before you; and they chose, as the best route for a railway, that by Antioch and Aleppo, down the Euphrates, on to Bagdad, and so to the Persian Gulf. The harbour was to cost £350,000, and the railway about £6,000,000. They found that the route would be an easy one. There were a couple of bridges required over the Orontes river, and some cuttings between the Orontes and Aleppo; but the line from Aleppo down to the Persian Gulf was stated to be principally

over flat, dry, level ground, that would present every facility for a railway. There is a steamer already running between Basrah and Bagdad. The navigation through and from the Persian Gulf would be far superior to that from Suez by the Red Sea; and there remains the possibility of ultimately completing the communication by railway from Bagdad *via* Kurrachee to Bombay.

By the adoption of this route we should save about 800 miles of distance, and several days of time. There can be no doubt that it is a most important route, in a strategical as well as in a commercial point of view, for ourselves, as a nation. We should have the command by sea of the two ends of it, in the Mediterranean and in the Persian Gulf, and we should be able by its aid to connect our forces in Europe more intimately with our armies in Asia—to unite them for any operation intermediately between Great Britain and India, and to reinforce Great Britain from India, or India from Great Britain, within a fortnight, whenever we required to do so.

Mr. Bancroft, in a speech that did not exhibit much delicacy, the other day in America, accused us, though I do not know that the accusation was worth much, of having constructed a chain of forts from Madras to Ceylon. But what we really want, in a military point of view, is a chain of forts along the route of the Euphrates Valley from England to India. There is an idea that we should meet with great difficulty from the inhabitants in making such a line; but it is said by others, on the contrary, that as Englishmen we should, on the whole, be well received, while if the Turks attempted themselves to construct the railway they would meet with great opposition—that it would be looked upon in the one case as an undoubted advantage; in the other as another instrument of oppression. Just as the Turk who wants food on that route often finds it difficult to procure any, whereas the Englishman, having money and being ready to pay, is surrounded by plenty.

The ultimate route, then, that we should look forward to, practically, at the present time, is that through Italy and by the Euphrates Valley. By this route we may hope to go some day about 5,000 miles in a fortnight.

In concluding, there is another most interesting feature to which I would direct your attention. Every reader of prophecy must regard a map of this sort with great interest, when he remembers the predictions that are not yet fulfilled. One can hardly look at it, indeed, without observing that it points in both directions, from the east and from the west, towards the Holy Land. We see and know that the Jews have been and are now scattered from that promised land among all nations; and judging from the completeness with which the prophecies with regard to their banishment have been fulfilled, we may be quite sure of the punctuality with which those prophecies will also be literally fulfilled which speak so plainly of their re-instatement. May we not, therefore, indulge the hope that in laying out and establishing these routes between England and India, we are really doing something more—that we are contributing in an important degree to fulfil the designs of Providence. Who can read the passage

in Isaiah, "Every mountain shall be a highway for my people," without thinking of all the summit railways and grand tunnels that are in contemplation? We are surely in some measure assisting to pave the way for the return of that people to the land to which they will "fly ere long as a cloud, and as the doves to their windows," bringing their silver and their gold with them, and which land they are destined on their conversion to inhabit and to enjoy in future generations.

The CHAIRMAN: This is a subject of very considerable interest, and presents some little difficulty. But we are, I think, greatly indebted to Captain Tyler for the insight he has given us into the subject as a whole, and also to the various details. I would, therefore, propose that we give him our best thanks.

A. F. RIDGWAY, Esq.: Having been associated with Mr. Waghorn in assisting to develop the importance of the communication with the East Indies, I trust I may be excused, as an old pioneer of the overland route, for addressing you on this important occasion. It is a matter of such vast importance to every person here, as I know it is to every one, military, naval, or civil, that I intrude myself upon you to say how thankful I am, and how thankful we ought all to be to the lecturer for having taken so much trouble in explaining to us the facilities of going backwards and forwards between England and India.

At the first establishment of the Peninsular and Oriental Company I made a table (see Appendix) of the time occupied in conveying the mails to China, Bengal, and elsewhere. I have that table somewhere; and I will find it and send it to Captain Burgess that he may see if it is of any use to publish it in the Report of this Meeting. Lord William Bentinck read an extract at the same time from a Report of the Marquis of Wellesley, the Governor-General of India, stating that he had been eight months without a particle of intelligence from England. Mr. Waghorn told me he would never rest till he brought the mail from Bombay to London in 25 days, and that I should see it performed in 15 days before I died. His words as regards himself were true, my days are nearly numbered, and my memory is failing me; still I am of opinion that the Beyrout route across to Bagdad and Bombay is the route to be taken, if it can be accomplished. The difficulties are, the managing of various powers and the ignorance of the persons with whom we have to contend. Persons who have children to go and seek their fortunes in the world, ought to study this important subject, and do what they can to bring about a more speedy communication with India than now exists. With these remarks I conclude with joining most cordially in the vote of thanks to Captain Tyler for the very interesting lecture he has given us on this occasion.

APPENDIX.

TABLE showing the Time occupied in the Transit of the Mails overland to India 1837 and 1838.

The Mail Left		By the Steamship.	Arrived at Alexandria.	Left Suez for India.		Arrived at Bombay.	Arrived at Calcutta.	Arrived at Madras.	Arrived at Ceylon.	Arrived at Canton.	Number of Number of days from London to London to Bombay via Falmouth, Marseilles.	
London.	Falmouth.			By the Ship.	Date.						Days	Days
1837.	1837.		1837.		1837.							
Jan. 2	Jan. 4	Blazer.....	Jan. 28	Skimmer.....	Feb. 6	Mar. 30	...	...	April 15	...	55	115
Feb. 3	Feb. 5	Volcano.....	Feb. 28	Fugh Lindsay S	Mar. 4	June 24	...	...	...	...	88	88
Mar. 1	Mar. 3	Hermes.....	Mar. 24	Fugh Lindsay S	April 23	July 12	...	...	...	...	72	72
Apr. 3	Apr. 5	Emily.....	Apr. 24	Fugh Lindsay S	May 12	Aug. 12	...	...	...	...	72	72
May 1	May 3	Volcano.....	May 21	Fugh Lindsay S	June 12	...	...	...	...	...	46	46
June 1	June 3	Hermes.....	June 21	Fugh Lindsay S	July 24	...	...	...	...	...	112	112
July 1	July 3	Blazer.....	July 21	Expirates.....	Aug. 16	...	...	...	...	...	155	155
Aug. 1	Aug. 3	Volcano.....	Aug. 25	Expirates.....	Sept. 1	...	...	...	...	...	127	127
Sept. 1	Sept. 3	Don Juan.....	Sept. 25	Atlanta.....	Nov. 1	...	...	...	...	...	52	52
Oct. 1	Oct. 3	City London.....	Oct. 25	Hugh Lindsay S	Nov. 29	Dec. 21	...	...	...	...	54	54
Oct. 28	Oct. 30	City London.....	Nov. 22	Hugh Lindsay S	Nov. 29	...	...	...	...	...	...	...
Nov. 25	Nov. 27	Braganza.....	Dec. 23	Berenice.....	Dec. 30	1838.	...	...	...	...	57	57
Dec. 23	Dec. 25	Emerald Isle.....	Jan. 17	Atlanta.....	Jan. 27	Feb. 21	...	...	...	...	60	60
1838.	1838.		1838.		1838.							
Jan. 17	Jan. 19	Tagus.....	Feb. 14	Hugh Lindsay S	Feb. 21	Mar. 24	...	...	...	...	63	63
Feb. 17	Feb. 19	Tagus.....	Mar. 14	Atlanta.....	Mar. 30	April 17	...	...	...	...	43	43
Mar. 17	Mar. 19	Tagus.....	Mar. 25	Atlanta.....	Mar. 30	May 9	...	...	...	...	43	43
Apr. 17	Apr. 19	Tagus.....	Apr. 15	Berenice.....	Apr. 21	May 9	...	...	...	...	53	53
May 17	May 19	Tagus.....	May 15	Atlanta.....	May 13	June 4	...	...	...	...	51	51
June 17	June 19	Tagus.....	June 15	Berenice.....	June 13	July 4	...	...	...	...	43	43
July 17	July 19	Tagus.....	July 15	Atlanta.....	July 13	Aug. 18	...	...	...	...	63	63
Aug. 17	Aug. 19	Tagus.....	Aug. 15	Atlanta.....	Aug. 13	Sept. 1	...	...	...	...	49	49
Sept. 17	Sept. 19	Tagus.....	Sept. 15	Atlanta.....	Sept. 13	Oct. 20	...	...	...	...	72	72
Oct. 17	Oct. 19	Tagus.....	Oct. 15	Atlanta.....	Oct. 13	Nov. 25	...	...	...	...	41	41
Nov. 17	Nov. 19	Tagus.....	Nov. 15	Atlanta.....	Nov. 13	Dec. 31	...	...	...	...	57	57
Dec. 17	Dec. 19	Tagus.....	Dec. 15	Atlanta.....	Dec. 13	Jan. 19	...	...	...	...	66	66
1839.	1839.		1839.		1839.							
Jan. 17	Jan. 19	Tagus.....	Jan. 15	Atlanta.....	Jan. 13	Feb. 21	...	...	...	...	57	57

* Wrecked, and the greater portion of the Mails lost.

† These three Mails went on from Suez together; the two former were detained in consequence of an accident to the machinery of the Berenice, on her voyage from Bombay to Suez.

‡ Taken out by the "City of Londonderry" on the 19th February, which vessel put back, leaky, 28th February.

§ Taken out by the "Iberia," which put back to Penzance by stress of weather, with loss of rudder, on 1st December.