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REPORT TO THE DIRECTORS

OF THE

MADEIRA AND MAMORÉ RAILWAY
COMPANY, LIMITED,

BY

EDWARD D. MATHEWS,

Resident Engineer,

UPON HIS RETURN FROM

BRAZIL AND BOLIVIA

IN

1875.

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1875.



TO THE BOARD OF DIRECTORS OF THE MADEIRA AND MAMORÉ RAILWAY COMPANY, LIMITED.

GENTLEMEN,—You chairman has done me the honour of suggesting that I should present you a report upon the various matters that have come under my notice since I left the head-quarters of the railway at San Antonio, in April of last year, and I therefore beg to offer the following remarks :—

INTRODUCTION.

Upon the management of the Public Works Company of their contract I have already fully reported, and doubtless the board is in possession of my ideas upon the subject. In December of 1873 I found it necessary to request the Brazilian authorities to place an embargo upon the plant, tools, and other materials that had been placed at San Antonio by the Public Works Company, as the agents of that Company seemed desirous of taking away the articles that would be saleable in Pará. This embargo was granted me, and nothing was removed.

The engineers sent by Messrs. Dorsey and Caldwell arrived at San Antonio in January, and at once commenced their survey, being successful in finding a very fair line for the first section from San Antonio to Macacos. Their survey and profile for this section would, with some slight modifications, have been accepted by me on behalf of the Company. Thus the allegation made by the Public Works Company that this portion of the line could not be made for less than £20,000 more than their contract price is disproved.

Finding that Messrs. Dorsey and Caldwell's engineers were not prepared to carry on their surveying operations over the whole

length of the line, I decided that it would not be my duty to hand over to them the material and plant ; but a correct inventory thereof was drawn up and agreed to by Mr. Steele, the contractor's chief agent, and myself. A copy of this inventory is extant in this office.

The advices that I received from London in the early part of 1874 led me to believe that the steps taken by the Bolivian Commissioners in London would lead to a long delay in the prosecution of the works, and I therefore decided to make a journey up the rapids and into Bolivia in order to obtain, by personal inspection, a knowledge of the ground over which the railway had to pass, and of the country it was to be built for.

I arranged to leave Señor Ignacio Arauz in charge as agent of all the Company's property, and left him a proper power of attorney and full instructions as to his duties. From the letters that have been received from him in this office during my absence, it is clear that he has faithfully kept the trust reposed in him by me.

On the 24th of April I left San Antonio and commenced the passage of the rapids, and thus having brought my report to this point, it will be well to make a sub-division of the subject matter of the remainder. This I will do as follows —

- 1st. The right bank of the river, and the passage of the rapids.
- 2nd. The river from Guajará Merim to Exaltacion.
- 3rd. Exaltacion to Trinidad.
- 4th. Trinidad to Coni.
- 5th. Bolivia. Coni to Cochabamba, Cochabamba to Sucre.
- 6th. Sucre.
- 7th. Sucre to London.
- 8th. Results to be expected from the enterprise.

I.—THE RIGHT BANK OF THE RIVER AND THE PASSAGE OF THE RAPIDS.

ORGANISATION OF THE EXPEDITION TO BOLIVIA.

A party of Bolivian merchants had organised their return to Bolivia in the early part of 1874 ; having arranged to commence the ascent of the rapids in the month of April. I requested permission to accompany them, it being unwise to attempt the passage of the rapids with single canoes, for one crew is not able to pull the canoe through some of the stronger currents, or drag it over the dry land portages of Theotonio, Girão, or Riberão.

CARGOES TAKEN UP TO BOLIVIA.

The expedition consisted of seven large embarcations called "gariteas," two small canoes or "montarias," and probably about 100 persons, including Bolivian Indians and whites. The merchants were taking to Bolivia general stores of merchandize, such as dry goods, guaraná, iron pots and kettles, ordinary claret, bar iron, and a few other odds and ends suitable for sale in the Mojos and Beni districts. I should estimate the total weight of merchandize thus taken up the rapids at about thirty tons, and its value at about £10,000.

STATE OF THE RIVER AT THE TIME OF THE JOURNEY.

The state of the river was considered favourable for the ascent of the rapids, as the water had fallen about six feet from its highest flood level, and was falling daily. Consequently the currents were not so strong as at high water, and many side channels were available which could not be used either at high or at low water. At high water they would be useless, as the currents would carry the canoes into the overhanging branches of the trees bordering the bank; and at low water they would be entirely dry. At many of the rapids the use of these side channels avoids the danger of hauling the canoes through the main rapids where the power of the water is greatest.

START FROM SAN ANTONIO.

My own canoe had fourteen paddles, but as I had to take whatever men I could get, several sick Indians who were desirous of returning to Bolivia fell to my lot. This caused me generally to be far in the rear of the other canoes, and often obliged me to take a long spell at the paddle myself, for on many days during the latter portion of the journey I have paddled for eight hours at a stretch.

At starting from San Antonio the baggage had to be taken over to the left bank and there passed overland, while the empty canoes were sent back to the right bank and passed up the channel which separates Holy Island from the mainland. This work of transferring the cargo took up the whole day, and at dark we had not succeeded in re-embarking all the effects, so made the canoes fast to the bank, and passed the night of the 24th still in San Antonio, but above the fall on the left bank of the river opposite the settlement.

SAN ANTONIO TO THEOTONIO.

The next day the 25th, and part of the 26th, was passed in ascending from San Antonio to Theotonio, which was reached in the afternoon of the 26th. The currents on both sides of the river being very strong we could only paddle for short distances, and it may be said that the whole distance was done by "roping," that is, sending forward the small canoe, or *montaria*, with a light cable, the end of which to be made fast to any available stump or tree, then the crew of the larger canoe, or *garitea*, haul on the rope until the point to which the rope is made fast is reached, and then the *montaria* goes ahead again and the process is repeated. This slow mode of progress will account for the great time occupied in getting over the short distance of about nine miles by water from San Antonio to Theotonio.

THEOTONIO.

Arriving at the Theotonio Falls, one has to cross a large bay formed by the river at the foot of the fall, and here the waves are almost always high, especially when the wind blows up the fall. Here my *garitea* had a very narrow escape of swamping with all on board, for being low down in the water the waves dashed over the quarter, and many of my Indians being *Cruzeños*, and therefore unaccustomed to canoe navigation, took fright, and by rising up and ceasing to paddle endangered greatly the safety of the canoe. However, by encouraging them by words and prompt action in baling out the water that had entered the canoe, we happily got to the foot of the fall, on the right bank, where the Bolivian merchants that had preceded me from San Antonio were waiting to assist me in passing my *garitea* and baggage over the portage.

RAILWAY LINE BETWEEN SAN ANTONIO AND THEOTONIO SHOULD BE KEPT INLAND.

The country between San Antonio and Theotonio needs but little description, as the surveys have already been completed to Macacos, and the path has been cut inland of the fall. I observed that between Macacos and Theotonio, the right bank of the river is hilly, the banks rising in places with a straight wall of twenty or thirty feet elevation above the highest water level. The line, therefore, between these points must probably be kept away from the river, and a cut should be run inland from Arauz's Road at any favourable place on the first

two miles from Macacos, in order to determine how great is the extent of the rough ground on those miles. The result of this cut would also determine how the drop to lower land at station No. 3 or Ross Town should be overcome, and indeed determine whether such descent be advisable or not.

INLAND LINE ADVOCATED.

An investigation of the surveys and sections made by the Public Works Company shows that the road had found an elevated plateau at about three miles from Macacos, gently rising from 100 to 180 feet above high water at San Antonio. The engineers of the Public Works Company left this plateau and turned down to the river, on nearing which the line encounters a drop of 150 feet in 27 chains, equal to about $8\frac{1}{2}$ per cent., or 1 in 12, but the necessity, if any, for leaving the plateau and seeking the river bank, does not appear.

From this plateau, I think, a strenuous effort should be made to keep the high ground gained, and run the line as direct as possible for Ribeirão. An inland line would probably secure good crossings over the rivers Yaci-Paraná, Tres-Irmãos, and Ribeirão, and avoid any low lying lands that may exist near the outlets of those streams. A glance at the levels given by the Public Works Company's sections would lead to a belief that a great inland plateau, about 150 to 200 feet above high water at San Antonio, exists a few miles from the course of the river through the rapids, and having gained this plateau it would certainly be advisable to endeavour to keep on it. My remarks upon the country through the remainder of the falls, should therefore be considered as remarks upon the river bank, and not necessarily upon the site of the railway.

THEOTONIO HEALTHIER THAN SAN ANTONIO.

To resume then the account of my journey up the rapids. The afternoon of the 26th of April was occupied in transferring my gear and baggage to the upper side of the fall. The portage was about 600 yards in length and passes over a rocky hill about fifty feet high. Theotonio is reported to be much healthier than San Antonio, and it might be found advisable to make a sanitarium at this fall, or perhaps even make the Drawing and Accounting Offices there.

METHOD OF PASSING CANOES UP STRONG CURRENTS.

From Theotonio the canoes started in Indian File, with the small montarias ahead, the passing of the strong currents being much facilitated if this order is kept. The practice is that each garitea should be furnished with a strong but light cable of about fifty fathoms length, and on arriving at a current that cannot be passed by paddling, the montaria goes ahead with the rope of the foremost garitea as before described, and then each garitea embarks the point of the cable of the garitea next behind him, so that a continuous chain is formed over the current, which is surmounted by these means. If the current is a long one and requires more than one "roping" to ascend it, then no garitea is allowed to leave a point gained by hauling until the garitea next behind it shall have reached that point and given the end of its rope again to the foremost one.

THEOTONIO TO MORINHOS.

The 27th and 28th were occupied in ascending from Theotonio to Morinhos, which was reached on the morning of the 29th. Several strong currents are met with on this length of the river, and in one of them my garitea became fixed on a rock. A montaria that was sent to my help by my Bolivian friends was driven with great force against the bow of my garitea and sucked under water by the current, the four men who were in her with difficulty escaping by clinging to branches of trees, while the montaria did not appear, until some distance below us it came up to the surface of the water.

ARAUZ'S ROAD.

The river bank between Theotonio and Morinhos is very level, and Arauz's road, which runs close on the river edge, would serve very well for the site of the line should it prove desirable to leave the higher ground before referred to. I may here mention that Arauz's road was in most parts where I visited it much overgrown, but it was evident that the work of clearing had in the first instance been well done, all the large trees having been felled. The overgrowth was of quite recent character, and being entirely composed of soft and succulent plants, would be easily cleared away ahead of any exploring party or travellers by a very few Indians.

MORINHOS RAPID PASSED.

The Rapid of Morinhos was passed with gariteas half unloaded and in two rope's lengths through a channel on the right bank of the river, about four hours being occupied in passing all the seven gariteas through the currents. Above the real fall, and perhaps only 200 yards further up stream, very strong currents were met with and the whole of the rest of the day was occupied in overcoming them.

The river Morinhos passes close by the foot of a hill which rises to perhaps 100 feet, but Arauz's road runs at the base of it with plenty of room for the line without causing any considerable work.

ABOVE MORINHOS RAPID.

From Morinhos upwards we continued paddling and roping up the right bank which presented a uniformly level appearance, and on the afternoon of the 30th we crossed over to the left bank of the river, in order to avoid many strong currents which are met with near the mouth of the Yaci-Paraná.

YACI-PARANÁ.

From the section shown by the Public Works Company's Engineers of the river bank in the neighbourhood of Yaci-Paraná it would appear that some two miles and a quarter of the bank is liable to flooding at high water. The exigencies of the ascent forced me to keep in the company of the other gariteas on the left bank of the river, and from that side I could plainly see that although the land on the river bank upon the opposite or railway side was low lying, there was high land about a mile and a half to two miles inland. This also is another argument in favour of keeping, if possible, on the high plateau found by Arauz's road between Macacos and Theotonio.

CALDERÃO DO INFERNO.

On the 3rd of May we arrived at the foot of the Rapid of Calderão do Inferno, having once visited the railway side of the river finding the bank as usual very level and suitable for the site of the line if necessary. The fall was passed on the left bank or opposite side of the river, and it took us the whole of the 4th and part of the 5th to get the cargoes carried over the portage of nearly a mile in length, and the canoes hauled empty up the rapid. Of the right

bank of the river at this fall I cannot speak from actual observation, but my assistant Mr. Dalton who was over this portion of Arauz's road in July and August of 1873, reports it to be "uneven and very rocky from the 'Rabo' or lower fall to the top fall a distance of three or four miles." This description would also do for the left bank that I was over, but the rocky ground there, was principally composed of large boulders and a section over it would not be very heavy. The section given by the Public Works Company doubtless indicates correctly the right bank of the river at the fall, and shows that a line along the river margin would not meet with any more serious obstacles than a short cutting of about $\frac{1}{4}$ mile in length and 10 feet average depth.

FROM CALDERÃO DO INFERNO TO GIRÃO.

On the 6th of May the canoes were re-loaded, and the upward journey was recommenced, and by night fall the foot of the Girão falls was reached. When nearing the falls the hills above Girão show bold and high, but appear isolated and have not the appearance of forming part of any continuous range. It seems therefore probable that the inland line that I have suggested would avoid the broken ground at Calderão, Girão and Tres-Irmãos. There is nothing special to remark of the river bank between Calderão and Girão. Arauz's track was taken about two miles inland and ran over a mile or so of very uneven ground, the section showing cuttings and banks of 20 and 30 feet in depth. My assistant Mr. Dalton describes this portion of the line as "passing over very bad country," but there was no reason for taking the track away from the river bank where a much lighter section could have been obtained.

DEATHS OF TWO INDIANS AT CALDERÃO DO INFERNO, CAUSES EXPLAINED.

At this part of the journey I had the misfortune to lose two of my crew, a man and a boy, and as the fall of Calderão do Inferno bears nearly as bad a name as San Antonio for fever, I shall explain the causes that in my opinion account for these deaths. Firstly one should observe, that in ascending the rapids, the crews are composed of Indian sthat have been for some time engaged on the Madeira river in rubber gathering. Those of a weak constitution suffer from fever and are naturally anxious to embrace an opportunity of

returning to their country, they get over San Antonio, Theotonio and Morinhos falls and it is at Calderão and Girão that their strength begins to fail and the weak ones of the crew die. I do not believe that there is any special danger to life at either of these falls, save only that it is thereabouts that the constant wettings and hard labour of the ascent commence to tell upon the Indians. The boy that died in my canoe shortly after leaving Calderão was an earth eater and having indulged too largely in that disgusting vice of certain of the tribes, I believe that the intense heat of the sun killed him, his stomach being in a thoroughly disorganised state. The man, had stolen cachaça (native rum) at Morinhos and while intoxicated had fallen in the river, this brought on a severe cold. The nights were wet and cold and he according to a custom that exists with many of the Indian tribes determined to die, and received his relatives' commissions to those members of his family that had preceded him in their last journey. I therefore found it impossible to save his life and during the night at Girão he died. I myself was very unwell at these falls, but it was merely a return of a bilious fever that I had suffered from in San Antonio and could not be anything special to the part of the river about Calderão and Girão.

PASSAGE OF GIRÃO RAPID.

The passage of the Girão falls required that the unloaded craft should be hauled over the portage of about $\frac{1}{2}$ a mile in length, the descent from the summit being down a steep rock. This work occupied the whole of the 7th of May and on the 8th the upward journey was continued.

GIRÃO TO TRES-IRMÃOS.

The 8th, 9th and 10th of May were occupied in passing from Girão to Tres-Irmãos, the railway bank of the river appearing to be almost level and with few streams or ravines. Of the many streams marked on the survey of the Public Works Company on this length, I only noticed two that were of any consequence and for these openings of 60 or 80 feet would probably suffice.

PASSAGE OF THE RAPID OF TRES-IRMÃOS.

The rapid of Tres-Irmãos was passed on the right bank on the 11th without any of the canoes being unloaded, and without greater trouble than that encountered in strong currents between many of the falls.

The river of Tres-Irmãos is a considerable stream, I ascended it for about a mile. The banks are of solid earth and suitable for receiving screw piles. Openings of an aggregate waterway of 180 feet would, if the river is to be passed anywhere near its outlet into the Madeira, have to be provided.

PACAGUARA SAVAGES.

Here we met the first savage tribe that we had seen, consisting of men and a child who belonged to the "Pacaguaras" that have their "Malocales" or settlements on the river Tres-Irmãos. The men had on shirts and trousers received from the engineering parties that had been up the river, and were very well behaved and at our request brought from their plantations a supply of plantains and fresh maize for which they received the payment of an axe, machete, or a few fish-hooks and some line. These savages might if properly treated be made useful in fishing and hunting, and in scouting for the few tribes that are hostile.

TRES-IRMÃOS TO THE BIG BEND.

On the 13th we reached the point where Arauz's road leaves the river and crosses the big bend. This point has been named "San Louise." The river bank from Tres-Irmãos to this place needs no description being in every respect favourable for the railway if the line has to follow the river's course.

ACROSS THE BIG BEND.

The track across the big bend was described to me by several of the Indians who had accompanied Sr. Arauz, as perfectly level and dry, There has been some idea of its being swampy during the rainy season, but enquiry proves this to be incorrect, for the section given by the Public Works Company shows rock at the bottom of all the small streams crossed. I had in my canoe a very intelligent Bolivian of rather a superior class, who had been one of the mayor-domos or foremen under Senor Arauz, and this man assured me that from the track over the big bend, looking eastwards, no sign of hills could be seen, but only a vast undulating plain. Senor Arauz has also assured me that there are no hills to be seen, and all the evidence that I could collect leads me to the belief that a cut across the interior, entirely avoiding all the bends of the river, would not only shorten

the length of the line, but would locate it where the smallest amount of earthwork and bridging would be met with.

PAREDÃO AND PEDERNEIRA RAPIDS.

Four days were occupied in passing round the big bend, and overcoming the rapids of Paredão, Pederneira, and another fall above the latter that is not named or mentioned in Messrs. Keller's maps.

FROM END OF TRACK OVER BIG BEND UP STREAM.

On the 17th we passed the huts called "La Cruz," at the point where Arauz's road struck the river bank after passing the big bend. The land hereabouts is fairly level, but there are several ravines, three of which would require sixty feet spans. Mr. Dalton reports the first mile up from "La Cruz" as "low-lying," but I did not notice this considering it fairly suitable for the line, and on this length I notice in my diary, that I landed twice.

AS PENHAS COLORADAS.

About eight miles above La Cruz, occur on the right bank, the hills called "As Penhas Coloradas" the "Red cliffs" which rise straight up from the water a height of perhaps a 100 feet. The Public Works Company's Engineers surveyed Arauz's road over these hills, but do not appear to have taken any levels, for in their sections about 25 miles from stations 17 to 19 is entirely missing, neither can I find in their level books any record of levels having been taken over this length. These hills continue for nearly three miles when the land returns to its natural level. The ascent and descent of these hills would, if the line has to go over them, be severe and give heavy work, but there summit is tolerably flat. To cut a side benching round on the river side of these hills would be an almost impossible work, for the current is very strong at their base, and therefore a bank would require to be protected from scour by expensive piling or revetment.

ARARAS RAPID.

The Rapid of Araras was passed on the right bank on the 18th, without unloading canoes, and with only one "roping" of about 80 feet. It is said that when the river is low the left bank is the best for ascending this rapid, but with water the right bank is preferred,

as the "olada" or wave is high on the left bank when the river is at all full.

ARARAS TO THE RABO DO RIBEIRÃO.

The right bank from Araras, past Periquitos and to the "Rabo," or the "tail" of the Ribeirão falls requires no description. It is all fairly level, and the section given by the Public Works Company shows that there are no earthworks of any consequence. This portion of the journey was passed on the 19th, the rapid of Periquitos being ascended on the right bank without unloading canoes.

THE RABO DO RIBEIRÃO.

The passage of the "Rabo" and Fall of Ribeirão occupied the 20th, 21st, 22nd, and part of the 23rd. The Rabo extends for about five miles below the real Fall of Ribeirão, and is a succession of whirlpools and currents, extremely dangerous to canoes, either on the upward or downward journey. The downward journey is by far the most dangerous as the canoes have to be steered in full course through the boulders and rocks scattered over this length of the river, which here has an average fall of about $4\frac{1}{2}$ feet per mile.

NAVIGATION OF THE RABO DO RIBEIRÃO IMPOSSIBLE.

If any scheme of partial navigation between the rapids is ever carried out, a tramway would have to be laid down over this length, for no steamer could live in these broken waters. The bank does not offer any material obstruction to the building of the line up to the fall, at which place the levels taken by the Public Works Company's Engineers appear to have concluded, for no section is given above the river of Ribeirão.

THE RIBEIRÃO FALLS.

At the foot of the fall the river forms a bay somewhat similar to, but smaller than that below Theotonio. Round this bay the water runs in a return current which flows with great force up stream, and if the crew do not paddle with great strength, the canoe is in danger of being carried into the rough and broken water at the foot of the fall. To pass the upper fall it is always necessary to take the right bank of the river, and unload the canoes entirely, hauling them over the portage of about 500 yards in length, and re-embarking the canoes above the fall.

THE RIVER RIBEIRÃO.

The River of Ribeirão, which is at the foot of the fall, is a considerable stream at the outlet, but narrows a very short distance therefrom—a sixty foot span would probably suffice.

FROM RIBEIRÃO TO MISERICORDIA.

The land on the railway side of the river from Ribeirão to Misericordia is rocky and rather uneven, having stretches of raised lands for distances of a quarter to half a mile intermixed with reaches of the ordinary level. The elevated portions are not, however, more than twenty feet above the level ones, and therefore the works would not be heavy as the elevations could be graded up and down.

THE MISERICORDIA RAPID.

The Rapid of Misericordia, passed on the morning of the 24th, is especially dangerous, although at first sight it appears a mere "corriente." The river swirls over a point of rock and forms a succession of whirlpools from which no canoe, if once drawn in, can escape. In ascending, this rapid must be passed by a creek on the right bank. It is said that at low water this rapid does not offer much obstacle, but I did not receive any information from my Indians to that effect. The channel on the right bank offers no obstacles that cannot be overcome by hard work in unloading or hauling, and is therefore preferable. The descent should be made almost in mid-channel, while if anything, steering to the left rather than to the right bank.

CAPTAIN MILLER OF THE STEAMER "EXPLORADOR" MET WITH.

At this rapid three canoes descending from Bolivia came up to us and in one of these was Captain Miller, who had assisted Dr. Velarde to take the "Explorador" up the rapids. Captain Miller had left the Company's service, served the late contractors the Public Works Company for a time, and was then on his way to San Antonio or Manaos in search of employment.

SR. BARROS CARDOZO, BRAZILIAN CONSUL AT EXALTACION, REPORTED ASSASSINATED.

From him I learned that Señor Barros Cardozo, Brazilian Consul in Exaltacion and the Mojos provinces, had been assassinated by one of his own Brazilian servants. I was pleased to find that this outrage

had not been committed by Bolivian Indians, who are, as a rule, much quieter and more tractable than the mixed races of Brazil.

MISERICORDIA TO MADEIRA.

Proceeding onwards from Misericordia our canoes kept on the right bank, the country showing fairly level and with few igarapés (ravines) until about two miles above the fall, where the river bank appears to be rather low. Here it would be advisable to locate the line on the land side of a hollow that is to be found a few chains inland, especially as these rather low-lying lands extend nearly up to the cachuela of Madeira, which was reached on the evening of the 24th, after having passed four strong currents, and arrived at the principal fall, which was to be passed on the following morning with canoes half unloaded.

THE MADEIRA RAPID.

At the Rapid of Madeira there is a hill of perhaps 150 feet high on the railway side, but it is evidently an isolated bluff, and even if the line should not be taken inland, there is room at the foot of the hill on the river side, for the road. Arauz's road has been carried over this hill, but needlessly so.

JUNCTION OF THE RIVER BENI.

The whole of the 25th was occupied in passing the principal fall of the Madeira Rapids, and the currents above it. The junction of the River Beni occurs amongst the currents above the principal fall, and from this circumstance the fall has been named the "Cachuela do Madeira," as below the junction the Madeira river is said to commence. From the junction of the Beni to that of the "Itenez," the river is by some called the "Rio Grande," by others the "Itenez," and it is only above the latter junction that the Mamoré reigns. Above the Madeira Fall, and in the neighbourhood of the junction of the Beni, the river is much broken up by islands, and consequently the navigation of this stretch is almost, if not quite as bad as that of the "Rabo do Riberão." At the junction of the River Beni, the river appears to divide into two parts, and they appeared to me to be of almost equal width and volume of water.

THE LAYES RAPID.

Early morning of the 26th the expedition continued the ascent of

the rapids of "Layes" formed by two small falls with a current below them. These were passed with canoes half-unloaded. Near the fall, but below it, is a wide stream on the right side of the river, which would probably require a span of hundred feet, while the earthworks hereabouts would be inconsiderable.

COCOA TREES VERY PLENTIFUL.

In this part of the river I noticed a great many wild cocoa trees, which, although growing almost universally on the banks of the Madeira and Mamoré, are hereabouts more thickly collected together. The fruit of these trees is of very superior quality, and with very little trouble an excellent plantation might be organized.

THE PÃO-GRANDE FALL.

The Fall of Pão-Grande we reached on the morning of the 27th, and had to unload all the cargo and carry it over the portage about a quarter mile in length. This fall is impassable by loaded canoes at any season, and only on the right bank can empty ones be hauled up the falls of a channel between an island and the mainland. This channel has two "saltos" or jumps each of about four feet in height, and it was wonderful to see how well the Bolivian Indians manage to make the canoes ascend these almost perpendicular falls. The right bank is very rocky, and considerable work in removing boulders may be met with here. Above the fall, there are several bluffs, and over one of these Arauz's Road has been taken. My assistant, Mr. Dalton, says of this part of the line, "Above Pão-Grande the road is good for about five miles, when three or four very stiff rises are met with, over these for some un-accountable reason the road is cut whereas had it been carried along the river bank, an almost level line would have been found." In this opinion I concur, and this fall will, I believe, be passed by the railway with a section somewhat similar to, but certainly not heavier than, that of the first three miles from San Antonio to Macacos.

PÃO-GRANDE TO BANANEIRA.

Between the falls of Pão-Grande and Bananeira the road is fairly level with no ravines that cannot be crossed by thirty-foot spans. In this stretch there is hollow land a short distance inland from the river bank. This low-lying land is probably inundated in the rainy season by drainage water that cannot get through into the river,

but there is a width of high land close on the bank sufficient for the line, and probably the pools could be drained through this bank, or by deepening the existing igarapés.

THE RAPIDS OF BANANEIRAS.

The Rapids of Bananeiras were reached at early morning of the 29th, and ascended on the left bank. The principal fall had to be passed with empty canoes, the cargoes being carried over a very short portage across an island. The head currents of these rapids however give nearly as much trouble as those below Riberão, and are very dangerous. They occupied us for the whole of the 29th and the 30th.

RUBBER GATHERING NEAR BANANEIRAS.

At this fall, about eight or ten years ago, two Bolivians made a small settlement and collected rubber. One of them was returning to Bolivia with our expedition after having made a small competency by rubber-gathering on the Madeira River below San Antonio. He told me that he and his friends stopped at Bananeiras for nearly twelve months on the Bolivian or left side of the river. They found that the quantity of rubber given by the Seringa trees of the rapids was not so great as that given by those of the lower Madeira, but their health was uniformly good and they were not molested at all by savages.

BANANEIRAS TO GUAJARÁ-MERIM.

From Bananeiras up up to Guajará-Merim I was obliged to keep on the opposite side of the river to that on which the railway has to run, but the many glimpses I got of the railway side would lead one to believe that there do not exist any obstacles to construction. The surveys of the Public Works Company also warrant the same inference being drawn, the only noticeable feature on this length being that at about five miles below Guajará Guasu a marshy lake is said to exist, but the usual high bank appears to run along the river margin, with width sufficient for the location of the line.

Above Bananeiras and Guajará, the hills of the "Sierra da Paca Nova" show bold and high, being apparently some 30 to 40 miles inland.

PORT SELECTED BY ENGINEERS OF PUBLIC WORKS COMPANY BELOW GUAJARA-MERIM.

The rapids of Guajar , Guasu and Merim, offer no obstacle of any consequence to free navigation either in ascending or descending, the fall being but slight and distributed over nearly a mile of the course of the river. I am informed that one of the Engineers of the Public Works Company selected a landing place about a mile below Guajar -Merim, it being in his opinion suitable for a terminus, having good water access in the dry season and being apparently a healthy spot.

LAST OF THE RAPIDS PASSED.

The last of the rapids was passed on the morning of the 1st of June, after thirty-seven days' hard and constant labour in battling with the force of the many currents.

GENERAL REMARKS UPON THE COUNTRY THROUGH WHICH THE RAILWAY HAS TO PASS.

Before passing to the second division of my report I will shortly state my belief, that in the whole stretch of country from San Antonio to Guajar -Merim, there is no natural obstacle that should at all call for doubt as to the feasibility of the construction of the Madeira and Mamor  Railway. If we take the 240 miles of river bank into consideration, it may be broadly asserted that few if any rivers that are encumbered with rapids, have such almost uniformly level banks, as those of the Madeira. My assistant Mr. Grant Dalton, who had the opportunity of accompanying the Public Works Company's Engineers over the whole of Arauz's road from San Antonio up to Bananeiras, says in his report to the Company dated June 16th, 1874 ; —“ There are no Engineering difficulties of any moment, the road “ will as a rule run through a level country, inequalities of ground “ being rare between the Cachuelas. At the Cachuelas the ground is “ invariably uneven, but will be easily got over with light banks and “ cuttings in which not much rock will be found.”

TIMBER FOR SLEEPERS, BRIDGES, &c.

Timber of good quality for sleepers and smaller bridges or culverts is found, throughout nearly the whole length of the line. The Public Works Company made a provisional contract with Se or

Ignacio Arauz for the supply of sleepers of good hard wood at three per milrei, or say eightpence a piece. There are many kinds of excellent hard woods, but it is difficult to get the proper names of them, as the workmen of Bolivia of course do not know the names used in Brazil. They are however universally good judges of timber and can select woods that will not perish when used in the ground. Pão de Arco, Massuranduba, Laura, and Itauba, may be mentioned as being amongst the best kinds of timber for sleepers or bridging.

MR. CALDWELL'S CONTRACT.

A contract having been entered into by Mr. Josiah Caldwell, estimating is on my part unnecessary, but I may here say that in my opinion he has secured an excellent contract, and that I believe if he sends a few Engineers like those he sent out in the early part of last year and backs up their efforts by a judicious selection of imported labour, and a careful arrangement for supply of materials and stores, two and a half years counted from the commencement of the works should see the Madeira and Mamoré Railway an accomplished fact.

CLIMATE AT THE RAPIDS.

The question of climate in the rapids is I think now proved to be, that although at San Antonio ague fever is prevalent, all the country above that spot is fairly healthy. In the clearing of Arauz's road, more than 150 people must have been engaged for upwards of twelve months and the deaths were I believe two or three only. The Engineers engaged in the survey of that road for the Public Works Company enjoyed good health when away from San Antonio, and out of the hundred individuals that formed the expedition that I accompanied up the rapids, only three lives were lost on the journey.

SAN ANTONIO OR THEOTONIO AS HEAD-QUARTERS.

There appears to be great prejudice against San Antonio, and though I believe it to be unjust, still it would not be wise to shut one's eyes to its existence; it might therefore be prudent to remove the head-quarters of the construction staff somewhat higher up the country, say to Macacos or Theotonio.

FISH, GAME, PLANTAINS, &c.

Fish and game abound in the rapids, and plantations of yuca and

plantains are easily and rapidly capable of being brought to form material helps to the provisioning of a body of labourers.

RAINFALL.

The average rainfall at San Antonio for 1873 was 7·61 inches per month, making a total of 91·32 inches for the year, 17·55 inches of this fell during the six months of dry season from 1st of May to 31st of October, and the remainder 73·77 inches fell during the rainy season from 1st of November to 30th of April; but on 44 days out of the 181 in this period absolutely no rain fell at all, and only on 20 days during the same period did the rainfall of the 24 hours exceed a fall of one inch. In these 20 days 37·49 inches, or more than half the total fall of the six months' rainy season, fell.

WORK MAY BE CARRIED ON ALL THE YEAR ROUND IN FORESTS.

These figures prove, I think, that the works of the railway may be carried on all the year round, with intermissions of a few hours, or perhaps days, as the heavier storms of rain require. I believe that if the workmen are *well housed* they are as well off in the forest during the rainy season as they can be at San Antonio or any other headquarters.

HUTS—PALM ROOFS PREFERABLE TO ZINC.

For hut accommodation for the labourers, I am decidedly in favour of erecting good palm leaf huts; they last quite long enough for what is required of them, and make cool and well ventilated and water-proof huts when properly erected. Zinc roofing is suitable for stores or permanent buildings, but as it attracts the heat of the sun enormously, it requires a second roof of planking underneath it, and is therefore too costly to be used for hut accommodation for labourers.

GENERAL INFORMATION AS TO OPERATIONS OF CONTRACTORS—PARÁ AGENCY.

To make complete the portion of my report that refers more directly to the railway, I cannot do better than introduce here a copy of a letter that I forwarded to the new contractors in January, 1874 in reply to a letter of theirs asking for general information.

My further experience and travel since that date has only served to confirm the views I then expressed, with exception of the advice

given as to the employment of Messrs. Samuel G. Pond and Co., as agents in Pará. An inspection of their accounts rendered to the London office has convinced me that their charges are exorbitant.

LETTER TO DORSEY AND CALDWELL.

San Antonio, 2nd January, 1874.

Messrs. Dorsey and Caldwell.

Gentlemen,

According to promise in my letter of the 20th ultimo, which replied partly to yours of the 10th October, I now proceed to offer you a few further remarks upon the points raised in your letter referred to.

In order to reply somewhat categorically to your letter I have selected nine subjects therefrom. They are—

1. The river stages between Pará and San Antonio.
2. The most desirable mode of transporting materials.
3. Is it safe to send a steamer from Europe to San Antonio?
 - 3a. If so what is greatest draught allowable in the river Madeira.
 - 3b. From Pará to San Antonio in 10 days and from San Antonio to Pará in 5 days.
4. List of articles advisable for immediate dispatch here.
5. Advice and suggestions as to best manner of proceeding with the work.
6. How best to provide labour.
7. How best to house the labourers.
8. How best to feed and keep them.
9. Width and character of streams that railway is to cross.

RIVER STAGES BETWEEN PARÁ AND SAN ANTONIO.

1. The distances are reckoned as about 900 miles on the Amazon from Pará to Serpa and 600 on the Madeira from Serpa to San Antonio. Both rivers are fairly supplied with wooding stations.

WOOD OR COAL.

The price of wood is from 30 milreis to 40 milreis, say £3 to £4 per 1,000 sticks, which are here reckoned as being equal to a ton of coal, but if the coal is good I should say the ton would yield most work.

STATIONS ON THE AMAZON.

On the Amazon the principal settlements are Breves, Gurapá, Mont Alegre, Santarem, Obidos, Villa Bella and Serpa, at most of which towns bullocks and general supplies can be obtained.

STATIONS ON THE MADEIRA.

On the Madeira, except Borba, a poor place, there are nothing but small stations of the "Seringueiros" or rubber gatherers. All these men keep wood on sale, but you cannot count upon supplies or provisions.

OBSTACLES TO NAVIGATION IN THE MADEIRA.

The navigation is free from all obstacles from Pará up the Amazon and Madeira until the Piedras de Uruas, on the latter river, are reached about three days' steam from Serpa. This is the first dangerous point, and for six months out of the year requires perfect knowledge of the channels. I believe there is plenty of water in these channels all the year round, but when the rocks are just covered by the water great care is necessary. The other dangerous points in this river above the last named are Marmelos, Das Abeillas, and Tamandoa; the first and last being sand banks, and the other a rocky channel.

SAND-BANK, IN AMAZON NEAR VILLA BELLA.

In saying that the Amazon is free from all obstacle, I should mention that there have been years when in the months of September or October a sand bank or bar, near Villa Bella, has only had eight feet of water on it, but I do not think this is well authenticated.

2. TRANSPORT OF MATERIALS UP RIVER.

In transport of materials we have to consider the ocean, the river and the road. My opinion is that at first the ocean and river traffic should be kept separate and distinct from each other, for the reasons that I have already given you in my letter of the 20th ultimo, namely scarcity of "praticos" (pilots), difficulties of clearing at Pará and opposition from the Amazonas Company, Limited.

PARÁ AGENCY.

I therefore recommend that the first shipments be made to Pará,

and consigned to Messrs. Samuel G. Pond & Co., who will tranship them, and who have great facilities for getting goods through the customs. As they are our Company's agents, all matters in connection with the concession will be properly attended to.

OCEAN STEAMERS THROUGH TO SAN ANTONIO.

I could not advise that you try to send a steamer right through to this place this season, for you will hardly be ready to send a full cargo before March or April next, and the river begins to fall again in May. It appears to me that the heavy cargoes of rails, bridgework, &c., should be got ready for dispatch from Pará towards the end of next November; by that time you would have been able to arrange for ocean-going steamers to run up here quickly in succession during the four to five months of full river, and you will have got good gangs of men here for unloading. But if you wish to run your ocean steamers up here before November, you must have a wooding station and tugs and barges ready below the Piedras de Uruas, so that you can come up from thence with a 2 feet 6 inches to 3 feet draught. But as you can make a very good start with the materials on the ground (of which more hereafter), I strongly advise you to come and see for yourselves, and perfect your arrangements after due consideration and consultation out here.

STEAMERS RUNNING FROM SAN ANTONIO TO PARÁ.

The Amazon Company, Limited, run a steamer up here regularly every month, starting on the night of 5th from Pará and arriving here on the 20th; there is also another from Manaos, starting from thence on 27th, and arriving here on the 4th or 5th; and I have no doubt but that you could get a special rate named by the Amazonas Company in London for the transport of your first shipments.

FREIGHTS BETWEEN PARÁ AND SAN ANTONIO.

£6 per ton is the lowest that has yet been obtained, but I think that to prevent opposition they would take £4 or £5.

TRANSPORT OF MATERIALS OVER LINE.

For transport of material over the road I strongly advise that as little as possible be sent ahead of the rails. As probably two-thirds of the line will be surface construction the rails should be laid down

smartly, and if necessary temporary bridges set up at the ravines, so that an open road will always be kept behind the advanced parties. This is the American method of construction ; I need not therefore enlarge on the subject, and will content myself by saying that in my opinion this work will be best and most speedily carried out by the adoption of such a system.

3. SAFETY OF SENDING STEAMERS FROM EUROPE TO SAN ANTONIO.

As to the safety of sending steamers from Europe to this, as I have already stated, I see no reason why this should not be effected during the months of January to April. The total rise of the river here from its lowest is 48 feet 6 inches, but this height is only reached in March, but we may safely calculate on 25 feet of flood water from December to end of June at this place. The dangerous points on the river are, as already stated, four in number, and over these there is at lowest water always three feet ; therefore we ought to be able to calculate on 28 feet for seven months, and if the river were thoroughly surveyed I believe this would be found correct,

3A. GREATEST DRAUGHT PERMISSIBLE.

But the river is of various widths, and as we have no certain information as to rise and fall lower down, I think it well to say that steamers of fourteen feet to sixteen feet draught can come up from January 1st to April 30th.

3B. TIME OCCUPIED—COAL OR WOOD.

With reference to time occupied this depends on the fuel burnt ; if you send ocean steamers up they must burn coal all through their trip, and they ought to run up from Pará in thirteen or fourteen days at most. Certainly coal has gone up seriously in price lately, although in the States it is cheaper than at home, but even at £3 a ton here, if of good quality, I believe you will save expense by its use in general on these rivers. If you burn wood you must have large fire-grates and tubes, and these are very expensive with coal fuel. This, therefore, offers a subject for consideration in arranging the ocean and river traffic. To have supplies of coal to enable ocean steamers to run up the rivers, you must have deposits at Pará, and perhaps one station half way up, while, if you intend to burn wood on the rivers you must, I opine, change your steamer at Pará.

4. ARTICLES FOR IMMEDIATE DISPATCH HERE.

For a good start you will find everything here in the way of plant, for I have taken over all the late contractor's stores. Material for sixteen miles of permanent way is here, if we except "Ibbotson's Clips," which I much want to see sent to us, but I would advise you to lay in the road temporarily with the "fishes" we have here, get ahead thus over temporary bridges, and having created confidence relay again and put in the finished works.

MATERIALS REQUIRED FOR FIRST DISPATCH.

You will, however, have to arrange for sending a couple of locomotives with trucks, etc., before next wet season; also, you may think it convenient to send the remainder of the material required for the San Antonio Jetty, and bridgework for the first section of the line which is probably the roughest of the whole length. The only articles in plant that I can recollect as wanting at once are a good supply of rope falls of all diameters, also light chain, $\frac{1}{4}$ in. and $\frac{3}{8}$ in. in diameter. It will be well also to have a good stock of Piassava rope for canoe work, but this you will buy cheapest in Pará or Manaos.

5. SAN ANTONIO JETTY, &c.

One of the works that should be carried out during the coming dry season is the erection of the San Antonio Jetty; for which, send two vertical boilers, engines, jibs, crabs, etc., on travelling trollies; to lift to two or three tons, so that you may have full facilities for unloading your vessels to come up next fall. I have sent home my final suggestions for this work, so that Colonel Church will be able to settle the matter with you; and I need only say here that my plan No. 7, for an L shaped jetty is, I believe, the best and most economical that we can set up. This plan was sent to Mr. Hopkins with my No. 16. of 24th of June last, accompanied by a schedule showing the ironwork still required.

FAIRLIE LOCOMOTIVES.

For the rest of the work we have not yet sufficient data to decide on the details, but if we are supplied with the Fairlie Locomotive and the "Ibbotson Clip," we shall make a good job of the line.

BRIDGE WORK.

For bridges I do not think you can do better than send out light iron pile shafts and girders for thirty and sixty feet spans, but pray take every care that all the parts are thoroughly interchangeable, otherwise great loss and delay will occur. There is no reason why the head of a pile shaft should not suit a cap or a coupling ; those we have here are so arranged that they cannot be used indiscriminately.

WORK FROM SAN ANTONIO END OF LINE.

As to the mode of doing the work, my opinion is that it must all be done from this end. The only works you could attack from the Guajará end would be clearing and earthwork, and by the time you got your rails and other iron up there from this end these works would probably have to be done over again. Push a road through from this end that you can get your trucks over and then finish up afterwards.

6. LABOUR.

The Labour question is the most difficult perhaps of all. The late contractors never attacked it with sufficient vigour. You must draw labour from every possible quarter and not depend upon any single one.

BOLIVIAN LABOURERS—COOLIES OR CHINESE.

Bolivia will undoubtedly send a valuable contingent, say 1,000 men, and these, if properly sought for, ought to be had for £3 to £4 per month and found. I do not think it will be much use sending into Bolivia from the Pacific side ; wages are high there on account of the many roads going on in Peru and Chili ; also there is great opposition to us there from the Peruvian interests. A commencement to recruit labourers should be made in the Mojos and Beni department, and if American or English gold for advances is sent up and the wages I have quoted are offered I believe the men will be found : then the search can be continued upwards towards Cochabamba from this side with greater prospect of success from the prestige it will have gained by partial success in Mojos and Beni. You must always have a good number of Bolivian Indians for canoe work, clearing and other timber work, but your earthwork and other construction ought to be done with imported labour. On this point you will not need advice from me as to the sources from which it can be drawn ;

I will therefore only say that I believe the East Indian coolie or the Chinese would do well here ; a good many of them would have ague fever, but they would recover as the work of clearing went on.

7.—HUTS.

Decidedly the best houses for this country are made with palm boards and palm leaf roofs, and up the line the palm trees are very abundant ; near a station such as this they get scarce, and it is not desirable to build houses close together with palm leaf roofs as fire then spreads rapidly.

ZINC ROOFS REQUIRED AT STATIONS.

At stations therefore zinc roofs boarded underneath will be found the best and most economical. Asphalted felt has been used with success on many works, but I am not much in favour of this article ; it requires good boarding underneath, and even then is apt to leak at the nail holes. Here the alternations of sun and rain are very trying, and "felt" would I think deteriorate rapidly. Zinc sheeting is put together rapidly and lasts well ; any rough boarding underneath answers its purpose of stopping the radiation of heat.

8.—FOOD SUPPLIES.

Considering that you have perfectly free navigation from San Antonio to Pará and other ports of Brazil where supplies are obtainable in large quantities, I think that bullocks, farinha, charqui, coffee, sugar, and rice should be expected from Brazil for some time to come. Once we have a temporary road through, then good supplies will undoubtedly come down from Bolivia, and by that time producers there will have become convinced of the reality of the undertaking and will have raised crops for our supply and for export. At present I do not see how we can expect Bolivia to yield large quantities of cereals, for as there has hitherto been no means of exportation, only sufficient for home consumption has been raised.

GENERAL STORE.

I would impress upon you the vital necessity of at once establishing a good store here with food, clothing, etc., both for Europeans and Indians. By this you will be able to keep your men well contented, and while charging prices far below those current on the river, you will be able to make such profits as will materially reduce the price of

labour. It would be impossible to tell you in writing the kind of stores required. I would therefore suggest that you purchase a first stock in Pará, as unless you have the proper things in calicoes, dungarees, shirtings, etc., losses will occur.

COST OF KEEP OF LABOURERS.

The average calculation of this river for the keep of an Indian is a milrei or two shillings per day, but I have kept them well for much less, and my practice is to estimate at two shillings per day and save 30 to 50 per cent.

MEDICAL REQUIREMENTS.

You will doubtless send a good medical staff with officers accustomed to treat tropical maladies such as fever, ague, dysentery, etc., and pray by no means forget to let the doctors bring out a fresh stock of vaccine matter, as few, if any, of the Bolivian Indians are vaccinated.

9.—STREAMS TO BE CROSSED.

Detailed information as to width and character of streams is not to hand yet. There are two large rivers to cross, the Yaci-Paraná and Tres-Irmãos; the former of these spreads itself at its junction with the Madeira, but in neither case will it be necessary to have openings of greater individual width than 60 feet. With a succession of these we can bridge these rivers rapidly and well, for as there is no great current down either of them there is no necessity to give them greater waterways. For all other streams 30 and 60 feet spans will be ample, placing one or more in each case as circumstances may require.

I think I have now replied to the various queries in your letter, and I assure you that both myself and my assistant, Mr. Dalton, who has been here since the works started, will most gladly render you any assistance or co-operation in our power.

I am, Gentlemen,

Yours very faithfully,

(Signed)

F. D. MATHEWS,

Resident Engineer.

II.—GUAJARÁ MERIM TO EXALTACION.

PORT ABOVE THE FALLS.

The river above the falls narrows considerably, its general breadth being about half a mile, with deep water giving every facility for free navigation. Above the Guajará Merim there is very good quiet water on the railway side, where a good harbour can be made, should further experience prove that the fall cannot be easily passed by steamers.

ISLANDS OF CAVALHO MARINHO.

The Islands of Cavalho Marinho, about ten miles above Guajará Merim, are several in number, but there is plenty of water in the channels, so that they offer no obstruction to navigation. Canoes are obliged to keep crossing from side to side of the river, in order to avoid the strong currents usual at the bends, but a steamer would be able to keep mid-channel, as the ordinary current of the river does not I think run more than two miles per hour.

THE HILLS OF PACA NOVA.

The range of hills called "La Sierra da Paca Nova" by Messrs. Keller are very plainly seen from the islands of "Cavalho Marinho." Messrs. Keller depict them as trending out to the "Cachuela do Pão Grande, but this I do not think is correct. They seemed to me to finish off a good distance from the river, and the hills of "Pão Grande" are I believe quite separated from those of Paca Nova.

THE RIVER TO JUNCTION OF ITENEZ.

There is nothing special to report of the river from "Las Ilhas do Cavalho Marinho" to the junction of the river Itenez, which we reached on the 7th of June, after seven days' hard paddling, and I might say seven nights as well, for the practice is to paddle as much as possible during the night so as to avoid the chance of attack from the savages: thus very long hours of work are made during this portion of the journey, from 14 to 18 hours being the usual allowance of paddling given to the men.

JUNCTION OF ITENEZ WITH THE MAMORÉ.

The river Itenez, whose waters are clean and dark coloured, is

wider than the Mamoré at the Junction. The waters of the Mamoré are probably greater in volume, as they are deeper and give their whitish clayey colour to the united waters below. Both these rivers are exceedingly handsome at the junction, and so fine a "meeting of the waters" it would be difficult to match.

THE RIVER MATOCARI.

On the 12th of June we passed the river Matocari on the right bank. This stream is said to be navigable to the villages of San Joaquin and San Ramon, and might doubtless be utilised during the rainy season, instead of taking goods for those villages round by the river Itenez and the Fort of Principe da Beira.

GRAZING LANDS BELOW EXALTACION.—PROPOSED TRANSPORT OF CATTLE TO SAN ANTONIO.

Above this river we commence to pass many open lands or "pampas" on either side of the river, with excellent grass for cattle feeding grounds. The largest of these cattle feeding establishments is called "La Estancia de Santiago" and was the property of the late Don Barros Cardoza, Brazilian Consul in Bolivia for some years. He is reported to have had nearly 8,000 head of cattle, and I am credibly informed that, had he not lost his life in the early part of 1874, he had intended to drive a large number of his cattle by land from Guajará Merim to San Antonio down the road cut by Señor Ignacio Arauz. From his estancia to the first cachuela, the cattle would have been taken in canoes, or on rafts, a comparatively easy work, as the navigation is entirely free from other obstacle than a few "playas" or banks of sand which stretch out into the river at low water, leaving, however, in every case a channel deep enough and wide enough for craft drawing not more than 7 or 8 feet. Pasturage for the cattle would be easily found at night along the river banks, which are covered with "capim," a rough wild grass, or "chuchia," a kind of wild cane, the succulent points of which are greedily eaten by the cattle.

PRICE OF OXEN AT THE ESTANCIAS AND AT SAN ANTONIO.

Oxen in the estancias of Mojos are worth from 15 to 20 pesos faibles, say about £2. 10s. to £3. 10s. a head, while at San Antonio and on the higher Madeira they are worth from 80 to 100 milreis or £8 to £10.

COCOA PLANTATIONS OF EXALTACION.

On the 15th the canoes arrived at the "chocolotales" of Exaltacion, which are very large plantations of cocoa trees belonging to the government. These plantations are farmed out by the authorities of Exaltacion and Trinidad to speculators who make good profits as there is no labour, or very little, expended in clearing. At the proper season a party of Indians descend the river from Exaltacion, collect the fruit, clear away a little of the rubbish from beneath the trees, and then the "chocolotales" are abandoned to the savages and wild animals till the annual time of collecting again comes round. Doubtless these "chocolotales" were planted at the time when the Indians were more populous in the fifteen missions of the department of the Beni.

EL CERRITO : THE COO'S ESTATE NEAR EXALTACION.

"El Cerrito," the National Bolivian Navigation Company's property, was reached on the 16th. This place is named from the only small hill that is to be found on this part of the river for many miles, and is said to be the only spot that, at exceptional high floods, is not inundated. There are four houses all belonging to the Company, well built with palm leaf roofs and wattle and dab walls. Here I found a Bolivian named "Melchior Cruz," in charge with five peons, acting under the orders of Señor Francisco Ceballos, who lives in Exaltacion and has an "Ingenio de caña," or sugar mill there. Señor Ceballos had been left in charge by Dr. Velarde. The men are employed in a "chaco," or plantation, which is certainly very well kept. The ground cleared may be about ten acres, and is well stocked with yucas (mandioca) plantains and sugar cane. The products are sold to passers by when possible, and the crops of yuca made into "harina de yuca," or mandioca flour, while the cane is sent to Sr. Ceballos's mill for grinding. In consequence of the small demand in comparison with the large supply of these articles in Exaltacion, it is probable that the plantation does not yield at present more than sufficient to cover the expenses.

THE ESTATE OF GREAT SERVICE DURING CONSTRUCTION OF THE RAILWAY.

To the enterprise, however, the plantation will be of great service when the works are in progress. A steamer with canoes in tow

could take large supplies of the products of the estate to Guajará Merim, and thus the enterprise would be sure of obtaining the necessary vegetable food for the labourers at reasonable prices. The Bolivian agriculturists of the Beni are all most patriotically disposed in favour of the railway, but I fear their patriotism would not prevent their putting exceptionally high prices upon their productions if they saw that the enterprise was dependent upon them. In my ascent of the rapids, I had to pay a Bolivian, who was descending to the River Madeira, 12 milreis, or £1. 4s. 0d., for an arroba of 25 pounds weight of mandioca flour, worth about a peso or a peso and a-half in Exaltacion, say 3s. 2d. to 4s. 10d. It will be well, therefore, that the Company should have means of its own of supplying fruit and breadstuffs at reasonable prices.

THE S.S. EXPLORADOR.

The small steamer the "Explorador" is here, and in safety. As far as one could tell, the hull seems tight and good, as she did not make any water to speak of. The boiler is said to be useless, having burst twice on the trip up the rapids. The wood fittings are in fair condition; the paint, gilding, and varnish only being damaged. Whether the whole of the machinery was in working order I could not say, but my cursory inspection showed it to be not much damaged by exposure.

EXALTACION.

On the 17th I arrived at Exaltacion, which is the first village in Bolivia that a traveller up the Mamoré meets with. Here I had to stay eleven days, it being necessary to find a new crew for the further journey to Trinidad, the men that I had brought from San Antonio all belonging to Exaltacion, or to the villages on the Maddalena and Baures rivers. I was exceedingly well received by Sr. Francisco Ceballos, and by the majority of the inhabitants, but the Corregidor, one Faustino Varoma, a nomination of the party in power under the "Frias" regime, did not seem inclined to lend assistance to anyone belonging to the enterprise.

In Exaltacion there are about a dozen Bolivians of some sort of position and education, a "cura," or parish priest, and the before-mentioned Corregidor. All these men, except the "cura," keep small stores, and exchange their goods with the Cayubaba Indians for chocolate, mandioca, sugar, or rice, all of which articles are sent to Trinidad or Santa Cruz for sale to merchants established there.

POPULATION OF EXALTACION DECREASING—KELLER'S OPINION OF
THE CLIMATE OF EXALTACION DISPUTED.

The Cayubaba Indians are, I fear, decreasing rapidly in numbers, the deserted houses and the lines of the old streets giving a sad and desolate look to the place. The present population cannot be more than 1,500, and I should judge that less than fifty years ago there must have been nearly 4,000 Indians in the old mission of "La Exaltacion de la Santa Cruz." Señor Keller has given a graphic description of the town, it is, therefore, unnecessary for me to occupy space and time on the subject; I observe, however, that "amongst the causes which tend to contribute to the decadence of so flourishing a town," he cites the fevers, which he says of "late years appear to have taken an endemic character." To this I would remark that in exceptionally high floods, which appear with a rather remarkably regularity to occur about once in seven years, the lands of Exaltacion are flooded to a depth of perhaps six inches, and after the retirement of the waters, ague fever may be epidemic or prevalent, but I could not agree that fever in Exaltacion is "endemic," or peculiar to the country—on the contrary, I should say that "El Cerrito" and "Exaltacion" are generally very healthy places.

CAUSE OF THE DECLINE OF THE INDIAN POPULATION OF THE BENI.

The reason for the decline of the Indian population is to be found, without doubt, in the baneful effects to Bolivia of the rubber-collecting trade of the Madeira and Purus rivers. This trade is the real cause that is rapidly depopulating not only Exaltacion, but all the towns of the Department of the Beni.

To take the year 1873 as an example of the working of the emigration from Bolivia to the rubber districts of Northern Brazil. In that year 43 canoes descended the rapids from Bolivia, with merchants on their way to Europe with ventures of "cascarilla" (cinchona bark), or with speculators in the rubber "estradas" of the Madeira river; while in the same year 13 canoes only ascended to Bolivia. We may average the Indians that leave Bolivia with these canoes at 10 per canoe, and thus we have an exodus of 430 Indians from their country in twelve months, while only 130 return in the same period; we thus have 300 Indians lost to Bolivia in 1873, and as the rubber collecting fever has been decidedly on the decrease for the last four or five years, the year 1873 does not give a fifth of the number of Indians

that have left in previous years. We may, I venture to think, estimate the drain to human life that the Department of the Beni has suffered from the Northern Brazilian rubber trade at 1,000 men per annum during the decade of 1862 to 1872. The worst feature of this emigration is, perhaps, the fact that rubber speculators and merchants descending the rapids will not allow the Indians to take any of the females of their families with them. This is done on account of avarice in some cases and necessity in others, which prompt the "patron" or owner of the descending craft to load his canoes as fully as he can with his merchandise, reserving as small a place as possible for provisions, which, on account of the quantity of farinha consumed, occupy so much space that every mouth that requires to be filled, without its owner being able to assist in the propulsion of the craft, becomes a very serious consideration. Thus it arises that in every town of the Beni the females are in a majority of perhaps five to one over the males, and the populations are decreasing.

PROPOSAL FOR RE-POPULATING THE BENI.

Here I may mention that in Trinidad I had a conversation with Don José Manuel Suarez, the prefect of the Beni, upon the subject of the serious depopulation of the Department and that at his request I addressed some remarks upon the subject to Señor Don Mariano Baptista, the Minister of Home Government and Foreign Affairs in Sucre. Sr. Suarez proposes that the Government of Bolivia should send a special mission to Brazil, to ask to be allowed to interview all the Bolivian peons that are in the province of the Amazon, whether engaged with rubber collectors or others, engage them if possible for work on the Madeira and Mamoré Railway, remitting through Government agency a portion of their earnings to their destitute female relatives in Bolivia, and at the termination of their agreements sending them back to Bolivia. These Bolivian peons are held by the "Seringueiros," or rubber collectors, and in this respect there is nothing to choose between Brazilians or Bolivians, in a perfect state of slavery, by means of debt and drink. At most of the Barracas on the Madeira river, where the Seringueiros live, the Sundays are passed in perfect orgies of drunkenness. On that day it is that the peon delivers over to the "patron" the rubber that he has collected during the week; he is then treated liberally to white rum (called "cachaca" on the river), and when under the influence of this liquor he is induced to buy trinkets, calicoes, ribbons, and other articles

that he could very well do without. These are charged to him at enormous prices, whilst his rubber is credited to him at inversely corresponding low ones, and he is thus kept under a heavy load of debt, and cannot, under the Brazilian laws, leave his "patron" until it is worked off, which happy event the patron takes care shall not happen. If a Bolivian authority, aided by the Brazilian officials, were to visit these unhappy exiles, and to settle between "patron" and "peon" the just state of the accounts, paying the amount fixed upon to the patron, I believe that a thousand Bolivian peons could with ease be gathered together on the banks of the Madeira river. They could work on the railway for two or three years with advantage to themselves and their country, and return to their native villages at the expiration of their agreements with a small fund in hand. This would be the only and the most expeditious method of re-populating the now half deserted villages of the Department of the Beni. The Minister at Sucre heard my arguments and acknowledged them to be true, but as at home it is said to be "a far cry to Loch Awe," so in Bolivia it is "a far cry from Sucre to the Beni," and the Government were too much occupied in devising means for securing their own retention of power in the capital to be able to devote time or thought to places so distant as Trinidad or Exaltacion.

THE PORT OF EXALTACION.—"TIERRAS DISBARANCANDAS" FALLING BANKS.

The port of the town of Exaltacion is situated at the apex of an immense bend in the river Mamoré, each arm being at least a league in length. The wind therefore exerts a great force on the craft made fast at the foot of the bank, which rises more than 50 feet above low water level. On this part of the river boats are also much exposed to danger from the falling banks, called "Tierras Disbarancandas." The Mamoré, and indeed all the rivers of the Beni valley, are for ever shifting their courses in many parts of the forests through which they flow. They undermine the banks on one side, which falling away form the numerous curves, on the convex shore of which the mud and sand brought down by the current is deposited, and playas and banks termed "igapo" lands are formed. On these a forest grows in course of time and "vargem" lands arise.

CHANGES OF THE COURSES OF THE RIVERS.

The river on the concave side of the curve is continually causing the trees of the terra firma to fall and obstruct its course, a barricade

or "palisada" is formed, the river then returns in exceptionally high floods to its old course, bursting through the *vargem* and *igapo* lands, and so the ever recurring changes of the river course continue. In illustration of this I saw on the river Chapari a place where the current was breaking down a bank that was apparently "terra firma," and had trees growing on it that were of great age. At the foot of this bank and under some 15 feet of earth was a deposit of timber blackened and in fact almost carbonised by time and pressure of the super-incumbent earth. From the manner in which these logs of timber were deposited, one above the other, it was evident that it formed part of a huge collection of drift-wood such as may often be seen collected together in many parts of the rivers. In all works on the river side, great care must be taken to see that the bank is not a "tierra-disbarancanda," or of slipping nature. In the Cachuelas, however, this feature of the river does not appear to exist, but on the Mamoré all "chacos," "barracas" and "pueblos" are placed some distance from the river, generally from $\frac{1}{2}$ a mile to a mile, so that they may not be exposed to this danger.

LAND-SLIP AT THE PORT OF EXALTACION.

Whilst I was at Exaltacion an enormous mass of the bank at the port gave way and fell into the river, causing the loss of one man and a large canoe. This landslip measured more than 100 feet in length, the breadth of earth that fell being more than 30 feet at top, which was upwards of 40 feet above the then water level. It is therefore evident that a more secure situation must be sought for the port of Exaltacion when any navigation of the Mamoré commences. The port which is used at high water, about a couple of miles higher up the river than the one used for the greater part of the year, is, I think, always preferable notwithstanding its greater distance from the village when the water is low.

PROVISIONS FROM EXALTACION.

Provisions are at present rather difficult to obtain in any quantity at Exaltacion, from the fact that no stocks are kept, the demand being very limited. There is, however, no doubt but that when the owners of plantations and feeding grounds in or near Exaltacion become convinced that the railway will be constructed, they will at once prepare large quantities of various articles suitable for provisioning the workmen on the railroad, or for sale on the Madeira and Amazon rivers. The following are some of the prices current when I was in Exaltacion.

PRICES OF PROVISIONS AT EXALTACION.

"Farinha de Yuca" or mandioca flour, 12 reales (4s. 10d.) per Bolivian arroba of 25 lbs. Rice, 6 reales the arroba in the husk, this only produces about 15lbs. when husked, thus the dressed rice may be put at 2d. per lb. Sugar, brown in cakes called "empanisadas" $\frac{1}{2}$ a reale, say 2 $\frac{1}{2}$ d. per lb. Ordinary aguadiente, 8 reales (3s. 2 $\frac{1}{2}$ d.) per "frasqueira" of 3 bottles, a stronger and better sort of spirit fetches 8 reales per bottle. Meat, fresh, sells at 1 peso of 8 reales (3s. 2 $\frac{1}{2}$ d.) per arroba of 25lbs., when preserved by being salted and dried in the sun it is called "charqui," and sells at 3 pesos (9s. 7 $\frac{1}{2}$ d.) per arroba, say 4 $\frac{3}{4}$ d. per lb. Wheaten bread is very scarce, when obtainable, costs $\frac{1}{2}$ a reale, say 2 $\frac{1}{2}$ d. for a small loaf that may perhaps weigh a couple of ounces. The flour comes from Cochabamba.

LABOURERS FROM EXALTACION.

Very few men for the works could be counted upon as obtainable at Exaltacion, as I do not think there were more than 100 men in the town at the time I was there, and the few "patrons" of the place appeared very anxious to engage the men that returned from the river Madeira to Bolivia. Exaltacion, however, will probably always be of importance to the enterprise, from its being the best point at which to unite labourers from the other "pueblos" previous to their descending the river to the railway, and also its being the market at which to obtain the above mentioned supplies for the provisioning of the labourers when at work. I would, however, recommend that the Company's possession at "El Cerrito" should be utilised as much as possible in these ways, as there the Indians would not be exposed to be tempted away from their contract by the native patrons of Exaltacion and its neighbourhood.

WOOD FUEL FOR STEAMERS.

Before concluding this chapter of my report, I would advert to the difficulty that to me appears to exist in supplying the wood necessary for the fuel of the steamers which will ply from the upper terminus of the railway to Exaltacion. This portion of the Mamoré is much infested by savages, principally "Chacobos," and there is no doubt but that they would prove troublesome for a considerable time to isolated settlers. Messrs. Keller give the distance from Guajará Merim to Exaltacion at 72 $\frac{1}{2}$ leagues say 200 miles. On account of the nume-

rous "playas" or sand banks it would not be possible to navigate by night except when perhaps the moon was very clear, and allowing for the strength of the current and the smallness of the steamers that will probably for some time be used, it would be necessary to have wooding stations say about 50 miles apart from each other. Three stations would therefore be required and I would suggest that the Brazilian and Bolivian Governments be requested to make these stations military outposts, each to be garrisoned by about 40 to 50 men who could also be employed in cutting the wood for the steamers. The price agreed upon by the navigation company and the governments would defray the expenses and a great step would be taken towards repressing the savages in their attacks on the passing craft.

III.—EXALTACION TO TRINIDAD.

START FROM EXALTACION.

Having secured a crew of eleven men in Exaltacion after considerable difficulty and some opposition from the Corregidor, I started on the 28th of June for Trinidad.

CROPS OF GRAIN GROWN ON THE SAND BANKS.

The river on this section preserves a very uniform width of from 800 to 1,200 yards and runs through level plains of very rich alluvial soil on which the Cayubaba Indians of Exaltacion and the Mobimas of Santa Ana have numerous plantations, some of the playas or sand banks are of enormous size, and on them the Mobimas during the dry season plant several kinds of "frijoles" or beans, and also a sort of pulse called "mani" from which they make their favourite beverage of "chicha," and which they also use as a substitute for rice; there are also many pampas for cattle grazing.

LANDS VERY SUITABLE FOR SETTLEMENT.

The lands on this portion of the river would I think be very suitable for emigration, as the climate is good, the land of excellent quality for the production of crops of sugar-cane, rice, maize plantains and every other description of tropical produce, or for cattle rearing. Also there are no savages in this district, the country between Exaltacion and Trinidad being traversable freely on

either side of the river. The river abounds in fish, and wild ducks, herons, storks, and other waterfowl are plentiful on its banks.

RIVER YACUMA AND VILLAGE OF STA ANA.—TRADE TO REYES, &c.

On the 30th, we passed the mouth of the river Yacuma, a day's paddle up which river is the village of Santa Ana the home of the Mobima Indians.

It is by this river that traders take goods for the pueblos of Reyes, San Pablo, San Borja and Santa Cruz all of which are peopled by the Maropa Indians, and from which villages a trade is carried to the towns of Apolobamba in Bolivian territory and Sandia in Peruvian. The river Yacuma is said to be navigable all the year round for large canoes, and is free from savages, therefore, a small steamer may be advantageously employed here after the construction of the railway of the cachuelas.

STEAMERS TO TRADE ON THE AFFLUENTS OF THE MAMORÉ AND ITENEZ.

One of the merchants who accompanied me up the rapids, sold goods to the value of £3,400 in Exaltacion to a trader who sends canoes up the affluents of the Mamoré or the Itenez to the various pueblos of the Department of the Beni, such as San Joaquin, San Ramon, San Nicolas and San Pedro on the Machupa river, Maddalena on the Itonama, Concepcion de Baures and El Carmen on the Baure river sometimes called "Rio Blanco," the above mentioned town of Reyes and others on the Yacuma, and San Ignacio on the Jamucheo. Considerable trade will doubtless be opened up with these towns and villages, and work will be found for two small steamers, one to run on the affluents of the Mamoré and the other on those of the Itenez the head-quarters of both being at Exaltacion or "El Cerrito."

RIVER JAMUCHEO AND VILLAGE OF SAN IGNACIO.

On the 1st of July we passed the mouth of the river Apiri on which there are no villages, and on the 3rd and 4th we got to districts where the Canichana Indians have their chacos on the Mamoré. At night of the 4th we stopped opposite the mouth of the river Jamuchéo. When this river is full the pueblo of San Ignacio, on its banks can be reached in six or seven days, but when dry three weeks are often required as the canoes have to be dragged over the many shallow parts of the river bed.

PORT OF SAN PEDRO.

Half a day's journey from the River Jamucheo is the port of San Pedro the pueblo of the Canichana Indians. The village is about two leagues from its port on the Mamoré, and is situated on the source of the Machupa river which is as aforesaid an affluent of the Itenez.

THE CANICHANA INDIANS OF SAN PEDRO.

At the port of San Pedro on the Mamoré there is a large and well built shed for the sentinel who takes charge of the canoes belonging to the villagers, and from the style of the work, the quality of the timber and the tidiness of the place, my previous favourable opinion, obtained by the employment of a few Canichanas in San Antonio, was confirmed to the effect that these Indians are the most desirable of any of the various tribes of the Beni. They are excellent workmen with the axe and are I think less addicted to the use of ardent spirits than the Cayubabas or the Trinitarios.

ROAD FROM THE MAMORÉ TO SAN PEDRO REQUIRED.

Traders going to San Pedro use the port on the Mamoré, instead of making the round by the river Itenez. Their canoes are hauled up on land and dragged by oxen across the two leagues of pampa between the Mamoré and the Machupa. The Navigation Company will do well to make a corduroy road over this track so that the town of San Pedro may be accessible during all seasons from the Mamoré.

SAN XAVIER.

At night of the 6th we were opposite to the port of San Xavier a village of small importance situated on a creek running into the right bank of the Mamoré.

THE RIVER YBARI.

On the 8th we entered the Ybari, on which river the town of Trinidad, the capital of the Department of the Beni is situated, and on the 9th after eleven days good work we arrived at its port, the town being distant about two leagues from the river.

TRINIDAD.—PRINCIPAL TRADE.—SEÑOR IGNACIO BELLO.—JOURNEY TO COCHABAMBA INSTEAD OF SANTA CRUZ DECIDED UPON.

In Trinidad I was exceedingly well received by all the inhabitants,

who are enthusiastic in favour of the railway, which affords them the only hope of arresting the decay of the department arising from the emigration before referred to of the Indians to the Madeira river. There are here a few merchants of considerable position and resources whose principal trade appears to be the export of cocoa to Cochabamba and Santa Cruz, receiving in return flour from Cochabamba, and dry goods from Santa Cruz, brought from the town of Curumbá on the river Paraguay. The principal of these merchants, Señor Ignacio Bello, has always been anxious to do everything in his power to assist in the construction of the railway, and received me with great kindness; and as I found that he was on the point of making a journey to Cochabamba, I decided to proceed in his company, and give up any idea of visiting Santa Cruz, more especially as I was informed that the river Piray was very dry, and the savage Sirionos who dwell on its banks were very active, having attacked several canoes during the months immediately prior to my arrival in Trinidad.

COUNTRY ROUND TRINIDAD.—PERIODICAL INUNDATIONS.—SPLENDID CATTLE.

The country round Trinidad is a flat pampa, with a rough kind of tall grass, which requires burning frequently. These pampas are almost annually flooded, and are, I think, more subject to these inundations than those of Exaltacion. The inundations at times rise up to the town itself, there being only one street that is said to be left dry on these occasions. The grazing lands, however, generally have some slight eminences upon them, where the cattle find refuge during these floods, and as, upon the retirement of the waters, the grass springs up with renewed vigour after the rubbish has been burnt away, the cattle thrive excellently, and are really handsome animals, being nearly twice as large as the Brazilian oxen. They would, indeed compare very favourably with our ordinary English cattle.

PRICES OF PROVISIONS.—PRICES OF IMPORTED GOODS.

Prices of provisions are much the same as those current in Exaltacion. I observe, however, that Manchester goods, such as calicoes, longcloths, ribbons, &c., are brought to Trinidad from Curumbá *via* Santa Cruz, at prices far below those at which they can be brought at present from Pará *via* the Cachuelas, and it is evident that when the trade in these goods is carried up the Amazon and over the railway, the merchants of Pará must be contented with smaller profits than those they now obtain. Pará, on the Amazon, and Curumbá, on the

Paraguay, are both Brazilian ports, and I presume that the same tariff of customs rules alike at both places, nevertheless calicoes, bought in Pará, that cannot be sold in the river Madeira for less than 250 or 300 reis—say 1s. to 1s. 2½d. per yard, can be bought in Trinidad at 2 reales, or 9½d.; also, longcloths, on the Madeira, sell at 200 to 300 reis (9½d. to 1s. 2½d.) per yard, and are only worth 1½ to 2½ reales, say 7½d. to 1s. per yard in Trinidad. It must, however, be noted that only very low quality goods are brought from Curumbá, and that the secret of business in Trinidad seems to be to sell at a low price without regard to quality.

ARTICLES MOST SUITABLE FOR IMPORTATION TO TRINIDAD.

The articles that leave the best profit when taken up the Cachuelas are iron pots, enamelled saucepans and other general ironware for house use, also claret of a low class, for anything called "wine," and sold in bottles with pretty "etiquettes" fetches 8 reales (3s. 2½d.) per bottle, and no Bolivian in the Beni would pay more even for "Chateau Margaux" or "Chambertin."

SMALL-POX AT TRINIDAD.

The town of Trinidad did not display a very animated appearance at the time of my visit, but that was not to be wondered at, as small-pox was very prevalent.

POPULATION DECREASING.

The people also complained bitterly of the great emigration of the Indians during past years to the Madeira river, and as in Exaltacion, the remains of streets that were well populated but a few years ago, tell a sad tale of the results to Bolivia of the rubber fever of the Amazon valley.

MADIRA AND MAMORÉ RAILWAY THE ONLY SALVATION FOR THE BENI.

The construction of the Madeira and Mamoré Railway is the only event that can save the once flourishing department of the Beni from becoming again the hunting grounds of the savage Siriono and the wild beasts of the forest. The few merchants of the town are so convinced of this that they are merely living on in the hope of being able to wait for the realization of the undertaking, and Sr. Ignacio

Bello, the wealthiest of them all, in money or in cattle, made the journey in my company to Cochabamba, with the avowed intention of purchasing a property there and leaving the Beni. He gave as a reason the pressing need of education for his children, but if that were all, he could send his children to Cochabamba and remain himself in Mojos. I prefer to think that the true reason for his leaving is the increasing poverty of the Department. The construction of the railway would, however, arrest entirely the decay by affording a ready means of transit to a good market for the chocolate, sugar, oxen, hides, skins, and other produce of which the inhabitants are now only able to realize but a small amount in value compared with what they will be able to, when the line is open, and some of the exiled Bolivian peons have been brought back to their homes.

RATE OF WAGES FOR PEONS.

In consequence of the scarcity of hands, the peons now get 30 to 40 per cent. more for their journeys than they did a couple of years ago; thus, from Trinidad to Coni, they now get eight pesos for the up-river voyage, and two for bringing back the canoes, while formerly the price was six to seven pesos for the round trip. The monthly rate of pay does not, however, seem to have altered much, as it is still about five pesos (16s.) per month, so that the price established in San Antonio of "ten pesos fuertes," or £2 per month, should be sufficient to induce patrons and peons to go to the works.

LABOUR FROM THE BENI FOR THE RAILWAY.

Being desirous of testing the possibility of obtaining labour from the Beni, for the railway, I invited some of the principal residents to express to me in writing their willingness to assist in the construction of the line when resumed, explaining to them the great assistance they would be rendering to the contractors by taking their labourers to the works, and undertaking the entire care of their men in manner similar to that done by Señor Ignacio Arauz, in the cutting of the track from San Antonio to Guajará Merim. My ideas were responded to by the principal men of the place, namely, Sr. José Suarez, the Prefect; Sr. Ignacio Bello, his son-in-law; Sr. Miguel Maria Cuellas, Sr. Manuel Becerra, Sr. Jesus Arauz, brother of Sr. Ignacio Arauz, and Sr. Francisco Ceballos, of Exaltacion. By means of these "patrones" I believe that 5 to 600 men could yet be raised, for the works of the railway, in the various pueblos of the Beni; and, as I

maintain, that whoever carries out these works must always have a certain number of Benianos for timber work, and for navigation purposes, amongst the rapids, I am of opinion that no better plan can be adopted than that of entering into contracts with some of the above-named parties for the supply of this labour. All responsibility as to housing and feeding these peons would thereby be taken off the principal contractor's employes.

IV.—TRINIDAD TO CONI.

START FROM TRINIDAD.

On the 19th of July I started with Don Ignacio Bello and other traders, there being in all eleven canoes, with an aggregate number of a hundred Indians in the crews that then left Trinidad for the port of Cochabamba, on the River Coni, an affluent of the River Chapari, which itself is an affluent of the Mamoré. All these canoes, except my own, were laden with cocoa in the bean, or "pepita," as it is there called, a few tiger skins and tamarinds being the only other articles that were taken up for sale in the interior of Bolivia.

OUTLET FROM TRINIDAD TO MAMORÉ.

Canoes ascending the river from Trinidad do not have to return by the rivers Ybari to the Mamoré, as there is a lagoon about a league from the town, from which a creek or "curiche" gives egress to the principal river. This creek is not, however, large enough for even small steamers, such as the "Explorador," which would always have to descend the river Ybari to its mouth, before they could ascend the Mamoré, which above Trinidad, still preserves a bold and wide course, with free facilities for navigation, and has many plantations and sugar estates on its banks.

THE RIVER SECURÉ.

On the third day out from Trinidad, we passed the entrance to a large lagoon situated on the right bank of the river, and then on the left bank we passed the mouth of the River Securé, which has its rise in the mountains of the northern part of the province of Cochabamba. This river though broad and wide for a great portion of its course is very shallow, and entirely unnavigable from the driftwood and timber collected therein. An expedition sent up by the Prefect of

Trinidad shortly before my arrival, returned with the only result of the impracticability of the river for any kind of navigation.

BELLA VISTA, THE PORT OF LORETO.

The same day we got to Bella Vista, the port of Loreto, a small village inhabited by Indians of the Trinitario family. Here is a "trapiche" or sugar mill and many large and well-kept cane fields and plantations, but the land is much cut up by old river courses called "madres," and must be entirely inundated in exceptionally high floods.

SIRIONO SAVAGES.—COCOA PLANTATIONS.

Above Bella Vista the right bank is subject to visitation by the "Siriono" savages, and it is advisable therefore for canoes to keep on the left bank, on which, a short distance in the interior, are plantations of cocoa (chocolotales) belonging to the Government.

JUNCTION OF THE RIVER GRANDE.

On the 24th, the sixth day after leaving Trinidad, we got to the "Junta de los Rios," being the junction of the Rio Grande with the Mamoré.

THE RIVER PIRAY.

Of the navigation of the Piray or Sará, which is an affluent of the Rio Grande flowing from the district of Santa Cruz, I can only speak from hearsay. It is said to be free from all obstacle to navigation for at least eight months of the year, but for the remaining four I should think it would be closed to steamers, as even canoes have to be unloaded and dragged over the shallows, which I am informed are of frequent occurrence. The Rio Grande at its mouth appeared to be very dry, while the Mamoré had plenty of water and was about 500 yards in width.

THE RIVER CHIMORÉ.

The next day we entered the River Chapari, leaving the Mamoré, or as it is there called the Chimoré, on our left. I was only able to ascend the Chimoré a short distance, but that was sufficient to convince me that it is a far superior river to the Chapari in volume of water: and I am informed by Dr. Velarde, who has ascended it to the port of Chimoré, distant only about two leagues from Coni, the

port of Cochabamba, that it is far preferable to the Chapari for navigation, having no great amount of driftwood and no rapids as far up as he penetrated.

THE RIVER CHAPARI.

The River Chapari, though about 200 yards in width at its junction with the Mamoré, is in my opinion entirely useless for trading purposes. It is a very serpentine river, and the bends are so continually changing their courses that the whole river is one succession of sand banks and stockades of dead wood, through which even canoes are with difficulty manœuvred.

THE CHAPARI USELESS FOR NAVIGATION.

The ascent of the Chapari occupied our party eleven days of constant struggling with the stockades of dead wood and the rapids of the River Coni on which the port is situated, and I think the conclusion may at once be arrived at, that a better channel for navigation must be found, and this is, I believe, afforded by the River Chimoré.

CONI, THE PORT FOR COCHABAMBA.

Coni is distant about 45 leagues from Cochabamba, and is a small clearing with a few huts where the mule drivers and traders from Cochabamba remain while waiting in the dry season for the canoes from Trinidad. As the mule drivers only come to Coni when they expect to get a freight, intending travellers must make arrangements beforehand to have animals ready for their arrival, otherwise they will have to foot it over very bad roads.

THE YURACARÉ INDIANS.

The district is the home of the Yuracaré Indians, who are called savages, but are very friendly and well disposed. They are nomads in so far as that they only live in one clearing for perhaps two or three years, until they are tired of the spot or fancy that the "chaco" does not yield so well as it did at first. They then make a move to another part of their district, which ranges from the higher waters of the Chapari to the foot of the hills of San Antonio and Espiritu Santo on the road to Cochabamba.

TRADE VIÂ CONI.—NEW PORT FOR THE NAVIGATION COMPANY.

At this place I found a Corregidor and one or two traders, who had

come down from Cochabamba, either to receive the departmental tolls on the traffic, or to receive their cargoes of cocoa, and ship the return loads of wheaten flour or salt. There were about 200 mules in all waiting at Coni, the cargo for each one being 8 Bolivian arrobas, or about two cwt. During the five or six months that this trade is open, more than 1000 cargoes, of 8 arrobas each, are received from Cochabamba in salt or flour, while a similar quantity of cocoa or leather and tiger skins is returned, and this trade is carried on under every possible difficulty of miserable roads, and defective means of navigation.

Coni is about 950 feet above sea level, and has a delightful climate ; while the vegetation is not of that dense and rank nature found on the main portions of the Amazon and Madeira rivers, so that ague and fever is very little if at all known. The Navigation Company will have to set up a port and clearing at the small Indian village of Chimoré on the river of the same name, and then the present port of Coni will be abandoned.

V.—BOLIVIA—CONI TO COCHABAMBA—COCHABAMBA TO SUCRE.

START FROM CONI—UTILIZATION OF THE YURACARÉ INDIANS.

On the 9th of August I left Coni with five mules, an arriero, or mule driver, and also taking with me the Cacique, or headman and five boys of the Yuracaré Indians, who were useful on the road in carrying small packages, and with their bows and arrows shooting fish in the river, or game in the forest, so as to provide a repast at the halts at night. These Indians always volunteer to accompany a traveller of any note, and as it is well that they should always be disposed to especially assist anyone connected with the navigation or railway enterprises, I did all I could to keep them friendly, and believe that when operations are resumed, should it be intended to take men down to the works from Cochabamba, these Indians can be made very useful in clearing ground at the Chimoré port. and in taking the peons down to Trinidad, or even to Guajará Merim. They could also be utilized as guards against the few hostile tribes of the Mamoré, such as the Sirionos and the Chacobos, while, if properly managed, it might be possible to induce a hundred or two of them to locate themselves at the wooding stations necessary on the Mamoré, and referred to in the second chapter of this report. As these Indians

are more expert with their bows and arrows than the tribes of the lower Mamoré, their presence would effectually check the incursions of those savages that refuse to approach civilization in the slightest degree.

PACHIMOCO.

The first night's halt was made at one of their chacos, called Pachimoco, a single house where lives the Intendente of the tribe, the next in authority to the Cacique. Here I was well treated, the supplies of the chaco, such as yucas, maize, and plantains, being freely offered to me, while the centre of the hut was given up to me for my camp bed.

THE RIVER SAN ANTONIO—THE YUNGAS OF ESPIRITU SANTO.

On the second day we came to the River San Antonio, an affluent of the San Mateo, which is an affluent of the Chapari. This river, where we first crossed it, is about a mile in width, forming at this season an immense playa of water-worn stones, through which the river finds its way in shallow channels, whilst during the rains the whole is covered with a very turbulent and rapid stream. Having crossed the river, the track leaves the plains of the Mamoré and the Chapari and commences to enter upon the mountainous districts called the Yungas of Espiritu Santo. The track so far is but a path cut through the forest, and is in wet weather quite impassable, from the depth of the mud and the numerous holes in which mule and rider may easily come to grief; but over the hilly lands it has in former days been roughly paved after the fashion of old Spanish roads.

THE MOUNTAIN ROAD VERY BAD.

The third day we followed up the course of the San Antonio, descending into it several times and riding up and down the "cuestas," which are, perhaps, the roughest mountain paths I have yet ridden over, the zig-zags being of the shortest and steepest possible. These paths are, as is usual in mountain districts, much worn by the trampling of the mules, and the drainage of the rains which hollows them out, so that at times one appears to be riding between two walls of earth.

CRISTAL MAIO.

The third halt was made at a place called Cristal Maio, at an elevation of 1,920 feet above sea level. Here we came upon

the first settlements of Bolivians of the type found generally in the interior, such as Cochabambinos, Pazeños, and others. Planting "coca" is the only occupation of the settlers in this district, who are continually extending their clearings down the slopes of the hills towards the plains below.

THE COCA PLANT.

This plant is a small tree, allowed to grow to four or five feet in height, and planted in rows kept in excellent order. The leaves only are valuable, being collected carefully, dried in the sun, and then when pressed into seroons they fetch at Totora, the great coca depôt of the district, from 11 to 16 pesos the "sesta" of 22 lbs., or say 1s. 7d. to 2s. 4d. per lb.

USE OF THE COCA.

Without this stimulant, used largely in the interior of Bolivia and Peru, but unknown by, and apparently useless to, the Indian of the plains of the Mamoré, the Quichuan or Aymará Indian appears unable to exist, for it serves him on his long journeys with his mules or llamas in place of food or drink.

BEST DISTRICTS FOR THE GROWTH OF COCA.

The best districts for its production appear to be the eastern slopes of the northern hills of Bolivia, and a very large and valuable trade is carried on at most of the towns of the republic in this article.

CONTINUOUS RAINS.—ZINC ROOFED HOUSES.

There is said to be much rain in this district, the months of August and September alone being blessed with a few fine days. The houses, in view of this constant rain, are built with roofs of very steep pitch, at an angle of 60 degrees perhaps, whilst the settlers who can afford it have covered their houses with sheets of tin or zinc, brought at great expense from Cochabamba and the Pacific coast. The timbers used are extraordinarily heavy, in order that the frequent violent wind storms may not overturn the houses. A foundation wall of dry stone, raised 18 inches from the ground, is first placed, and on that a bed plate of hard timber dressed with the axe to 12 or 14 inches square, then uprights and wall plates to match complete the solid framing.

The fourth day's ride continued to be over very rough ground, the whole of the distance done being over a succession of "cuestas," which in places were actual staircases. At one moment one would ascend to 3,000 feet elevation, and then quickly down to 2,500, and even 2,000, the road being dug out of the side of the rock, just wide enough to allow of the passage of one mule with its burden.

GOLD AT MINAS MAIO.

At a place called Minas Maio, there is a tradition that gold has been found in the sands of the ravine, and at Espiritu Santo the river bed was full of quartz stones, from which I selected a few that have since been declared by a geological authority to have come from gold bearing reefs.

METALLIFEROUS CHARACTER OF THE DISTRICT.

There is also much ironstone of a shaley character in some of the ravines; copper pyrites also abound in some of the quartz stones in the rivers, and there is no doubt that the region is highly metalliferous, and will well repay explorers when the improved navigation of the Mamoré shall have caused the amelioration of the present bad roads of the district.

"EL CHACO."

The fourth night was passed at a house called "El Chaco," 3,250 feet above sea level. The settlers appear only to produce provisions sufficient for their own use, and I found it impossible to purchase even a fowl or a few eggs at any price, so that had I not taken a small supply of "charqui" and tinned meats with me, I should have passed a bad time on this part of the road.

FORAGE OF THE DISTRICT.

A grass called "saracachi" is grown for the mules, and is, I believe, peculiar to the district; it grows in bunches, and is cut off at the ground, leaving the roots, which soon afford another growth.

COFFEE GROWN.

Coffee of a very superior class grows here, but does not appear to be cultivated largely, owing, doubtless, to the greater profits yielded by the coca.

WAGES OF PEONS.

The labourers or peons are all of the Quichuan race, and earn 4 reales, say 1s. 7d., per day and their rations.

The mountains at "El Chaco" rise on either side of the river to a height of probably 6,000 or 7,000 feet, their tops, generally in the clouds, being clothed with forest.

LANDSLIP AT LINA TAMBO.

The fifth days' ride was from "El Chaco" over the *cuesta* of Lina Tambo, the summit of which was 6,150 feet above sea level. There had been a tremendous landslip, the path having been covered up for more than a mile in length, a distance that had to be traversed in drenching rain over the debris of the mountain side. After passing the summit we crossed a river called the San Jacinto (another affluent of the Chapari and Chimore system) over a bridge of rough timbers spanning perhaps 60 feet, with dry stone abutments and timber longitudinals. The fifth night was passed at a "pascana" or resting place by the road side, we having failed to reach any habitation.

TOLL AT LOS JOCOTALES.

On the sixth day we passed a few houses called "Los Jocotales," where a toll of 2 reales, 9½ pence is collected upon all cargoes of merchandize carried by mules or donkeys, but the traders complain bitterly of having to pay tolls on a road that is so little cared for as this is.

INCA CORRAL.

We then passed over a very high ridge, on the summit of which the Aneroid marked nearly 8,000 feet above sea level, and the night was passed in a small hut at Inca Corral, a wide valley, at an elevation of 7,715 feet, and running nearly N. and S., down which the wind blew with searching force, the thermometer at night sinking to 39½° Fahrenheit. The country at this height is open, the few trees being quite stunted and covered with mosses and lichens. Maize of a very large size and very sweet is grown, also barley and potatoes, while a root called "Yacunes," somewhat like a small yellow carrot, is eaten raw and esteemed a great delicacy by the few cotters who live here to tend the cattle which are in fair numbers.

FROST AT NIGHT.—CUESTA DE MALAGA, THE HIGHEST PASS.

Rising early in the seventh morning, the grass was covered with hoar frost and the cold extreme. Proceeding up the valley or raised plateau of Inca Corral we soon began the ascent of the Cuesta de Malaga, the highest and last before reaching Cochabamba, and really on the dividing ridge of the watersheds of the Mamoré and Rio Grande systems. On this ascent all trees stop at about 10,800 feet elevation, while the still higher tops of the mountains had snow in their crevices. I was told that in 1873 a snow-storm in August filled up the pass, and that an arriero and his "recua," or drove of mules, perished in the drift, a cross on the pathway attesting the fact. The summit of the pass I made to be 12,550 feet, and soon after passing it we came to cultivated lands and some isolated huts.

BARLEY AND POTATOES.

Barley and potatoes are the only products, the soil being very barren and full of stones. No trees are visible, and only a rough long grass from which a few sheep and oxen find sustenance.

TOTAL CHANGE IN THE APPEARANCE OF NATURE.

From this point onwards into Bolivia the face of nature seems entirely changed, the luxurious tropical vegetation of the plains being left behind, and the stony barren hills of the Andes, with their occasional irrigated valleys, entered upon.

COCHI-JANCHI.

About 5 p.m. of the seventh day we got to the village of Cochi-Janchi, at 10,950 feet above sea level, a village of mud or adobe houses, which, from the absence of any trees, look very dreary. The people, however, must be very laborious as the hills are much cultivated, some up to their summits of probably 12,500 or 13,000 feet elevation.

POTATOES SENT TO COCHABAMBA.

The village has a church and probably fifty or sixty scattered farms, and supplies Cochabamba with potatoes, in which a large trade appears to be done, both in fresh fruit and preserved, called "chuño," which is really nothing more than a frozen potatoe and a most horrid sub-

stitute for the real article. In this state, however, it is said to keep for any length of time, and forms the staple article of food with the Quichuan Indian.

ROAD TO CONI BY BANDIOLA.

From the village there is another track that leads to Coni by passing through a district called Bandiola to the east of Espiritu Santu, but that track also has to pass the ridge of Malaga, and I was credibly informed that the *cuestas* in that direction are far more severe than those over which I travelled, and as my Yuracaré Indians refused to return to their homes by the Bandiola road, I think it may be agreed that it is not a practicable one. The Malaga *cuesta*, although rising to a great height was not very steep, the ascent and descent being so gradual that I did not once have to dismount from my mule in going over it.

On the eighth day, leaving Cochi-Janchi in the morning, we passed another *cuesta*, whose summit was only 600 feet lower than that of Malaga, and passing several villages came about midday to the pueblo of Sacaba, a considerable town about four leagues from Cochabamba.

SACABA.

From Sacaba the shortest road to Cochabamba is over a ridge of hills that stretch out into the plain where the city stands, but the animals being very tired and footsore we made the detour round the hills arriving at the town at dusk.

COCHABAMBA.

Cochabamba, probably the most important town of the Republic of Bolivia, is situated in a plain 8,450 feet above sea level, overlooked by the snow-clad heights of Tunari and Larati. The town is well built, with regular streets, a handsome Cathedral and other public buildings.

AGRICULTURAL PRODUCTS.

The population probably is about 50,000; the greater portion of whom are engaged in agriculture, for Cochabamba may certainly claim to be the agricultural capital of Bolivia, whilst La Paz may be termed the mineral capital. Large stores of flour, maize, corn, barley, potatoes, fruits of all kinds such as apples, pears, apricots and strawberries are forwarded from Cochabamba to the central towns of the Republic.

COMMERCIAL FIRMS.

Here there are three German houses of considerable wealth and position, and the American firm of Haviland and Keay who are contractors for public works, and for the coaches that run to Arani through the valley of Cliza.

MINERAL WEALTH OF THE DISTRICT.

Very little if anything has been done in mining in the neighbourhood of Cochabamba, owing to its still greater distance from the coast than Potosí, Oruro, or many of the other mineral towns of Bolivia but I am sure that there is immense wealth in minerals in all the hills encircling the plain in which the city stands, and samples of manganese, silver and lead ore that I have brought from the outcrop of lodes in the district attest the fact.

CLIMATE.

The climate of Cochabamba may I think be classed amongst the finest of the world, it enjoying an almost perpetual summer, whilst the nights are pleasantly cool and strengthening to constitutions depressed by the humid heat of the Madeira and Amazon valleys.

FEELING OF PUBLIC OPINION ON THE ENTERPRISE.

From my reception in Cochabamba it is evident that all classes and shades of political opinion are, notwithstanding the disappointment caused by the abandonment by the Public Works Company of its contract, resolved to do all possible to assist the enterprise to completion. Cochabamba sees in it, its only hope of emancipating itself from the heavy costs and charges levied upon all its European necessities by the merchants of La Paz and the Pacific Coast, and also its only hope of securing an outlet for those abundant agricultural products that now are lost for want of customers.

INTERVIEW WITH THE MUNICIPALITY.

The Municipal Council invited me to a special session and requested me to give them information upon certain points that were in doubt with reference to the future prospects of the enterprise, and also as to the supposed difficulties of construction of the railway and the unhealthiness of the climate.

ADDRESS SENT TO CONGRESS BY THE MUNICIPALITY.

The remarks that I addressed to the Municipality being satisfactory it was decided that a note should be sent to the Secretaries of the Congress sitting in Sucre, praying the Congress to take the question of continuance of support to the enterprise into early consideration and praying that a favourable solution might be given to the matter, whilst all the Deputies from the Cochabamba district, some twelve in number, received special instructions to vote in favour of and to protect the enterprise.

WHY POPULAR MEETINGS WERE NOT HELD.

Public meetings in favour of the enterprise would have been organised during my stay, had it not been feared that they might give rise to some political manifestations of disapproval of the acts of the Government in their interpretation of the decree of November, 1873, and as party spirit was very much excited amongst Government supporters or "Rojos," Quevedistas and Corralistas, it was thought advisable not to make the Company's affairs a vehicle for political disturbances.

LABOUR OBTAINABLE.

With reference to the prospect of obtaining labourers from this district I think that at least a thousand good workmen might be obtained from the valleys of Cochabamba, Cliza and Arani; and notwithstanding the distrust left by the acts of the Public Works Company in returning peons without due payment for their loss of time suffered in a fruitless journey from Cochabamba to the Beni, or from Chiquitos to Santa Cruz, I had many applications from peons desirous of proceeding to the railway, while two well known contractors offered to enter into engagements for either subcontracts or for supplying labour for the works.

TOTORA ROUTE TO SUCRE DETERMINED UPON.

I determined to make my journey to Sucre by way of Arani and Totorá, in order to see the new cart road in course of construction between these places, and also at Totorá, to obtain all the information possible with reference to the advisability of a road from thence to the proposed new port on the Chimoré.

TARATA AND CLIZA.

Leaving Cochabamba on the 31st of August, in one of Messrs. Haviland and Keay's coaches, we were soon in the pampas, and passed the towns of Tarata and Cliza, both populous and flourishing places. August being one of the dry months, the pampas were bare and dusty, but evidently in the spring and showery seasons large crops of barley, wheat, and maize are raised. The pampas are dotted over with the dome-shaped huts and houses of the Quichuan Indians, and from their being built in mud and stones, the country presents features similar to those of many of the plains of Central India.

PUNATA.

The first night was passed at Punata, a town with about 16,000 inhabitants, and a place of considerable trade in cereals, felt hats, and ponchos made from vicunha and other wools. Here I was introduced to a Señor Manuel Arauco, who is the principal man of the place, and was most hospitably received by him. He has a most interesting museum of products of the province of which he is a native, and showed me some excellently tanned specimens of leather; also various dyestuffs and drugs collected in the forests of the hills which border on the plains of the Beni.

EXPORTABLE PRODUCTS OF THE PROVINCE.

Amongst other articles I noticed and brought away small samples of *brasileto* wood, *campeachy*, a root which might be utilised as a purple dye instead of *Orchella* weed also turmeric collected near Santa Cruz, and called "*coorcama*" in the district. As this article commands a large sale in Europe, at about £30 a ton, it might with great advantage be made an article of export, *via* the railway of the rapids. Señor Arauco, who is a most talented man, spoke with great enthusiasm of the benefits to accrue to the eastern provinces of Bolivia from the completion of the railway and navigation schemes.

ARANI.—LAGOONS NEAR VACAS.—IRRIGATION WORKS.

Leaving Punata, the road passes through Arani, a small town at the end of the pampa, and then commences to ascend the hills leading to Vacas and Totora. Near Vacas are the lagoons from which it is proposed to take water for the irrigation of the pampas of the Cliza

valley. The lagoons are three in number, the largest being about $1\frac{1}{2}$ leagues in length by half a league in breadth. The works, which have been carried out by Messrs. Haviland and Keay, of Cochabamba, for Mr. Meiggs, of Lima, are now in abeyance, and it was supposed that they would be abandoned, the reason being that it was surmised, that if the channel cut from the lagoons to the pampas were opened, the lagoons would drain dry in about four years, and that no return for the capital spent (about £50,000) would be obtained. I think it may be considered that the lagoons are only drainage deposits from the surrounding hills, which attain altitudes of 14 or 15,000 feet, the lakes themselves being about 9,500 feet above sea level, while the pampas to be irrigated are at an altitude of nearly 9,000 feet. There are no rivers to empty themselves into the lagoons, and there is only the drainage of the hills during the rainy season to depend upon. Some authorities aver that the lagoons are supplied by springs, while others think that they are decreasing yearly in size; and it is probable that they are parallels on a small scale of Lake Titicaca, in the north-western corner of Bolivia, or of the Lake of Valencia, in Venezuela—lakes that are known to be decreasing yearly, from extended agriculture, and in the case of Lake Valencia denudation of forests. If irrigation could be taken to the pampa lands of the Cliza valley, they would, perhaps, become the richest agricultural plains in the world, as their climate, owing to the considerable elevation, is suitable for the production of almost any cereal.

PATH FROM VACAS TO THE RIVER CHIMORÉ.

Vacas is a small Indian village of no other interest than that it is said, that from there exists a path that leads to the Chimoré and Coni rivers, and its position on the map would lead to the belief that it is favourably situated for explorations to these rivers.

NEW ROAD BETWEEN ARANI AND TOTORA.—PAY OF LABOURERS.

The road from Arani to Totora has been made without any engineering help, and consequently the grades are very uncertain, and the routes taken might in many cases have been improved upon. Notably one part of the road, about two leagues before arriving at Pocona, has been taken over a ridge, the descent from which is accomplished by a zig-zag of 3 inclines of possibly 1 in 6 at least, while the road might have been taken up a quebrada, and the abrupt descent avoided by a continuous grade of perhaps 1 in 25. However, consi-

derable work has been undertaken and some of the cuts are of great depth, one point of rock and earth being cut to 50 feet depth ; on the whole the work reflects great credit on the contractor Señor Demetrio Jordan, of Cochabamba, and is the first road undertaken in the republic by a Bolivian contractor. The tools in use by the peons were of the most miserable description, and considering this, it is clear that the Quichuan Indians may be made very fair navvies ; their daily wage on the road was 4 reals, or say 1s. 7d., without provisions.

POCONA AND TOTORA.—PROPOSED ROAD FROM THE RIVER CHIMORÉ TO TOTORA.—INTERNAL SYSTEM OF RAILWAYS FOR BOLIVIA INITIATED.

Pocona is but a small village, but the next town arrived at, Totorá, has about 15,000 inhabitants, and possesses considerable trade principally in coca, it being the chief emporium in eastern Bolivia for that article. Coffee, flour, sugar and potatoes are also articles of export, while foreign merchandize finds its way here from Sucre and Santa Cruz, numerous droves or "recuas" of mules and donkeys being met with between Totorá and Sucre. I took a good deal of information in Totorá with reference to roads to the head waters of the Chimoré, and was introduced to two of the principal men of the place, Don Eugenio Soriano and Don Saturnino Vela. These gentlemen are owners of cocales or plantations of "coca" in the hills which form the watersheds of the affluents of the Mamoré and of those of the Rio Grande. Señor Soriano has made a track from Totorá to Arepucho where his cocales are situated and is now cutting a further track from Arepucho to the Chimoré ; he is confident a much better road is found *viâ* Arepucho than by Espiritu Santo and the Yungas of San Antonio, and gives me the distances as follows : Totorá to Arepucho, 14 leagues, and Arepucho to the Chimoré 12 leagues, total 26. The road from Cochabamba to Coni *viâ* Espiritu Santo is 44 leagues. If a road by Arepucho and Totorá is made the 26 leagues can be easily done in three days, and from Totorá to Cochabamba, the road being good, can be done in two days, making five days in all, the last day of which can be done in coach from Arani. The Espiritu Santo route cannot be got over in less than seven days, and the road is not susceptible of much improvement, while the wide crossing of the River San Antonio renders the route almost impracticable for general traffic. I therefore conclude that our efforts should be directed to making a road from the Chimoré *viâ* Arepucho to Bacas or Totorá, this

latter place having the advantage of being a good starting point for a road to Sucre as well as to Cochabamba and Oruro. Thus a future would be prepared for an internal system of railways for the eastern part of the republic, in communication with the Madeira and Mamoré Railway.

FROM TOTORA TO MISQUE—MISQUE.—AIQUILE.

The height of Totorá is about 10,000 feet, and the road rises slightly on leaving the town, then crosses a large plain about 500 feet below the Totorá hills, then rises very sharply to 11,500 feet and descending a very steep and bad "cuesta" gets to a quebrada, up which the road for Misque is taken. Misque is an old cathedral town, once of considerable importance, but of late years much abandoned on account of the ague fever that is said to be prevalent there. It is in a beautiful plain 7,000 feet above sea level, and as irrigation is carried on to a great extent, the fields and feeding grounds were in very fine order. From Misque to Aiquile, the road taken up a wide and almost dry river bed is fairly level, the greatest altitude passed over this section being about 9,000 feet. Aiquile, the next town of importance, is a thriving place of about 4,000 inhabitants, from this place a road branches off for Santa Cruz. Aiquile seems a very healthy town, and many people have of late years moved to it from Misque; its elevation above sea level is 7,850 feet; its trade seems to be entirely in agricultural products.

SUGAR CANE AT QUIROGA.

Chinguri, Quiroga, and Palca are the next villages passed through; they are unimportant and call for no remark, other than at Quiroga, about 7,000 feet above sea level, there are several very large and fine cañaverales, or fields of sugar cane, small in height and of slender growth, but said to yield good produce. Cultivation was well carried on there, considerable work in aqueducts, channels, and other irrigation requirements being carried out.

THE "RIO GRANDE."

About six leagues from Quiroga we entered on the "Rio Grande," flowing between two ranges of hills, on either side of which a road might, with considerable ease, be made. The track now crosses the river about seven times, and then comes to a bridge now broken down entirely; the stone abutments of very inferior masonry are, however,

still standing. The roadway was, I am told, a suspension affair, which, being hung with too great a sag, was soon washed away. The river offers great facilities at the site for a span of a hundred feet, as two points of rock jut out from the main hills on either side, giving good foundations for the abutments. The Rio Grande, therefore, does not offer any very great obstacle to the construction of a good road to Sucre. In the rainy season, when the river is full, a "balsa," or raft, lower down the river than the old bridge, forms at present the means of communication.

FLOUR MILL AT CANTO MOLINO.

After leaving Palca, the short but sharp "cuesta" of the "Jaboncillo," so called from the greasy nature of the earth, a kind of clay slate, has to be surmounted. The next, called "Masa-cruz," rises to an elevation of 8,550 feet above sea level, and on the Sucre side falls 1,350 feet in about a couple of miles. At the foot of this hill, at the junction point of three large ravines, is a flour-mill, called "Canto Molino," where most of the wheat and maize grown in the Cochabamba district is sent for grinding. The power used is water, the machinery an old-fashioned vertical wheel, while grind-stones of fair diameter and hard grit are found in the neighbouring hills.

THERMAL SPRING AT HUATA.—FIRST VIEW OF SUCRE.

From Canto Molino the road continues up a ravine of from two to three hundred yards in width, with hilly country on either side, which offers good sidelong ground for a road, but here, as is usual throughout Bolivia, the road is taken up the bed of the river, which, from being dry for the greater part of the year, offers a ready-made road good enough for animal traffic. At Huata, in this ravine, there is a bathing establishment at a thermal spring, much used by the residents of Sucre. Beyond this village there is a very sharp cuesta, which rises to 10,000 feet above sea level, and shortly after surmounting the crest of the hill, one comes in sight of the capital of Bolivia, "Sucre," or "Chuquisaca," as it is called in the Quichuan tongue. The first appearance of the town is very pleasing, from the number of churches, convents, and other large public buildings, but the country round is very bare and dull looking, water being very scarce and only to be met with in the bottom of the deep ravines.

VI.—SUCRE.

ARRIVAL AT SUCRE.

On the eighth day from Cochabamba I arrived at Sucre, the time occupied usually in travelling between the two places being five to six days, the detour that I made by Totora being two days' journey longer than the route by the valley of San Pedro.

SUCRE.—PUBLIC BUILDINGS.—BAD MUNICIPAL ARRANGEMENTS.—
SMALL POX.

Sucre, although nominally the capital of Bolivia, is not the largest or most influential town of the republic, being surpassed in population, and consequently in commerce, both by Cochabamba and La Paz, while Potosí, once more populous than any of the three, has still nearly as many inhabitants as Sucre, which may be said to have a population of about 25,000. There are no manufactures and but little agriculture, so that the town owes its importance to its being the constitutional seat of government and the site of the principal universities and religious establishments of the country. The principal cathedral is dedicated to "Nuestra Señora de Guadalupe," and the Archbishopric of La Plata, with the see of Chuquisaca for head-quarters, once had jurisdiction over all the ecclesiastical dignities of Southern South America. There is a palace for the President, a Hall of Congress, and some imposing-looking structures amongst the colleges, convents, and other public buildings; whilst the streets and squares being broad and fairly well paved, the town has altogether a very decent appearance, although it is to be regretted that the sanitary arrangements of the Municipality should in this city, as well as in all the other principal towns of Bolivia, be conspicuous for, and remarkable solely from, their absence. For this reason it is that small pox hangs for such long periods of time about these cities, and kills yearly large numbers of the Indian population, who, averse to vaccination in ignorance of its benefits, fall easy victims to this terrible scourge of South American cities. Whilst I was in Sucre this plague was rife, my own servant boy, a Cruzeño, falling a victim.

DR. VELARDE—REPORT PRESENTED TO CONGRESS—ARTICLES
PUBLISHED IN NEWSPAPERS.

Here I met, for the first time, Dr. Juan Francisco Velarde, who had temporarily resigned his position as agent of the Navigation

Company in Bolivia, in order to represent the town of Santa Cruz in the Congress; he received me most enthusiastically and kindly. Dr. Velarde seemed to look upon my unadvised coming to Sucre as something almost providential, as he had begun to have serious misgivings as to the treatment the affairs of the enterprise would receive at the hands of Congress, owing to the active hostility of its enemies and the lukewarmness of its friends; the advent of a coadjutor was to him, therefore, an event of unparalleled importance. Finding that the question of the "Empresa Church," as the affairs of the Navigation and Railway Companies are universally spoken of throughout Bolivia, could not come to discussion in the Congress for some weeks, I applied myself to sounding the views of the deputies with reference to the enterprise, and informing the public generally of its views and aims. I also prepared a report upon the events that had transpired in connection with the railway since the letting of the contract in 1872, and had it printed for and delivered to the deputies in Congress. Dr. Velarde had, in the month of July previous to my arrival, prepared and published a most lucid and painstaking pamphlet concerning the affairs of the enterprise and the causes that had delayed its realization, but nevertheless the enemies of the railway continued to be very active; and as certain schemes which had for their object the carrying of Bolivian commerce by the waters of the River Paraguay to the Atlantic at Monte Video and Buenos Ayres, were being brought before the Congress by competing concessionaries, Dr. Velarde and I considered it necessary to keep the public instructed, by means of newspaper articles, in the condition of and the aims and objects of the "Empresa Church;" these articles we brought out in "La Cronica," an independent journal published in Sucre during the sittings of Congress.

NEW CONCESSIONS BEING APPLIED FOR IN CONGRESS—CARACOLAS AND MEJILLONES RAILWAY—LA PAZ AND LAKE TITICACA RAILWAY.

The schemes for which new concessions or renewal of old ones were being sought in the Congress of 1874, were mostly connected with the opening up of the eastern side of Bolivia. With regard to the Pacific side, the Concessionaire of the Caracolas and Mejillones Railway, Sr. Braun, asked for the payment of interest due on the bonds issued by the Bolivian Government for the construction of that railway, but failed to get any satisfactory resolution. Sr. Zara, the Concessionaire of the La Paz and Yungas Railway, of two feet gauge,

in the department of La Paz, sought for and I believe obtained from the Government a concession for an extension of that railway from La Paz to the Lake of Titicaca; this concession did not, however, come before the Congress, the Government appearing to have power to grant it without the necessity of an application to the Assembly.

SCHEMES FOR ROADS TO THE RIVER PARAGUAY—SEÑOR PARADIZ'S SCHEME.

The applications for concessions on the eastern side were four in number, all having for their object the construction of roads across the unknown territory which separates Bolivia from the River Paraguay. One scheme taken up in Sucre by a Señor Paradiz, obtained the recognition of concessions granted in 1853, for the construction of a road from Santa Cruz *via* Chiquitos to a port on the Paraguay River, to be called Port Vargas, situated about 180 miles below the Brazilian port of Curumbá, in the disputed territory of the Gran Chaco. The projector of this enterprise estimates that with about £60,000 he can complete his cart track, establish a rural colony at this port, and place two steamers, a schooner, and sundry lighters upon the river, and as he has secured the right to all duties that may be levied at the port for a period of eight years, he calculates that a profit of over 70 per cent. will be earned. His estimate of cost is, I think, far too low, and his chances of success are but small, as he has not been able to form his Company or obtain assistance in Buenos Ayres, for which town he started in December last from Sucre.

SEÑOR M. S. ARANA'S SCHEME.

The second scheme is propounded by Señor Miguel Suarez Arana, a Bolivian gentleman of good family. He proposes to construct two cart roads, one from Santa Cruz to an undefined port on the right bank of the River Paraguay, and the other from a town called Lagunillas, in the Cordillera, to the same port. The concessionaire asks for two-thirds of the duties to be created at the proposed port for a period of 40 years and seeks for tolls, premiums and other advantages. This proposal, however, did not come before the Congress, but was referred for settlement to the Government under special powers granted shortly before the Congress closed.

CAPTAIN GREENLEAF CILLEY'S SCHEME.

The third scheme is brought forward by Captain Greenleaf Cilley, a retired commander of the United States Navy, who proposes to

construct a railway from Santa Cruz to the territory of Otuquis on the upper waters of the river of the same name, an affluent of the River Paraguay. The length of this line would probably be not less than 300 miles, and Captain Greenleaf Cilley, estimating the cost of construction at £8,000 per mile, asked for a guarantee of 7 per cent on the expenditure, and for two leagues of land on either side of the line. But Bolivia is not reckless enough to promise a guarantee on such an enormous capital, and Captain Cilley had to strike the guarantee clauses out of his application. At the time I left Sucre the concession had not been granted even in this mutilated state, but was waiting for a report by the Council of State. Captain Cilley is the representative of the Vernet family of Buenos Ayres, who are descendants of the "Oliden" who received a concession of lands from Bolivia nearly fifty years ago. These lands are high and well suited for cultivation of coffee or cocoa, and Captain Cilley hopes to be able to attract emigration to them, if he can obtain the concession for the railway and funds wherewith to construct it.

SEÑOR REYES CARDONA'S SCHEME.

Sr. Reyes Cardona, for some time Minister to the Brazilian Court at Rio Janeiro, proposes a colossal scheme of railroads commencing at Bahia Negra on the Paraguay, crossing the deserts of Izozo to Santa Cruz, and from thence by Sucre on to La Paz. This vague scheme seemed to possess only one fixed idea, which was to seize the £600,000 deposited in the Bank of England for the construction of the Madeira and Mamoré Railway. In what part of the grand scheme of internal railways for Bolivia the fund was to be spent did not appear to be of much consequence, so that it was handed over to Sr Reyes Cardona, to be dealt with as his self-acknowledged "honour, talent and patriotism" should direct.

EFFECT OF NEW PROPOSALS UPON PUBLIC OPINION.

These various schemes tended to weaken public interest in the opening up of the trade route for Bolivia viâ the rapids of the Madeira and the River Amazon, and though the route of the Paraguay could never be at all antagonistic to that of the Amazon, some sections of the Bolivian public were glad to accept the delay in the construction of the Madeira and Mamoré Railway as an excuse for listening to new schemes and new interests.

THE BRAZILIAN MINISTER AT SUCRE ASSISTS THE ENTERPRISE.

The "Empresa Church" was, however, very fortunate in finding a staunch advocate and firm friend at Sucre, in the person of Sr. Lionel d'Alencar, the Minister of Brazil to the Republic of Bolivia. This gentleman whom I had the honour of knowing in 1868 at Caracas, he being then Chargé d'Affaires to the Republic of Venezuela, took a lively interest in forwarding the prospects of the enterprise by sending friendly communications to the Minister, Señor Mariano Baptista, expressing the great interest with which Brazil looked upon the Madeira and Mamoré Railway, and assuring the Minister of the desire of the Brazilian Government to assist Bolivia by offering the guarantee upon the extra capital, which it was known had been asked for at Rio Janeiro by the Company's agent there. Sr. d'Alencar also gave his opinion to the effect that Brazil would not look with any favour upon or assist schemes having for their object the carrying of Bolivian traffic by the River Paraguay to the Atlantic.

POLITICAL PARTIES.

Political parties in Bolivia spring up, change or die out according as some leading spirit rises up for a time and soon gives place to another and newer man, for politics in Bolivia cannot be defined in any other way than as purely personal.

QUEVEDISTAS.

The party once led by General Melgarejo, formerly President of the Republic, has now for its chief General Quintin Quevedo, whose followers are termed Quevedistas. To General Quevedo belongs the honour of having not only been the first to demonstrate practically the existence of a trade route for Bolivia by the Madeira and Amazon River, but also of having been the introducer of the grand idea to American enterprise.

THE POLITICAL CHARACTER GIVEN TO THE ENTERPRISE.

The "Empresa Church," therefore, at present, doubtless, has to struggle against the dislike inherent to it in the minds of supporters of other political parties in Bolivia, it being generally considered throughout Bolivia as a Quevedistic creation; and here I must do the party the honour due to it of saying that it has throughout the struggle loyally supported the enterprise.

CORRALISTAS.

Another party in Bolivia is termed that of the Corralistas, from its component followers acknowledging as their head Dr. Casimiro Corral, Minister of Home Government and Foreign Affairs in the Republic, under the presidency of General Morales. This party is a large and influential one, and its members, with the exception of some resident in La Paz, have always supported the various decrees that have been passed in favour of the construction of the Madeira and Mamoré Railway.

ROJOS OR BALLIVIANISTAS.

The third party in Bolivia is the one at present in power, and is headed now by Don Tomas Frias, the actual President of Bolivia. The terms "Rojos," or Reds, and "El partido Ballivian," are somewhat indiscriminately applied to this section of public opinion, which includes many independent members, as well as many of the supporters, and co-political religionists of the lately deceased President Don Adolfo Ballivian.

It is well known that Señor Ballivian returned to Bolivia from England in the year 1872, with a fixed resolve to crush the Madeira and Mamoré Railway and the National Bolivian Navigation Company; and, notwithstanding the failure of his project for a new loan proposed by him to the Congress of that year, the declared object of the new loan being principally the buying up of the old one, and the cancellation of the subventions to the enterprise, his more declared disciples in the "Rojo" party still perpetuate his idea, and endeavour in every way to throw obstacles in the path of the enterprise in its efforts to re-habilitate itself. The more independent members of this party do not, however, join in this blind policy of the Ballivianistas, and have afforded very valuable aid to the enterprise during the late discussions in Bolivia.

THE OPPONENTS OF THE ENTERPRISE DEFINED.

From this short review of the politics of Bolivia, it will be seen that the only opponents of the "Empresa Church" form but a small minority of the inhabitants of the Republic, and may be said to be extreme Ballivianistas, including such men as the Señores Aramayos, father and son, of whom more hereafter, and Señor Nicolas Acosta, at one time Secretary to General Narciso Campero

in the Legation to London. A few of the leading men of La Paz, whose hard-headed, restrictive notions still lead them to believe that the act of giving freedom and life to the eastern provinces of Bolivia will inevitably bring death to the western ones, have, from the inception of the enterprise, steadily opposed it, and, still consistent to their retrograde principles, continue to do so upon every possible opportunity.

INTERVIEWS WITH PRESIDENT FRIAS AND THE MINISTERS.

Shortly after my arrival interviews were granted me by the President, Sr. Frias, and the Ministers of Government and of Finance, Señores Baptista and Dalence, the result of these interviews being to convince me that the enterprise need not look for any active support from the present Government. In fact, I soon discovered that the policy of the Government of Bolivia was one of masterly inactivity, the Government being so fully occupied in maintaining its own power that it feared to bring on any question in Congress that might at all provoke discussion or create criticism of any of its acts. However, Señor Baptista, the most prominent member of the Government, assured me that the enterprise need not fear any opposition from his Government which would submit itself entirely to any instructions that might be furnished it by the Congress then sitting.

PROJECT OF A DECREE SUBMITTED TO CONGRESS.

The next step, therefore, was to formulate a project of law having reference to the affairs of the enterprise, and get it submitted to the approval of Congress. Señor Velarde, therefore, proposed the form of decree which was submitted to Congress on the 21st of September, having obtained the signatures of six other deputies in its favour. This project stipulated that the remainder of the 83 per cent. of the product of the loan of 1872 should continue to be applied to the construction of the Madeira and Mamoré Railway, that the Companies should give guarantees for the completion of the line, that the Government should consider the time for the completion of the road as extended to two years from the recommencement of the works, and should enter into negotiations with Brazil for the obtaining of the necessary favours with regard to the free navigation of the River Madeira and the freedom of the traffic from all taxation, as well as to solicit from Brazil its aid in the providing of further funds; that a permanent legation should be established in Lon-

don with powers to see to the proper inversion of the deposited fund and to put an end to all litigation, and that speedy provision should be made for a commencement of the collection of duties on all traffic coming into or going out of Bolivia by way of the Amazon. The project was passed to the Commissions of Finance and Industry for their report, but, owing to press of general business and the many sittings that the Commissions held before coming to a resolution on the subject, a whole month passed away, the reports on the project not being returned to Congress until the 19th of October.

CAUSES OF DELAY IN OBTAINING A HEARING IN CONGRESS.—OCTOBER ELECTION OF OFFICERS OF CONGRESS FAVOURABLE.

Questions as to the powers to be given to municipal authorities throughout the Republic, and disturbances in La Paz occupied the attention of Congress about this time so much that I feared the subject of the "Empresa Church" might get shelved altogether, but on the 9th of October new officers of Congress were elected, and a staunch supporter of the enterprise, Dr. Martin Lanza, of Cochabamba, was named President, whilst Señor Velarde was appointed as one of the Secretaries, while, to balance this favourable election, Señor Nicolas Acosta, the most active of our declared enemies, was named as co-secretary. This election of officers for the "mesa" or table of Congress served to prove that the friends of the enterprise were in a majority of at least two to one in the Assembly, and enabled Dr. Velarde to make sure of bringing the question of the railway to a hearing in Congress.

INTERVIEW WITH THE MINISTER OF FINANCE.

About the second week in October it became evident that the Commissions would report favourably on Dr. Velarde's project of law regarding the enterprise, and I called on the 13th on Dr. Dalence, the Minister of Finance, suggesting to him that, in view of the evident desire of the majority of the Bolivian public that the enterprise should be carried to completion, it would be advisable to forward instructions to the Financial Commissioners in London to cease obstructing the Company in its efforts to prosecute the work, and at least order them to delay all legal proceedings on their part until the wishes of Congress should be made known.

ORDERS SENT TO LONDON TO SUSPEND LEGAL PROCEEDINGS.

The Minister informed me that he would consult the President and

the Cabinet as to the desirability of adopting my suggestions ; and at a subsequent interview assured me that a letter had been sent to Messrs. Aramayo and Terrazas, ordering them to suspend all legal action. The letter of the Cabinet in Sucre, dated October 17th, 1874, and published in "The Official South American Gazette" for 2nd of February, is probably a correct copy of the instructions then sent to the Commissioners.

REPORT OF THE MAJORITY OF THE COMMISSIONS.—REPORT OF THE MINORITY.

The United Commissions of Industry and Finance comprised fourteen Members of Congress, and of these eleven signed a report favourable to the continuation of the enterprise. This report was most carefully drawn up, and successfully combating all the arguments of the opposition, offered for the acceptance of Congress a decree nearly similar to the project proposed by Dr. Velarde. The minority of three recapitulated all the accusations that have been brought against Colonel Church by the opponents of his enterprise, and proposed a short decree to the effect that as Colonel Church had not complied with the law of the 5th of November, the Government should, without loss of time, proceed to rescind the contracts, in conformity with the said law. This proposition was signed by the Deputy Nicolas Acosta before referred to, and by Deputies Luis F. Lanza and B. Villalva, of La Paz.

ADVERSE REPORTS BY THE BOLIVIAN CONSUL AT PARA, &c.— ADVERSE REPORTS REPLIED TO.

The Government, on the 23rd of October, published in their Official Gazette, "El Rejimen Legal," a letter received from a certain Dr. Benjamin Lens, who had in April, 1874, been sent down, *via* the Cachuelas, as Consul to Pará. This gentleman had probably left Bolivia with the idea of undertaking sub-contracts on the railway—a work for which he doubtless thought his position as Consul would highly recommend him, as he might, with his consular powers, be able to collect many of the Bolivian Indians on the Madeira River. He was, therefore, much disgusted at finding the works at a standstill, and addressed a communication to his Government, full of exaggerations and mis-statements, as to the condition of San Antonio, the materials and buildings there existent, and the conduct of the employés of the Railway Company. Dr. Lens, however, while villi-

fyng all those connected with the enterprise, could not help admitting the usefulness of the railway to his country, and stated to his Government his conviction that "it would be absurd to assert the uselessness of the scheme, because the probable growth of Bolivia, if the nineteen Cachuclas were overcome, is incontestible." He also stated that "the towns of the Beni, Santa Cruz, and Cochabamba call for the execution of the great work;" that "the track which had been made on one of the margins of the Madeira, proved that the railway could be completed in two or three years," and that "its incontestible benefits would amply remunerate Bolivia, by the encouragement of its commerce and the augmentation of its finances, without taking into account the increase of its industry, principally that of agriculture, its chief element of life." The Prefect of Trinidad also sent up a communication by one Señor Juan de Dios Molina, regarding the climate of San Antonio, and stating that on account of the death of the Chief Engineer sent there by the new contractors, the whole of the staff had been returned to London, and the place abandoned; while from Trinidad came another assault upon the enterprise, in the form of a petition by one Nazario Buitrago, for permission to seize the Company's property at the "Cerrito," near Exaltacion, declaring that the same was left without any care on the part of the Company's employés. To the first two of these attacks I replied in a report to the Government, dated the 28th of October, and Señor Velarde replying to the third one about the same time, the Government published our replies in the same official Gazette, thus removing in great measure the bad effects caused by the hostile communications.

TREATY WITH CHILI.

The settlement of boundaries with Chili came on for discussion about the middle of the month of October, and occupied Congress until the 7th November, being argued with much warmth by the opponents and supporters of the treaty concluded by the Government with the Chilean Minister Sr. Carlos Walker-Martinez. The final modifications of the Government treaty by the Assembly defined the northern Chilean boundary as the 24th degree of latitude, from the Pacific Coast to the highest points of the Andean range (excepting towns already under Bolivian Government, such as Antofagasta), and therefore reduces the Bolivian coast line to a still smaller extent than that afforded by the miserably small slip given to Bolivia at

the time of the partition of the Spanish Empire of South America into Republics.

THE MINISTRY ACCEPT THE REPORT OF THE MAJORITY OF THE COMMISSIONS.—DR. QUIJARRO PROPOSED AS NEW ENVOY TO LONDON.

Finding that our question now stood some chance of coming on for discussion, and seeing the evident probability that the decree proposed by the majority of the Commissions of Industry and Finance, would be accepted by a majority in Congress, Dr. Velarde and I thought it advisable to seek an interview with the Government, and again endeavour to induce the Ministers to declare openly in favour of the enterprise. On the 3rd November we had a satisfactory interview with Sr. Baptista, Minister for Home and Foreign Affairs, who assured us that the Government accepted the report and proposal of the majority of the Commissions, and would support the same in Congress. The Minister also said that the present Financial Commissioners, Messrs. Aramayo and Terrazas, would have to be recalled as the Government was convinced that the Companies could never work in harmony with those gentlemen. To that proposition Dr. Velarde and I cordially agreed, and took the first occasion to place the name of Dr. Antonio Quijarro before the Minister, as one most suitable in every way to bring the various matters in litigation between the Government and the Companies to an amicable adjustment. Dr. Quijarro was deputy for Cobija, and a staunch supporter of the policy of the Cabinet of Don Tomas Frias, but at same time a warm friend to the enterprise, and heartily desirous of aiding in the opening up of the commercial route for Bolivia, of the Amazon and Madeira Rivers.

DEBATE ON THE ENTERPRISE COMMENCED.—THE DEBATE ADJOURNED AND RESUMED.—SPEECH OF THE MINISTER OF FINANCE.

On the 7th of November, a Saturday, the Chilian question was finally disposed of, and the reports of the majority and minority of the Commissions of Finance and Industry regarding the "Empresa Church" were read to Congress, but no discussion took place until the following Monday, when, after the election of the President and Secretaries of Congress, who have to be re-elected monthly, Dr. Velarde opened the debate with great moderation and lucidity, shortly stating the necessity that had arisen that Congress should express

its views as to the necessity of removing the obstacles to progress that the Financial Commissioners had raised in London, and impressing upon the deputies, by the reading of copious extracts from scientific authorities, the advantages that would accrue to Bolivia from the establishment of communication between Bolivia and Europe *via* the Atlantic route. On the 10th, Dr. Velarde concluded his opening speech, and the opposition was commenced by Sr. Nicholas Acosta, who, making a violent and untruthful attack upon Colonel Church and all connected with the enterprise, begged the Deputies to decide that the enterprise should be put an end to at once and for ever. Dr. Miguel Rivas, Deputy for the Department of the Beni, and a supporter of Government, carried the debate over the 11th with an eloquent speech in favour of the project of the majority of the Commissions, Dr. Martin Lanza and Señor Enrique Borda, both of Cochabamba, also warmly supporting the enterprise. The debate was then adjourned to the 17th to allow for the election of a new Council of State, an operation that occupied the Congress for an entire week, owing to the excessively close balance of parties amongst the Deputies. On the 17th, General Quintin Quevedo ably defended Colonel Church against the accusations of Sr. Acosta, and Señores Sanjines and Navarro spoke in favour of the cancellation of the concessions to the enterprise, grounding their opposition principally upon the failure of the Public Works Company to fulfil their contract. Dr. Velarde replied to the arguments of the opponents, and the debate was again adjourned to the 19th, when Dr. Dalence, the Minister of Finance, being requested to attend and state to Congress the views of the Cabinet, said that the Government had thought it its duty to carry out the law of the 5th of November, 1873, by the nomination of Messrs. Aramayo and Terrazas as Financial Commissioners, and to support their action in London in consequence of their unfavourable reports as to the organization of the Companies, and the probability of the construction of the line, but that the Government were extremely desirous of seeing the Madeira and Mamoré Railway constructed, and was determined that not one penny of the deposited funds should be spent in any other object. The Government consequently considered that the project of law submitted by the majority of the Commissions should be adopted by the Congress. This speech of the Minister of Finance did the enterprise great good by determining the minds of many Deputies of the Ministerialist party, who had hitherto been in doubt as to the course that would be taken by the Government.

DR. QUIJARRO'S SPEECH—FIRST VOTING ON THE BILL—SECOND AND
THIRD READINGS.

The same day Dr. Antonio Quijarro, Deputy for Cobija, and one of the newly-elected Councillors of State, delivered an eloquent oration, embracing a complete *resumé* of the history of the enterprise which he had supported from its inception, and while deploring the delay and discredit that had occurred by reason of the default of the Public Works Company, Dr. Quijarro earnestly recommended the Assembly to vote for the decree presented by the majority of the Commissions, and prove thus to the world that Bolivia really was most desirous of emerging from her isolated position, and intended to uphold the proper fulfilment of the contracts she had made. The friends of the enterprise being determined that the project should be fully voted before the close of Congress, which was to take place on the 23rd of the month, called for a permanent session, and at 10 p.m. of the 19th the first voting was taken, only about eleven Deputies out of fifty-two present supporting the Opposition. On the 21st the Commissions of Finance and Industry met at 8 a.m. prior to the opening of Congress for the day, and agreed upon the final law that should be submitted for the second and third readings. These readings were quickly passed, a very feeble opposition being kept up by Señores Acosta, Sanjines and Mas, while Dr. Belisario Salinas, Deputy for La Paz and the Government candidate for the next Presidential term, spoke very favourably of the enterprise, and eulogized warmly the steadfastness displayed by Colonel Church in defending it against attacks from all sides.

BILL PASSED.

The proposal of the majority of the Commissions, which again declared the unaltered desire of the great majority of Bolivians to have the Madeira and Mamoré Railway constructed, then became law, except that it required sanction by the President of the Republic, who affixed his signature and promulgated the decree in due form on the 25th of November.

PUBLICATION IN SUCRE OF ADVERSE PAMPHLETS—OPPOSITION TO THE
ENTERPRISE BY F. AVELINO ARAMAYO.

During the days on which the debate was in progress the enemies of the enterprise were in full activity, and several adverse pamphlets appeared in Sucre, some employing fair argument as their weapon,

and some violent abuse and scurrility. One of the latter class, published by Señor F. Avelino Aramayo, son of Señor Aramayo, one of the Financial Commissioners in London, is entitled, "Bolivia y su Crédito Víctimas de la Especulación Church," or "Bolivia and her Credit Victims of the Church Speculation." This scurrilous sheet attacked Colonel Church in a most shameless manner, and contained all the erroneous arguments of the opponents of the enterprise, such as that the Public Works Company, Limited, was formed solely for the purpose of bringing out the loan of 1872, and other statements equally false. I replied to Señor Aramayo in the newspaper "La Cronica," already referred to, and exposed the fallacy of his arguments, while he, replying to me in another pamphlet, entitled, "Church y los suyos," or "Church and his Followers," boasts of the fact that the whole of the opposition to the enterprise had been created by himself when secretary to the deceased President Ballivian, who in 1873 was occupied for some time in London as Financial Commissioner of Bolivia. The younger Aramayo also acknowledges, in the pamphlet, that certain letters that appeared anonymously in the "Reforma," a newspaper of La Paz, in 1873, were written by him from London to President Ballivian, and states that he, by his representations of the mismanagement and "inconveniences" of the enterprise, induced his father (one of the present Financial Commissioners), General Campero (for some time Bolivian Minister to London), and Mr. Sampson, late city editor of the "Times," to believe that the "Empresa del Oriente," or enterprise of the East, was premature, and that the undertaking it would bring disastrous results to Bolivia. This Aramayo also carried his hostility to the extent of placing small handbills in the seats of the Deputies in Congress, insinuating that employes and others directly interested in the Company should not be allowed to vote in the project then before Congress with reference to the enterprise. This shaft had direct reference to Dr. Velarde, Deputy for Santa Cruz, and previously agent for the Company, who had been specially sent to Congress by the Cruceños to protect and further the interests of the undertaking, but had also indirect reference to General Quintin Quevedo, who, Sr. Aramayo affirmed, was a director and shareholder, and to other Deputies who Sr. Aramayo ventured to hint had been bought over in the Company's interests. This uncalled for active opposition from the Aramayos, and the extremely vulgar style in which it was carried on, instead of damaging the Companies, had, I believe, an effect the reverse of the intended one, for it opened people's eyes to the fact that the desire of

the Aramayo family was to crush the Madeira and Mamoré Railway, in direct opposition to the wishes of the majority of the Bolivian nation, for the sole purposes of obtaining the manipulation of the fund deposited in the Bank of England, and maintaining the isolation of Bolivia from the contact of the civilizing power of steam navigation on its eastern rivers.

FURTHER REMARKS UPON THE OPPOSITION TO THE ENTERPRISE.

The result of the contest in the Congress was to convince me, after much investigation, that the opposition to the Madeira and Mamoré Railway is kept up by but a small minority of interested parties in Bolivia, and by some of the principal merchants of Tacna and La Paz, who see in the success of the railway a break up of the monopoly of trade with Bolivia that they have so long enjoyed, and a consequent probable diminution of their profits. The oppositionists in Bolivia may be divided into Aramayistas and Paceños, of which the first are clients of, or related to, the numerous family of Aramayos, who are to be found in almost all the western towns of Bolivia, but whose reputation, if one may credit the pamphlets published in 1866 and 1867 by the creditors of the bankrupt mining firm of Aramayo Brothers, is not of the most immaculate.

LA PAZ V. COCHABAMBA.

The Paceños are, as a rule, very jealous of the growth of Cochabamba, and of the importance that will accrue to that town from the opening of the railway, and some of the Deputies from the La Paz provinces having at the inception of the undertaking opposed it, think it necessary to be consistent to the last, and register annually their feeble protest against the inevitable opening up of the eastern plains and rivers of their country; but deputies Dr. Belisario Salinas, of La Paz, and Señores Roman and Merisalde, of the Yungas of La Paz, deserve to be mentioned as having emancipated themselves from these narrow ideas, preferring to assist in the general development and welfare of their country rather than restrain their efforts to the benefit only of their own immediate provinces.

SPEECHES AT CLOSE OF CONGRESS.

On the 25th of November the Congress was closed with speeches from the President of the Republic, Señor Don Tomas Frias, and the President of Congress, Dr. Serapio Reyes Ortiz, the latter of whom

congratulated the Assembly of 1874 upon "having dedicated the national resources, obtained upon credit, to place Bolivia in contact with the new world that is called the rich and exuberant valley of the Amazon." He also stated that "it was a matter of high consideration and satisfaction for the Assembly to hear from the speech of the President of the Republic, that that official, assuming rather the character of Prime Minister, had been, and would always be, anxious to show respect and homage to the majority of the Assembly, even at the sacrifice, should it be necessary, of his own opinion."

DEPARTURE FROM SUCRE DELAYED. FINAL INTERVIEW WITH THE
MINISTRY. CAUSES OF DELAY IN THE MISSION OF DR. QUIJARRO.
EXTRACT FROM LETTER RECEIVED FROM DR. QUIJARRO.

After the closing of Congress, I immediately determined to return home, taking with me an official copy of the decree passed, but found it impossible to obtain animals for the journey which I at first wished to make by way of La Paz, in order to afford the fullest possible information with reference to the position and prospects of the enterprise, to the newly-arrived Minister of the United States. The Ministry announced the intention of moving the seat of government temporarily to La Paz, in order to carry out some new arrangements proposed for the service of the custom houses of the coast; disorder in the battalion stationed at Cochabamba also took place, and these events rendered it almost impossible to hire or purchase animals for a journey. I was therefore detained until the 23rd of December when I was fortunate enough to get mules as far as Potosí, where I hoped to find postal mules for the prosecution of my journey to La Paz. Previous to my departure I had interviews with the principal Minister, Señor Baptista, who delivered me an official copy of the decree to be handed to Colonel Church, together with his assurances that Dr. Antonio Quijarro had been named the new Diplomatic Representative and Financial Commissioner in London, it being hoped that the Government would be able to dispatch him without loss of time. I was also informed by the Minister that it was the intention of the Government to seek a temporary loan from the merchants of Sucre and Potosí for the purpose of dispatching Dr. Quijarro on his mission, and several of these merchants assured me that they would be willing to respond to the request. The revolution now in progress broke out early in January, and doubtless has prevented the Government from carrying out their promises, for Dr.

Quijarro writes me from Sucre with date of the 20th of February last, saying that "the Minister Baptista had written to him from La Paz on the 12th of that month, to the effect that as soon as the pacification of Cochabamba was effected the Government would occupy itself in forwarding matters in London; and that he hoped that by one of the mails of March he would be able to send a final and satisfactory notice, for that it was clear, that the Government, whose prestige had increased by a victory over the united parties of Quevedistas and Corralistas, was firmly resolved to fulfil the wishes of the Assembly." These advices Dr. Quijarro requested me to participate to Colonel Church with his remembrances, and I am therefore convinced that Dr. Quijarro at his arrival will be found most anxious to co-operate cordially with the Companies in the prosecution of the railway and navigation enterprises.

SHORT REMARKS UPON THE FINANCES OF BOLIVIA.

A concluding paragraph of this division of my report may, perhaps, be advantageously devoted to a few remarks upon the financial position of Bolivia. Colonel Church, in his various papers notably that entitled "Bolivia and Brazil in the Amazon Valley," contributed to the "Fortnightly Review" of November, 1870, has so clearly and truthfully shown the vast undeveloped resources of the country that it would be superfluous for me to enlarge upon the subject of the "riches" of Bolivia, I would therefore limit myself to a consideration of its "poverty" from a financial point of view, the first and principal reason for which is without doubt its isolated position, which cannot be better described than by the words of, perhaps, the most talented Minister that Bolivia ever possessed, namely, Don Rafael Bustillo, who, to quote from Colonel Church's paper above referred to, wrote to the Brazilian Minister, in 1863, as follows:—"Bolivia, "as your Excellency knows, occupies a territory entirely central in "this vast continent. It has but five degrees of latitude on the "Pacific coast, and even this is disputed in part by the Republic of "Chili.* "Bolivia is seated upon the masses of silver of the "double range of the Andes. She has a territory fertile beyond "measure, where the treasures of the most opposite climates are "grouped together. With all this Bolivia perishes from consumption for want of methods of communication which may "carry to the markets of the world her valuable productions, and

* This five degrees has now been reduced to two and a-half, by the treaty offered to Chili by the late Congress of Bolivia.

“stimulate her sons to labour and industry.” The only certain means of ameliorating the poverty of Bolivia by the providing of a mode of transport for its at present useless riches, lie, in my opinion, on the eastern side of the Republic, for nature has declared that the route to Europe shall not be a western one : and the enterprise of the navigation of the Madeira and Amazon Rivers with the railway of the rapids, offers a more speedy and economic transit than can be afforded by any scheme having the River Paraguay for its basis. In regard to time the Madeira and Mamoré Railway can with ease dispatch its freights from the port of San Antonio to Europe in 28 days or possibly less, while the Paraguayan route from Bahia Negra to Europe will occupy at least 40. In reference to cost the Madeira and Mamoré Railway offers to carry a ton of freight from the centres of Bolivia to its market in Europe for £15, whilst the lowest estimate that I have seen for the Paraguay route was that of £26 per ton proposed in 1858 for the navigation of the Vermejo.

But another reason for the present financial poverty of the country is the absolute non-existence of any financial talent or even ordinary account keeping knowledge amongst the Ministers and officials in power of late years. The absence of any proper knowledge of national account keeping (for if the shortcomings of the officials of the Finance Department of Bolivia are not to be set down to want of knowledge, they must be charged to want of candour or straightforwardness) has been thoroughly exposed in the matter of the loan of 1872. In the financial accounts for 1873 the debt appears as 8,500,000 Bolivian dollars or £1,700,000, the correct nominal amount of the loan, and although no notice is taken of the operation of the sinking fund which by the end of 1873 had paid off a first drawing of £34,000, there is in the estimated outgoings of the Treasury a credit taken for the service of a loan of £2,000,000. The Government also allowed Sr. Aramayo to charge Colonel Church with having received £10,000 of the loan and devoted the sum to his own purposes, whilst it must have known that the whole amount was fully and faithfully accounted for. In the published national accounts for the year 1871 the government acknowledges the receipt of the amount, and the same Aramayo's name appears as a witness to President Ballivien's receipt for £5,000 of the amount, whilst the remaining £5,000 was paid directly to the Government by Messrs. Erlanger and Company, but no account is published of the mode in which this £10,000 was expended by the Government, who allow the idea to prevail in Bolivia that the sum was given to Colonel

Church by the Government of General Melgarejo. Further the officials of the Treasury persistently deny that they have received any accounts from the firm of Messrs. Lumb, Wanklyn and Company in respect to the disposal of the loan, whilst in the report of Señor Pedro Garcia, Financial Agent of the Republic in 1872, to the Minister of Finance and Industry, published in "La Paz" in September of the same year, appears an account of the firm showing the state of the accounts up to the 9th of May of that year, and it is well known that several copies of the final accounts have been duly forwarded to the Bolivian Government.

The national receipts that even at the time the country gained its independence amounted to $2\frac{1}{2}$ millions of hard dollars, in 1873 only reached the poor total of 2,566,034 Bolivian dollars, or say £513,207, whilst the Minister of Finance declares a requirement of 3,660,679 dollars, or say £732,135, thus showing a deficit of £218,928 without offering to Congress any plan for equalizing the national account, and it is a fact that in the Congress of 1874 not one proposal whether financial or political, except the treaty with Chili, emanated from the Ministry. In the Ministerial statement of the National Finances for 1874 one sees at a glance that there is no effort made to equalize income and expenditure; for not much more than £20,000 per annum is got from the Bolivian people by any kind of direct taxation. Customs rentals cannot be expected to increase until the Madeira and Mamoré Railway commences to create new entries on the eastern side, for Peru only can benefit by any growth of commerce on the western side, having stipulated with Bolivia that it shall only pay her £81,000 per annum out of the receipts of the port of Arica. It is certain, therefore, that direct taxation must be resorted to, and as there is no individual poverty visible in Bolivia, I cannot see any reason why the Government should not be able to show easily a fair balance-sheet which should meet the current wants of the nation, and provide honourably for the service of the public debt. A writer in "La Cronica" of Sucre, of October 23rd, 1874, after proposing the imposition of an Income Tax, a revised stamp act and a new mining code adds, "That such are the methods that "in his judgment should be taken in the then sitting Congress. The "country would not refuse its aid to avoid the national bankruptcy "imminent. In Europe confidence would be re-established, and re- "sources which the country requires for the regulation of its finances "would be obtained for the payment of the most onerous debts, the "recal of the bad money circulating and the opening of good roads

“between the principal cities, the effect of these measures being to raise Bolivia to the level of the civilization at its doors, and placing it in that high position which its natural riches and its central position amongst the nations of South America entitle it to.”

VII.—SUCRE TO LONDON.

START FROM SUCRE.—POTOSÍ.—MINES OF POTOSÍ.—MINT AT POTOSÍ.

Starting from Sucre on the 23rd of December, I arrived at Potosí on the evening of the 24th, and remained there until the 26th, partly on account of a slight attack of ague fever that I suffered from there, and partly waiting for postal mules to take me on the first stage of the road to Oruro. Potosí, once the largest and most populated town in Bolivia, is situated at about 13,200 feet above the level of the sea, and owes its importance to the famous “Cerro” or Hill which rises 2,300 feet above the town. This famous hill still gives occupation to a population of about 25,000, while the ruined portion of the city shows that but a few decades since a population of three or four times that number must have found a livelihood from the mining operations so easily carried on whilst the lodes could be worked without any special appliances. The deposit of silver ore in this hill may be said to be practically inexhaustible, for as soon as internal means of transport in Bolivia shall be sufficiently advanced to allow machinery to be brought to Potosí, the old levels and shafts can be again worked, as the entry of water to these workings has been the sole cause of the decline of the mining trade. At Potosí is the only steam engine and machinery to be found in Bolivia, a machine for coining having been at great expense taken there during the presidency of General Melgarejo. This machinery is made by Messrs. Morgan, Orr and Co., of Philadelphia, and is managed by American engineers and employés.

POTOSÍ TO URURO.

From Potosí to Oruro was a journey of seven days, performed by the aid of posting mules, the ordinary stages between each posting house being about five or six leagues. The postal service is fair, good baggage mules being kept, but a saddle mule is not to be

obtained at any price, an intending traveller must therefore provide an animal for his own especial use. This part of the road is excessively mountainous and barren, the only inhabitants being a few Quichuan Indians, who at each of the post stations grow a little barley and potatoes for their own wants, and for sale to travellers, asking exorbitant prices for their products, as much as twenty shillings being paid at times for a quintal, or 100 lbs. of barley in the straw. The town of Poopo, a day's ride prior to arriving at Oruro, is situated in the midst of several flourishing tin mines, and the whole district of Oruro is noted for its richness in this respect.

ORURO.—MINING OPERATIONS.—FREIGHT OF ORE FROM ORURO TO TACNA.—ORE TO BE CARRIED OVER THE MADEIRA AND MAMORÉ RAILWAY.—GOLD DISTRICTS NORTH OF LA PAZ AND COCHABAMBA.

Oruro, with a population of about 8,000, is especially famous for the mines of tin, copper and silver in its immediate neighbourhood. There are here several Englishmen and Americans engaged in mining, with as good results as can be expected to be obtained in the absence of other means of transport for the ore than llamas and donkeys. I brought home with me a small collection of minerals from this district, many of them containing as much as 10 per cent. of silver and from 40 to 50 per cent. of tin. The practice here is to pick from the stuff sent up from the shaft the best looking pieces only, the selecting being carried out by Indians who soon get very expert in the work. The selected mass is then broken up by hand into small chips, washed in order to rid it of as much of the earthy impurities as possible, and packed into small bags of 50 lbs. each, two of which form the burden of a llama. The freight paid for carriage to Tacna by llamas, the cheapest mode of transport that exists, is from 2 to 3 pesos per quintal, say £7. 5s. to £10. 15s. per ton. This rate is not very high, but the time occupied on the journey is very great, the principal house in Oruro assuring me that it often took twelve months before they could obtain a return from their investments in tin ore, or "barrilla," as it is there called. When the Madeira and Mamoré Railway is completed, and a fair road made from Totora to the port on the Chimoré, the existing road between Oruro and Cochabamba will be improved, and the whole of the mineral traffic of the central Andean Valley of Bolivia will doubtless find its way to European markets over the Amazon route, even before the finances of the

country shall have sufficiently improved to enable an interior system of railways to be commenced. There is no great difference in distance between Oruro and Tacna, and Oruro and the port on the Chimoré, but a journey with animals by the latter route offers far less risk, as pasturage is plentiful everywhere, and there is no danger of the animals dying from the effects of the "soroche," so fatal on the pass of Tacora, the highest point of the Andes, passed on the road from Oruro to the Pacific Coast. One of the English miners, a Mr. Penny, who works a flourishing mine about a mile from the city of Oruro, and who has been resident in Bolivia for more than twenty-five years having travelled over most parts of the Republic, informed me that he had paid particular attention to the country north of La Paz and Cochabamba, and that he considered that the richest gold quartz in Bolivia, if not in the world, would be found in the mountains of that district, for he was certain that all the rivers that discharge into the Beni or the Mamoré flow over gold-bearing quartz.

THE REVOLUTION.

Arriving at Oruro I found that the revolution which commenced early in December by a mutiny of the 3rd Battalion at Tarata, near Cochabamba, had extended to La Paz, where the 2nd Battalion had declared General Quintin Quevedo President of the Republic.

ROUTE BY LA PAZ ABANDONED.

The postal service between Oruro and La Paz was entirely disorganised, while the Government forces under General Hilarion Daza were on the road between the two towns, it was therefore impossible to prosecute my journey to La Paz, and I determined, after being detained at Oruro for a week purchasing animals, to take the straight road to Tacna by way of Tacora. During the week a night attack on the Government house and barracks of Oruro was made by a party in favour of the revolution, but after a smart fusilade, in which two of the soldiers defending the barracks were killed, the attacking force had to retire without having gained any advantage.

THE DESAGUADERO.

I left Oruro on the 9th of January, the first day's journey being ended at "La Barca," on the banks of the "Desaguadero," or

riverine canal which unites the lakes of Titicaca and Poopo or Choro. This canal has to be crossed on a pontoon or raft, kept in its course by a hide rope stretched from bank to bank, a distance of about 300 yards, the tolls being 1 reale, say $4\frac{1}{2}$ d. per mule, $\frac{1}{2}$ reale for a donkey, and five llamas are passed for a reale. As the traffic is considerable the ferry must be a fortune to the proprietor.

LLOLLIA.

A day was lost at Llollia, a small Indian settlement 24 leagues from Oruro, the mules having during the night escaped from the mud-walled enclosure in which they had been placed, and on the 13th we arrived at the village of Curahuara de Carangas, situated in a plain 12,890 feet above sea level.

CURAHUARA DE CARANGAS.

This is probably one of the oldest Spanish settlements of the Andes, the church being said to be more than 200 years old. Near by are mines of silver and tin, the ores being of rich quality, but they are not worked now, although the inhabitants of the place believe that the district will some day turn out to be a second Caracoles. Shortly after leaving Curahuara the track has to ascend a very steep and stony ascent leading to a vast plateau, 800 feet higher than that on which the village is situated, and from this plain rise the snow-covered peaks of Sahama and Las Tetillas, the former of which is said to rise to an elevation of 21,500 feet. Passing the postal stations of Chocos, Sepulturas, and Cosepilla, where provisions for travellers and forage for animals are scarce and excessively dear, barley in the straw costing £2 per quintal of 100 lbs., being rations for four animals for one night, we arrived at Tacora on the 16th, this being the first station in Peruvian territory.

PERU ENTERED AT TACORA.

At Tacora post-house the track for La Paz meets the one from Oruro, and a few leagues beyond takes over the pass of Tacora, probably 14,800 feet above sea level, and the highest elevation travelled over in crossing the Andes between Peru and Bolivia. At this pass the soroche is very fatal to animals, the path being bordered with bones and carcasses of the mules or donkeys that have succumbed to its fatal effects.

PROJECTED RAILWAY BETWEEN TACNA AND LA PAZ.

Descending the mountain on the western side, I observed the marks left by the surveyors of the Tacna and La Paz Railway, an undertaking that appeared to me to be an almost impossible one, not so much from the height ascended to, as from the enormous amount of earthwork that must be encountered in following the curves of the ravines, up which the line is to be taken. In Tacna I was informed that the surveys demonstrated the practicability of the line, and that the ascent would be made with gradients not exceeding 3 per cent., but estimates of cost of construction do not appear to be made public.

TACORA TO TACNA.

From the Tacora Pass to Tacna is a ride of a day and a half, principally down a narrow ravine, which would be barren were it not for the irrigation carried on at every available spot from the small supply of water at the bottom of the gulch.

NEW ROAD FROM TACNA TO LA PAZ.

A short distance from Palca, a postal station nine leagues from Tacna, we came upon the new road that is constructing to La Paz ; this will be a great improvement upon the old track, and proves that Peru is making every possible effort to keep her trade with Bolivia.

TACNA.

Tacna, where I arrived on the 18th of January, is situated in a broad and arid plain, to which water has been brought at great expense by an aqueduct, which, passing the hill of Tacora, leads a supply from the head waters of the river Maury, which flows from the eastern side of the Andes into the river Desaguadero of the central plain of Bolivia. This work has been carried out at very great expense, and does not yield a sufficient supply for the wants of Tacna and its vicinity. The commerce of Tacna is undoubtedly of very important character, but one sees at a glance that the only "raison d'être" of the city is owing to its being situated on the one exit practicable at present for Bolivia to the Pacific Coast. There are no Peruvian towns in communication with Tacna, and the long lines of mules and donkeys seen continually entering into or leaving the town, are all either destined for, or coming from, the neighbouring Republic of Bolivia.

ARICA.

Arica, the port of Tacna, is united to it by a railroad fairly constructed and decently maintained, the works of the line having been but slight. The country between the termini of the line is a barren desert. Arica suffered greatly from the earthquake and tidal wave of 1868, the disastrous effects of which are visible in the ruined portions of the town, and the hulls of vessels washed far inland; but the custom house and pier have been rebuilt, and the place is slowly recovering, although it is probable that it will never again enjoy its former importance, as the merchants of Tacna have reduced their establishments at Arica to the lowest possible point.

MESSRS. J. CAMPBELL & CO.

In passing Tacna and Arica it was impossible not to observe the hostility evinced by the only English firm of merchants there established, to the enterprise of the Madeira and Mamoré Railway. This firm, Messrs. John Campbell and Co., is in conjunction with and practically the same as Messrs. Hainsworth and Co., and Mr. John Hegan, of London. These firms own nearly all the stock of the Tacna and Arica railway, and in order to increase the value of that property have laid out a considerable amount of capital in projecting a railway from Tacna to La Paz, doubtless rightly judging that, as they hold the key to the coast in the Tacna and Arica railroad, they will be for years to come the masters of the position. The hostility of the firm of Messrs J. Campbell and Co. is thus probably accounted for, and I would do the general body of merchants of Tacna, comprising French and German establishments of considerable eminence, the justice to believe that they do not share the narrow views of the English firm, for some of the principals of the foreign houses alluded to evinced to me great interest in the progress and welfare of Colonel Church's enterprise, stating their opinion that as its realization would immensely assist the development of the internal resources of Bolivia, it must indirectly benefit instead of damage the Pacific trade and credit; for Bolivia offers a field sufficiently large for the introduction of capital and commercial intelligence on both sides of her at present isolated position: and from one of the German houses of Tacna I received every possible courtesy whilst I was denied any attention at all by the English firm, simply, I believe, because I belonged to Colonel Church's enterprise, for my letter of introduction from Sucre ought to have entitled me to a different reception than that I met with at the hands of the said firm.

TACNA TO PLYMOUTH.

Leaving Tacna on the 23rd of January, I embarked the same day on the Pacific Steam Navigation Company's steamship the "Lima," and the rest of my journey viâ Callao, Panamá, Aspinwall, Jamaica, and St. Thomas' requires no comment, it being terminated by arrival at Plymouth on the 1st of March.

VIII.—RESULTS TO BE EXPECTED FROM THE ENTERPRISE.

GENERAL ANTICIPATIONS OF RESULTS FROM ENTERPRISE.

It is not perhaps too much to say that the realization of the joint enterprises of the Madeira and Mamoré Railway, and the National Bolivian Navigation Company, will change the entire character of not only the eastern provinces of Bolivia, but also of the Republic itself, whilst at the same time the Brazilian provinces of Mato Grosso and the Amazonas will be most materially benefited.

I believe that I am correct in stating that a maxim of political economy is to measure the value of a nation, not so much by the amount of its mineral wealth, as by the development given to its agricultural resources, for the former source of national greatness must sooner or later decay, if due attention is not paid to the creation or fostering of the latter. It may, in the case of Bolivia, seem absurd to say that its mineral wealth can ever appreciably decrease, and certainly such an assertion or fear must to any one that has passed over the highly metalliferous districts of Potosi, Oruro, and the whole central plain of the country, appear entirely groundless, but the examples of California and Australia teach us that though mineral discoveries are the first cause of the creation, and the settlements of new countries, it is their agricultural development that causes them to take rank amongst the nations of the world; and this it is that Colonel Church's enterprises will do for Bolivia, for there can be no doubt but that their realization will place Bolivia in the foremost rank of the Republics of South America. No scheme that has for its object the opening up of the country on any other sides than its northern and eastern can effect this result, for there alone exist immense plains and tracts of country suitable for any kind of agriculture or cattle rearing. On the western side of the Republic the

barren and inaccessible heights of the Andes forbid any attempts at settling, while the southern and eastern territory of the Gran Chaco is a cheerless swamp, never capable of affording a home to other than the irreclaimable savage, or the wild animals of the fast decreasing forests of the continent.

Few, perhaps, are the enterprises that can offer to create and unfold such vast industries as those found in the districts, to be benefited by the opening of the Amazonian route to the interior of the continent; for as we descend in an eastward journey from the barren summits of the Andean Passes, we find that the railway will prove the outlet not only for the mineral riches of Bolivia, her wools, hides, and other animal products, the drugs, dyes, and other commercial values of her unexplored forests, but will also develop agricultures that already exist in considerable scale on the descending plateaux of her eastern plains. Commencing at altitudes of 12,000 feet to 9,000, barley and potatoes are grown; from 9,000 to 6,000, corn, potatoes, apples, pears, and all kinds of fruit; from 6,000 to 2,000, coffee, coca, cocoa, and plantains; while from 2,000 down to the plains of the Madeira and Amazon Valleys, cocoa, plantains, sugarcane, maize, mandioca and other yams, tobacco, and other tropical products grow luxuriantly.

Politically considered, the enterprise will be of vast benefit to Bolivia, for her population, naturally a laborious one, will find employment in the impetus given to commerce, and will consequently become less turbulent, the need of, or occasion for, revolutions decreasing commensurately with the interest that each one will find in their increasing prosperity. A bond of unity will also be created for Bolivia, with her powerful neighbour Brazil, she being thereby rendered more secure from the encroachments of the Republics of the Pacific seaboard.

The results, financially considered, will be that probably a trade equal, if not superior to that now carried on through the Peruvian towns of Tacna and Arica will be created on the eastern side of the Republic; and from the customs' receipts of this trade Bolivia would have far more than sufficient to keep up the service of, and rapidly pay off both her internal and external debts. Taking the year 1873 as a guide, we find that the imports through the port of Arica amounted to £1,422,369, and the exports to £860,607. Of these figures three-fourths of the imports, or £1,066,776, and £842,345 of the exports fairly belong to Bolivia, making a total of £1,909,121

Bolivian commerce that passes through Peru, whose duties may reasonably be averaged at 20 per cent. on the value of the trade, so that Bolivia annually affords Peru a rental of more than £381,000, out of which she magnanimously grants Bolivia a subsidy of £81,000. That Bolivian commerce is not decreasing is proved by the fact that the exports of Arica for 1874 exceeded by nearly a million hard dollars those of 1873.

Bolivia is generally supposed to have rather more than 2,750,000 inhabitants. The present Arica statistics, therefore, give something less than 14s. per head per annum, and it is not unreasonable to suppose that a similar amount of trade will soon be carried over the Madeira and Mamoré Railway. The loan of 1872 demands an annual service of £136,000, and figures that I have put together for paying off the other debts of the country would serve to show that another £120,000 per annum would release Bolivia from all its financial embarrassments. The total requirement of £256,000 would in a very few years be provided by the customs duties collected on the eastern route, for the amount is not equal to three-fourths of the duties now shown to be received by Peru from Bolivian commerce. Bolivia would still have the Peruvian subsidy, the profits received from sale of guano on the Pacific Coast, and her departmental rentals, for the general government expenses and the improvement of her internal means of communication. It is not, therefore, too much to say that the realization of the Madeira and Mamoré Railway may be made the means of materially changing and improving the present deplorable financial and political appearance of the Republic.

With regard to the profits to be realized by the railway from the traffic to be carried over it, I am prepared, after considerable investigation, to accept the figures given by Colonel Church in his "Preliminary Report made upon the Railway" in 1870, as sufficiently correct for a preliminary estimate, indeed there are many items of Bolivian produce omitted, which will doubtless find their way to the Amazon Valley, such as flour, barley and potatoes from Cochabamba, and wines and liquors from Cinti. In Colonel Church's estimate I would reduce the number of passengers looked for, but at same time the cost to the enterprise of their transportation is placed at such a high figure that I do not think the net returns will be at all decreased by the alteration. Also the cost of freight for a ton of goods over the railway is set at £1 which is at least 10/- more than it should ever amount to. Colonel Church's estimate of a net return from passenger and

freight traffic amounting to £108,040 may therefore be taken as the result that is likely to be arrived at within a short time after the opening of the line, and is sufficient to provide for a dividend of 10 per cent. upon the possible cost of the line: this dividend being as Colonel Church points out entirely apart from all traffic that will arise from the settlement of the lands under the grants of Brazil of 100 square leagues or 576,000 acres; 23,040 of which have been allotted at San Antonio to the Company by the commission appointed by the Imperial Government for the demarcation of lands in the Madeira Valley.

In the hope that my desire to afford the fullest possible information upon every point that has come under my notice, has not led me to incur the fault of having been too prolix, I have the honour to remain,

Gentlemen,

Your most obedient Servant,

E. D. MATHEWS,

Resident Engineer.

Assoc. Inst. C.E.

London, 19, Great Winchester Street,
May 31st, 1875.



