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AUSTRALIAN TRANS-CONTINENTAL RAILWAY.

DIARY OF JOURNEY

OF THE

TRANS-CONTINENTAL RAILWAY SURVEY EXPEDITION

FROM MITCHELL TO POINT PARKER, QUEENSLAND.

BY

MAJOR-GENERAL THE HON. W. FEILDING,

LEADER OF THE SURVEY EXPEDITION,

TOGETHER WITH INTRODUCTORY REMARKS

ALSO

THE PRELIMINARY REPORTS

OF

PROFESSOR ROBERT L. JACK,

GOVERNMENT GEOLOGIST,

ON THE GEOLOGICAL FEATURES OF PART OF THE DISTRICT TO BE TRAVERSED BY THE AUSTRALIAN TRANS-CONTINENTAL RAILWAY.

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AUSTRALIAN TRANS-CONTINENTAL RAILWAY SYNDICATE, LIMITED.

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AUSTRALIAN TRANS-CONTINENTAL RAILWAY.

INTRODUCTORY REMARKS.

The following pages contain the diary of General the Hon. W. Feilding, the leader of the Trans-Continental Railway Survey party during the journey from Mitchell—the proposed junction of the Trans-Continental line with the present Queensland system of railways, and also with the lines in course of construction from New South Wales, Victoria, and South Australia—to the proposed northern terminus at Point Parker on the Gulf of Carpentaria.

The importance of a great trunk line of railway across the Continent of Australia opening up the vast and fertile western territory of Queensland, and joining in one grand system of communication the extensive settled districts in South Australia, Victoria, New South Wales, and Queensland, and the several populous capitals on the south and eastern shores with the northern coast, has long met with the attention of colonial statesmen and men of enterprise and experience. The railways are already in course of completion to the borders of Queensland and from Brisbane to Mitchell.

Mr. Thomas Archer, the present acting agent-general for Queensland, a recognised authority and a gentleman of great experience in connection with the colonies, states in a pamphlet on the subject of the Trans-Continental Railway:—

"The two main trunk lines of railway at present existing in Queensland penetrate the interior from the ports of Brisbane and Rockhampton on the eastern seaboard. The line from Brisbane is constructed and opened as far west as Roma, 320 miles. An extension to the Maranoa River has already been approved by Parliament. From this point (the town of Mitchell) the Trans-Continental is supposed to commence, confining the name 'Trans-Continental' to that portion of the line which it is proposed to construct by the land grant system. From Mitchell the course of the line is westward 120 miles to the town of Charleville on the Warrego River, thence northerly 170 miles to some point on the Alice River, somewhat to the west of a line between Blackall and Aramac, where the main line will meet the central line from Rockhampton. From the Alice River the line will then pursue a north-westerly course to Point Parker, on the Gulf of Carpentaria. The total distance from Mitchell to Point Parker is 1,050 miles; the portion to be constructed by the Company to join the main line on to the central from Rockhampton may be taken at 100 miles, making the total length of the railway to be constructed in order to complete a through system between Point Parker and the two eastern points of Brisbane and Rockhampton, 1,150 miles.

"This system is, however, not a Queensland Trans-Continental line only. By continuing the line south from Charleville for 250 miles a junction is made at Fort Burke with the New South Wales Railways, thus securing a continuous line over some of the richest country in Australia, from the shores of the Gulf in the north to the cities of Sydney and Melbourne in the south. To anyone examining the map it must be apparent that this line, when opened, must become the high road from the southern colonies to Europe, India, and all the wealthy and populous countries on the Indian Ocean, China, and Japan."

The project of the Trans-Continental Railway took its first rise in a practical form, in negociations commenced in April, 1880, with the Premier of Queensland, who was then in

England, and on the basis of the propositions then made, he on his return to the colony introduced and got passed an Act of the Colonial Legislature on 18th November, 1880, called "The Railway Companies Preliminary Act," authorizing the Government to enter into contracts for the construction of railways, subject to ratification by the Legislature, and providing for the free grant of extensive areas of land along the route of the line.

The Premier revisited England in the beginning of the year 1881, and renewed these negociations, which resulted in a provisional agreement set forth in two letters, dated 20th April, 1881, between the acting Chairman and Solicitors of this Syndicate on the one hand, and the Premier on the other.

Arrangements were then made for the immediate despatch of a preliminary Survey Expedition, to superintend which Major-General Feilding, one of the Board, accompanied by an experienced English Railway Engineer, Mr. Robinson, C.E., proceeded to Queensland. The Colonial Government placed at their disposal the surveys and reports of Mr. Thomas Watson, C.E. (late Chief Engineer of the Government Railways in Victoria), who had previously examined the route which the proposed line should take—and in addition the personal services of the Government Geologist (Mr. Jack), a gentleman of high reputation, well known in this country.

The Survey Expedition left London for Queensland on the 3rd June, and arrived in Australia on the 18th July. The expedition was authorised to make all preliminary investigations and surveys, and to report on the country adjacent to the proposed route of the line and to negociate a definite contract with the Government on the basis of the provisional arrangements made with the Premier of the Colony under the Bill passed by the Legislature, with such variations as those investigations may show to be expedient.

In regard to the prospects of the Trans-Continental Railroad proving remunerative, the Agent-General for Queensland writes, in the pamphlet before referred to:—

"To enable us to form an estimate of the profits that may be expected to accrue to the capitalists undertaking the contract for the construction of the railway from Mitchell to the Gulf, on the system of land grants as proposed, it will be necessary to take, as a criterion to judge by, the results that have followed upon the construction of railways in the other colonies, notably those of New South Wales and Victoria, in increasing the population and trade of these colonies and enhancing the value of property generally, and particularly of that which is situated on the lines or within their influence. Taking this as a test, we find that the increase in the trade, population, and revenue of these colonies has been marvellous since railways have penetrated sufficiently into the interior to open up the great natural resources of the inland districts. But largely as these railways have contributed to the general prosperity of the colonies, it is as nothing in comparison with the immensely enhanced values of all property, but more especially of all lands situated on or near the lines since these were opened. In ordinary country lands the increase may safely be set down at 100 per cent., and in town and suburban lands at from three up to tenfold their value before the opening of the railways.

"But in making comparisons between the results that have followed the opening up of the lands of the other colonies, with those that may be expected to follow the process in northern Queensland, we are hardly doing justice to the latter—there is not a point of view from which the matter can be looked at that does not reveal very great advantages in favour of Queensland, and there is no advantage possessed by the other colonies that she does not participate in—for extent of territory she leaves New South Wales and Victoria far behind, as a glance at the map will show, and the concurrent testimony of many explorers and travellers in the interior proves beyond doubt that the proportion of available country, nearly all of which can be placed in the very first rank for richness and fertility, very far exceeds anything else that has yet been discovered in New Holland. The writer has travelled over

hundreds of miles of an almost unbroken succession of hills and plains composed of the richest soils, and yet he was only skirting the edge of country of similar character that is known to extend with scarcely a break to the sea on the north and the boundary of the colony on the west. A very large proportion of this immense territory is well adapted for agriculture, and the remainder is unsurpassed for pastoral purposes, an industry that has hitherto formed the mainstay of Australian prosperity, and which, with the aid of railways, may be developed to a hitherto undreamed of extent. The pastoral produce alone of this country when fully developed would furnish sufficient employment for a railway, and when to this are added the numerous other sources of profit that must inevitably follow the opening up of the country, I think it will be conceded that the proposed line will not lack abundant and profitable employment.

"The mineral region of the McKinlay ranges, near which it is proposed the line should pass, will alone, when opened up, furnish employment for a very large population. The accounts of the richness of the gold, copper, and iron deposits of this large and as yet only partially explored district, would be incredible if they were not borne out by the testimony of numbers of people, experts and others, who have seen what they describe, and other minerals will doubtless be discovered in this district when it is thoroughly explored by men of science. The frozen meat trade with England, which though now in its infancy, seems destined before long to assume large proportions, and for which the port on the Gulf must become the main outlet for northern Queensland, is another industry which will create much traffic and add largely to the value of pastoral and other property. The production of sugar, rice and other tropical crops, also bids fair to assume large dimensions in the country on the banks of the rivers falling into the Gulf, large tracts of which are eminently adapted for this industry; the rapid increase and profitable results of sugar planting on the eastern sea-board of Queens-

land are an earnest of the success that must follow the introduction of this industry in the Gulf districts.

"The construction of the railway will be greatly facilitated by the advantages offered by the line already finished from Brisbane to Roma, in the speedy and cheap conveyance of material for construction. This line has already surmounted all the engineering difficulties between Brisbane and the Gulf, so that there is literally nothing of that kind worth mention now left to overcome; and though at one place, in crossing the range which separates the southern rivers from those running to the Gulf, the elevation will be some 1,200 to 1,500 feet above the sea level, yet the ascent is so gradual as to be almost imperceptible, so that, when the summit is attained, it is difficult to say on which watershed one is or which way the country falls; long grassy slopes follow each other in apparently endless succession, and from the summit of each slope a view presents itself unsurpassed in attractiveness to the eye of the pastoralist. This elevated range of country, which extends some 200 miles east and west by a breadth of about 50, contains some of the finest pasture lands in Australia, the air is wonderfully pure and balmy and the winter nights are cold, the writer having frequently found icicles on his water-bag in the morning when camping out. With this exception the country to be traversed is nearly all level or gently undulating, the rivers where the line will cross them are small and easily bridged, and the timber required for construction can be procured from the large gums that fringe the water-courses of the interior, and from the timbered ranges which will be occasionally crossed or approached by the line. Coal of good quality, and easily worked, has been found at several places on the Brisbane-Roma line, and in many other districts; and there is no reason to doubt that further discoveries of this valuable mineral will be made when the inland districts are opened up to the researches of science. It must also be considered a very great advantage, that the line from Brisbane to Roma, and that from Gowrie Junction to the border of New South Wales, which will soon be

joined on to the railway system of that colony, have been in operation for a considerable time and have established a traffic of which the Trans-Continental will reap the full benefit from the first, a benefit that will be increasingly felt for every section that is opened for traffic as the line advances."

In a letter to the *Queenslander* of July 19th, 1879, Mr. Sheaffe (than whom a better authority on the Gulf country does not exist) says :—

"And here I may point out a peculiarity never observed by me or mentioned by others, as far as I know, as existing in any other part of Australia—the Mackinlay Ranges, teeming with an extraordinary wealth of minerals, are flanked for nearly 200 miles by high undulating downs of exceeding fertility, so that, on the one hand, you have almost boundless pasture, and, upon the other, almost inexhaustible mines. That I am justified in speaking of these mines as almost inexhaustible, I shall proceed to show. The first known copper mines approached by this route are the Mountain Home, the Rio Grande, and the West Briton, applied for some six or seven years ago by some Sydney capitalists, and of which Mr. W. Wellington, who was sent from England by Messrs. Bolitho and Sons, reported as follows :—'The principal lode is at Mount Norma, is a well-defined lode, varying from three feet to six feet wide, running north and south and dipping to the east. It stands in the face of an almost perpendicular mountain, showing from 400 to 500 yards. The ore is principally grey, of the following percentage, namely, 34. Thousands of tons could be taken away here at trifling expense. The Rio Grande lodes consist of two, running parallel, with a distance of about 250 yards between them. The out-crops show very distinctly on both these lodes for about 300 and 400 yards in length, consisting of red oxide and grey ores of the following percentage, namely, 44. These lodes appear to be running into the Mountain Home lode. The West Briton, also running north and south, is about a mile north-east of the Mountain Home, on the top of a small ridge, showing a large lode from

six feet to eight feet wide, chiefly red oxide and grey ore, of the following percentage, namely, 38. These lodes appear to be well defined and regular, all running north and south and dipping to the east. The cost of working these lodes will be very little for a long time to come, in consequence of the ore being so near the surface.'

"The line, after leaving these mines, would then pass near the gold reefs of Bishop's and Fisher's Creeks, where several auriferous claims are still working and paying, and where numberless other reefs are known to exist, but are at present not worked, owing to the great expense of getting machinery, and the difficulty and uncertainty of getting rations. Near this, also, the Homeward Bound and Flying Dutchman copper mines are situated, from the former of which 250 tons of ore have been sent to Sydney, all of which has yielded over 40 per cent. of pure copper. Twelve miles farther on, the Cloncurry Copper mines are reached, the richness and magnitude of which it is difficult to conceive without having seen them; and though I have known many skilled miners who have worked at, and several mining engineers of note (Mr. H. A. Thompson, the Chairman of the Mining Board of New South Wales, being one) who have inspected these mines, I have never known one who was not at first sight astonished at the almost incredible amount of rich ore lying on the surface of the ground. Half a mile to the south-west extremely rich and extensive lodes occur, while 30 miles to the north-west unnumbered lodes and copper bearing veins appear. I myself know of nearly 100, only eight or ten of which are secured, *and none worked.* Mr. Sheaffe enumerates several other marvellously rich deposits of copper, and again quotes Mr. Wellington's report:—'Eight miles to the north-west, on the Leichhardt River, are two lodes, containing ores of red oxide, grey, and malachite. These lodes are from 20 to 30 feet wide—immense deposits of copper. Big boulders of grey ore lying loose on the surface, of tons weight.' 'These things,' continues Mr. Sheaffe, 'I have seen, and shall be most happy

to show to anyone desirous of seeing them, when I return to the Cloncurry.' Thus, I think, I am justified in speaking of these mines as almost inexhaustible, and in my assertion that this district will find ample remunerative labour for tens of thousands of our miners, if only regular and moderately reasonable carriage, with its natural port, was provided. I am in no way exceeding what we have a right to expect. To sum up the results of such a line as I now advocate, we may safely assume as follows :

"1st.—That all the wool produced west of the Thompson, which in a few years' time, if carriage is provided, will amount to that obtained from 8,000,000 sheep, or fully 12,000 tons, will go by it; giving, at present railway charges, about £120,000 a year for wool alone.

"2nd.—That the up-carriage required for the pastoral occupants will amount to fully one-third of the above, or to £40,000 a year.

"3rd.—That the copper mines along the line will produce at least 25,000 tons (100,000 tons would, I think, be much nearer the mark), which, at £4 a ton, would give £100,000 a year.

"4th.—That the up-carriage required for the gold and copper miners may safely be estimated at £50,000 ; and

"5th.—That the passenger and general through traffic, together with the mails and other proceeds, will more than pay working expenses, thus leaving over £300,000 a year to pay interest on cost of construction, or as returns to the country at large for the acreage alienated to induce capitalists to undertake the scheme, with advantages to the whole of Australia at present quite incalculable."

The above estimate of traffic is merely quoted as the opinion of Mr. Sheaffe, a gentleman having large experience in regard to the territory to be served by the proposed railway. An official and detailed estimate of the traffic prospects is being prepared by General the Hon. W. Feilding, and will be printed with his final Reports when received.

From General Feilding's Diary and the Reports of Professor Jack it will be found that the favourable opinions previously formed are corroborated, and the conclusions arrived at by Mr. Thomas Archer substantiated and established:

"1.—That the line will possess an admirable terminus for a great trade with Great Britain, India, the Indian Archipelago, China and Japan.

"2.—It traverses, for a thousand miles, the richest districts, pastoral, agricultural and mineral, to be found in Australia.

"3.—The Railway will not have to wait for development of traffic from emigration and agricultural settlement before it proves remunerative, but will command a large traffic from the start from pastoral and mineral produce.

"4.—The enhanced value of the land from the construction of the line would alone make the investment a safe and profitable one, even were that enhancement only one half of what has followed on the opening of lines in other and less favoured districts.

"5.—That the route of the Trans-Continental is the best for a through trade between the southern Colonies and Great Britain, as well as all the countries on the Indian Ocean and China Seas."

Taking all these advantages into consideration, it seems evident that no railway ever made has had more promising elements to start with. The profit that must accrue upon the enhanced value of the land to be granted to the contractors will of itself form a princely capital, irrespective of the large revenue that must be realised by the traffic of a whole territory, second to none in commanding position and immense natural resources; while the perfect safety always guaranteed by the British flag would render the investment as secure as if it were made within the "four seas" of Britain.

London, 10th January, 1882.

MAJOR-GENERAL THE HON. W. FEILDING'S

DIARY OF JOURNEY

OF THE

TRANS-CONTINENTAL RAILWAY SURVEY EXPEDITION

FROM MITCHELL TO POINT PARKER,

GULF OF CARPENTARIA.

August 2nd, 1881.—*Brisbane.*—I have now settled definitely the departure of the expedition from Brisbane for Thursday morning, August 4th. The party will be composed of Mr. Robinson and myself, Mr. Peter G. Grant, an excellent surveyor, and well accustomed to bush work. His assistant, Mr. Raff, who is also a surveyor, accompanies me as a secretary, accountant, and in charge of the commissariat and camp. Besides these, there is a cook, a blacksmith, and two drivers and horsekeepers. We take out with us from Mitchell two railway surveyors, chosen by Mr. Robinson. These we shall leave to make a section, for purposes of estimate, of the line we select for the railway between Mitchell and the point where that line will intersect the north and south line of the Main Trans-Continental Railway.

It may interest the Syndicate to know that capitalists from Victoria and N.S.W., foreseeing the benefits likely to arise from the construction of the railway, are rapidly purchasing stations in Queensland, and much in advance of the ordinary rates. The station of "Avington," on the Barcoo, has just fetched £70,000. Captain Hope, of Kantandra, between the Landsborough and Mills creeks (a waterless run, except the water collected in dams made by him), sold out to Mr. Weinholdt a few weeks ago for £21,000.

Squatters here say that all the country between the Nieve and the Cloncurry will, when traversed by the railway, be turned into sheep stations. I consider the question of emigration and settlements *are* important, and I have no doubt that if the Railway Company act wisely, it will adopt a system of construction of the line, by means of wages and land grants to the navvies, and insert a clause in the contract with this Government by which the families of the navvies shall be brought out free to Queensland. With this object in view, I will turn my attention to suitable places for future townships, and agricultural settlements along the projected line of railway.

I intend in tracing the proposed course of the line to keep in view the following points :—

(1) The necessity of avoiding all difficult ground, and the crossing of streams liable to flood. (2) The advisability of traversing as many cattle and sheep farms as would be compatible with a straight course. (3) The desirability of selecting the best land, and the course most likely to draw the greatest amount of goods traffic. (4) The adoption of such a track as would satisfy the political and commercial interests of the various trading communities. (5) The necessity for selecting advantageous sites for the creation of new townships in suitable localities adjoining the line.

It is satisfactory to be enabled to state, that many of the most wealthy capitalists and several of the largest railway contractors in Australia regard with great interest and favour the proposed undertaking, both as a most important national work and as a remunerative investment for capital, and have shown the greatest anxiety to be associated in the Syndicate.

August 9th, 1881.—*No. 5 Camp.*—Arrived at Mitchell from No. 4 at 11 a.m. Received letters from Europe, one from Sec. A.T.R.S. notifying change of code word from "Magnolia" to "Marjoram," wrote acknowledging same (No. 9), forwarded estimates for cattle and sheep stations, and statement of earn-

ings of railway from Dalby to Roma during first six months after its being open to traffic. Telegraphed to inspector at Roma declining further services of Tracker "Dick." Telegraphed to Inspector Thornton at Charleville, asking for one of the two black trackers at Morven. Wrote to Queensland National Bank forwarding documents for safe custody, and asking them to notify to secretary to the Post Office at Brisbane the change in the code word. Rode on in the evening to this camp, which is on right bank of Maranoa River, and about three miles from Mitchell. Road passes across alluvial flats, subject to floods in exceptionally high state of the river, which runs here in one perfectly defined channel with sandy and rocky bed. The country for miles along this river belongs to the Mitchell Downs Station, now in occupation of Mr. Stuart. Is now a cattle station with 20,000 head. Till 1871 was entirely under sheep, and then carried 100,000. Changed to cattle because of the then rising price of cattle. Is going to be changed back to sheep. 9.30 p.m.—The five horses missing this morning have not yet been brought in. Tracker "Dick" and Willie Jones left behind at No. 4 to search the country for them.

August 10th, 1881.—*Camp No.* 6, *Tyrconnell Downs.*—Up at five; horses still very difficult to catch, and so could not get all the waggons off until 9 a.m. Bought two more horses, £14 and £12. Halted at Wormalilla Creek for two hours to rest the horses, and for midday meal. Thermometer, which at 6 a.m. marked only 24 deg., was at 65 deg. in the shade. Road very dusty. Reached camp at 5 p.m. after a severe march on a bad road of 27 miles; with the exception of the first three miles, which was over open plains well grassed, the road passed through indifferent country—mulga scrub. Here and there, however, there was some good iron bark and box timber.

August 11th, 1881.—*No.* 7 *Camp, Government Dam, Blacks' Water Hole.*—Rouse at five a.m., made a short journey of only

10 miles, so as to rest the horses, to give less distance to be made up by the five missing horses, and chiefly because, though the water was muddy, it was plentiful, and there was a little grass about two miles off the track. The tracker and Willie Jones rejoined us with three of the five horses. Fortunately, the two still missing are the least valuable of those bought of Brown of Blythesdale. He has been notified of the loss of his horses, so that in all probability there will be but little financial loss on this head.

August 12th, 1881.—*Camp No.* 8, *Morven.*—Twenty-mile march, 10 minutes' halt at Government Dam, eight miles from here. Country ridgy, and covered with mulga and other scrub timber until within two miles of this place, when it became open box flats of fairly good soil. The only water here is obtained by means of a dam. The place was proclaimed a township about two years ago, and one mile square reserved as such. Only 60 lots of half an acre each were surveyed, and 56 of these put up for sale, the balance being appropriated for Government purposes. Some of the lots brought £12, but the average prices were £6 and £7 each half acre section. It is not well situated for a township.

August 13th, 1881.—*Camp No.* 9, *Angellala River.*—For one mile out of Morven the track passed over rough scrubby ground, with a rise of about 60 feet; the country then became open forest, and at two miles from Morven plains well grassed. There appeared to me about 14 square miles of open. These are called the Victoria Downs. Proprietor, Herbert Hunter, who has been the lessee about four years. Has about 7,000 cattle, some horses, and at present only about 25,000 sheep; but he has some more on the way hither. The head station is six miles from Morven on the north-west edge of the plain. As his run extends to meet Bradley's, towards Charleville, to meet Yo-Yo, in the north-west, and Brunell Downs to the north, I

deemed it wise to question him as to the country. He says that with the exception of a few patches of open, and of open forest, the whole of his run is scrubby, and unfit for anything except cattle. After leaving Victoria Downs, Mr. R. and I consulted together and decided on sending back Mr. W. Kerle on foot to Morven, thence by coach on Tuesday to Charleville and Oakwood on the Ward River, our plan being that he should prospect a new line for the railroad from "Nive Downs" station, through Caroline, Redfern, Maxvale, Donnybrook, and thence to Hodgson, between Roma and Muckadilla. From reports we learn that the line runs through much better country than that we have come, and crosses no ridges of importance. Halted for an hour at the Moognuthulla Creek, and after a march of 22 miles arrived here about 4 p.m. Left our new black tracker to look for a missing horse (the one I bought for £14 at Mitchell Downs). I bought a new draught horse at Morven for £12, including a good saddle and bridle. Thermometer 80 deg. and 26 deg. Ice in basin quarter of an inch thick.

August 14, 1881.—*Camp No.* 10, *Clare Creek.*—Made a short march in the afternoon, of 12 miles, so that the horses might get a good feed this morning to prepare them for a long march tomorrow, and to allow the tracker to catch us up without making too long a march. The tracker came in, but without having found the missing horse. The route passed through fair cattle country, open box-forest flats. Plenty of water even up to the upper part of the creek. No sort of difficulty in the way of a railroad. Not a blade of grass was to be seen all the way, as 30,000 sheep had travelled up just after the drought set in. Our horses had to be taken over a mile away in the forest to get any feed. Thermometer 78 deg. and 29 deg.

August 15, 1881.—*Camp* 11, *Yo-Yo Dam.*—The track passed through a fair cattle country for the first 10 miles, when we

came to the gate dividing the Victoria Downs station from those of Yo-Yo and Burenda. Here the road crossed the divide between the Angellala and the Yo-Yo creeks. The divide was evidently caused by volcanic action, as there are some nine or ten hills joined by low saddles. These hills are strewn with red, yellow, and white lava, and with solidified volcanic mud. I walked to the top of one of the highest of these (only 100 feet), and had thence a very extensive view to the south-west, west, and north-west. In these directions the country appeared good—myall plains, plenty of saltbush, occasional patches of mulga scrub. If this land were properly fenced in and not overstocked I believe that it would make excellent sheep country. In the plain, nearly enclosed by the volcanic hills, a settlement could be made to great advantage, as a large reservoir could easily be made at the head of the Yo-Yo creek, and the soil is of the best quality. On nearing this camping ground, which is on the bank of a considerable reservoir, we crossed extensive plains lightly timbered with myall. The construction of a railroad hither presents not the smallest difficulty, as the country is level, and wood and water sufficiently plentiful. Thermometer 75 deg. and 39 deg. Weather cloudy, and looks like blowing up for rain.

August 16, 1881.—*Camp No.* 12, *Reynella* (on the Warrego River).—For the first 11 miles the track lay through a splendid down country, well grassed, and covered in many places with two sorts of saltbush. After crossing Thomson's Creek (good water) the road enters a scrub of "mulga," and (whilst crossing a ridge, about 120 feet above the plain) of "bendee." The road here was very rough, and the large wagon became so disabled that I despatched it, after having spent two hours in repairing it, to "Burenda" to be put in working order by a competent smith. On getting into camp I found that the pole of No. 3 wagon had been broken whilst unharnessing the horses. We camped in the open, having no tents. Fortu-

nately the night was warm. Thermometer, minimum 46 deg. Distance marched, 17 miles.

August 17th, 1881.—*Camp No.* 13, *Biddenham* (on the "Nive").—Distance marched, 12 miles. The crossing of the Warrego at starting was difficult, as the banks were very steep, and the bed very deep in loose sand. The road lay through a good country for the first five miles; but, after that, it was patchy, a great portion of it red sand. On crossing the Nive the spliced pole broke short off, so we camped here to make a new pole, to await the return of No. 1 wagon, and to buy horses. A warm night. Thermometer, minimum 58 deg.

August 18th, 1881.—*Biddenham.*—It rained all day. Borrowed a rick cloth so as to enable us to keep the harness dry whilst greasing it. Grant and I made a new pole, which occupied us all day, as most of our tools had gone with the damaged wagon to Burenda. Received telegrams (1) from Syndicate, announcing that the Duke of Manchester had joined it. (2) From McIlwraith, announcing the appointment of Mr. Lyster to a clerkship in the Legislative Assembly, but adding, that if he wished to remain with me a "locum tenens" would be found. Mr. Kerle arrived from Charleville, but without his baggage, as the mail buggy was so rotten, and the horses too weak to draw it, that the vehicle had to be left here, and the driver and the remaining passenger had to ride the horses to the next stage (20 miles). Thermometer, minimum 55 deg. during night.

August 19th, 1881.—*Biddenham.*—A thick fog all night, and till mid-day the sun came out very fierce. Bought three horses for £40 from Macfarlane, the owner of the station. About 4 p.m. Raff came into camp with the large wagon, having marched 24 miles to-day. He had bought two good horses for £30. We had a thorough washing of clothes, repacking of wagons so as to make a good march to-morrow, when the black

soil of these plains will, I hope, be able to bear us. Ther. min. 55 deg.

August 20th, 1881.—*Camp No.* 14, *Oakwood.*—Despatched Willy Jones to Nive Downs with letter to McIlwraith, telegrams, &c., and with orders to meet me at Lansdowne with the bay horse we left behind lame at Mount Abundance on the 7th. Sent off Mr. Kerle with two horses to Charleville to fetch his baggage, and go thence to Nive Downs to commence there his "trial survey" for a time, thence *via* Donnybrook and Hodgson to Roma.

The station of "Oakwood" has just been bought by Dowling Brothers & Co., Victorian & N.S.W. group. They have only mustered as yet 46,600 sheep; but they hope to muster 48,000, and 6,000 cattle, besides horses. A large price has been paid, some say 25s., some 30s. per sheep, £8 for cattle and £11 for horses. The land we traversed from Biddenham was the finest country I have as yet seen, all open downs *very* slightly undulating, and with patches of myall, gidyah scattered about, with a little flooded gum along the watercourses. The grass, except where fenced into paddocks, is higher than knee-deep, and of excellent quality. The fencing has been newly done, and the road turned so as to exclude a large "dam" from the public. This dam is about $\frac{3}{4}$ of a mile north of the present track, and about 10 miles from Biddenham. The distance from Biddenham to Oakwood is about 22 miles by the existing road. About 9 miles from Oakwood the road crosses the highest part of the downs between the Nive and the Ward rivers, and from it could be seen the country as far as the Langlo, to the west, which appeared almost entirely forest or thickly timbered country, to the north and north-west nothing but downs as far as the eye could reach (about 30 miles), and to the south the view was bounded by sandstone ridges (outlined as if covered with fortifications) covered with timber. Midday feed at Buckeye Creek. I dined with Mr. Bulmore, the vendor, and with Mr. Dowling (vendee), and talked with each of them separately.

The latter is in favour of the railway, especially if the occupants should be allowed to purchase on easy terms, or to have a fixity of tenure at a reasonable rent. Ther. min. 44 deg.

August 23rd, 1881.—*Camp No.* 15, 17 miles north of Oakwood, (on the Ward River).—Bought two horses for £22 from Blyth (partner of Bulmore). Track along the river and in some cases in the bed of the stream. The river is nothing but a series of disjointed water-holes, and full of "ana" branches. The flood-marks, however, show that the water spreads out to a considerable distance and depth after heavy rain; at present the water-holes are frequent and deep. Ther. min. 47 deg.

23rd August, 1881.—*Camp* 15.—Raff and the Tracker returned last night without any of the missing horses. I determined, therefore, on sending them back to camp out and search the neighbourhood until found. This will necessitate a halt here for two days; but as Mr. Robinson is desirous of completing the drawing in of the sections, he took across the Nive and Warrego Rivers, and as I am anxious to explore this downs country thoroughly, it will not be time lost. I was 12 hours in the saddle to-day, from noon to midnight. Grant and I explored the whole of the down country west of the Ward, and then returned to camp. The land is quite first-class, but the uncertainty of the climate, *i.e.*, the droughts and the floods, make the country unfitted for anything besides wool growing, except here and there, where, if a large reservoir were made, a small number of people could be located. Until, however, the seasons are more regular, anything like wheat or crop growing would only lead to disappointment. Vines, however, appear to thrive and to bear large crops of grapes.

August 24th, 1881.—*Camp* 16 (on the Ward, about 20 miles from the last camp).—Lost four horses last night, and left Raff and the tracker to find them. Owing to the wagons taking a wrong turn we went about 22 miles; but we gained by seeing

a fine dam on Damson Creek, an out-station of Lansdowne, and some more glimpses of the grand "Down" country. A railway made along the watershed between the "Nive" and "Ward" would suit well.

Lansdowne Sheep Station, August 24th, 1881.—Grant and I rode out here this morning, making our way here over the downs to the east of the Ward, so as to see the whole country. The gullies on this side of the river being shorter and less defined than on the western bank, it would seem to me to be preferable to carry the line to the east of the river. The watercourses of the Ward are so numerous and complicated, and the flood-marks so high, that I shall seek for a good crossing place near to this station, which is within seven miles of the watershed line between this country and the Barcoo. We arrived here at 1 p.m., after a ride of four hours. The sheep shearing is in full swing, and gives employment for about 80 additional hands for about 10 weeks. The number of sheep is 186,000, the regular number of station hands, 40. The average weight of the clip, 250 tons. The cost of cartage to "Emerald" Railway Station this year is £8 per ton, and the cost of transit for shipment is £13 in all. Great complaints are made about the railway freight charges, and from all I know, it does appear to me that the Government tariff is not well arranged so as to increase the traffic. Mr. Turnbull, who manages for the Company which has just purchased this station for £250,000, returned home late this afternoon, and I had much conversation with him.

Lansdowne, 25th August, 1881.—I drove out with Mr. Turnbull to the north boundary of this property, 7 miles hence and 5 from Tambo. From it a fine view is obtained for 20 miles across the Barcoo, and far into the "Desert Country" north and east of Tambo. I have now no hesitation in recommending that the line be traced between the Nive and Ward,

and that it should pass close to the head station of Lansdowne, and run thence due west to Minnie Downs.

From conversation with Mr. Turnbull I gather that if the Railway Company will grant them leases for a fixed number of years, or give them a right of pre-emption, the squatters would gladly pay an increased rent, equal to 5 or even 6 per cent. on the purchase money; and would gladly give 8 shillings, 10 shillings, and even more per acre, according to the period over which the right of pre-emption was spread. I think also that they would be willing to forego any payment for compensation, provided that they are given either fairly long leases or a right of pre-emption. Mr. Turnbull says that the opinion generally held before my arrival here was that the Railway Company would turn out the present run-holders, and, cutting up their runs, offer them for sale or lease to small sheep or cattle farmers. I assured him that such a course would be entirely opposed to the interests of any company. The railway should be constructed chiefly by means of money raised by debentures on the land; and that the holders of the land would have to pay as much rent for the land held under the Company's lease as would represent the interest at 5 or 6 per cent. on the capital sum spent in the construction of the line. The longer the period over which the right of pre-emption should be extended the higher would be the rate of interest paid, and the higher the purchase money.

Our camp moved from No. 15 to-day, and encamped about 2 miles to the west of this station. Raff and the tracker had come back to No. 15 late last night, having recovered all four missing horses. Some were found 3 and some 8 miles from Camp 14. We change two of our men here to-morrow; one being incorrigibly lazy, and the other discontented and insolent. Mr. Grant goes into Tambo to-morrow to look for fresh hands, and to have a proper pole fitted on to No. 3 wagon in place of the one he and I made at Camp 12.

26th August, 1881.—*Camp No.* 17, *Lansdowne Station.*—

Walked out to camp before breakfast to pay off the two drivers, and to give instructions for to-morrow's journey. Worked all morning after breakfast at maps and calculations as to traffic.

I find that one may calculate one man for every 3,500 sheep as a basis for calculation as to the numbers of *permanent* hands on a sheep station. Mr. Turnbull thinks that $2\frac{3}{4}$ lbs. is a *low* average as representing the weight of a *clean* fleece, and that every sheep ought to represent a *nett profit* of 2 shillings per annum.

Lansdowne Station, 27th August, 1881.—Grant and Lyster went into Tambo with No. 2 wagon. I drove with Mr. Turnbull to the divide, 7 miles between this and Tambo; a fine view across the Barcoo towards Greendale. It is evident to me that the line should come close to the wool-shed of Lansdowne, and, crossing the head waters of the Ward about 2 miles north of the station, trend due west to head the Elizabeth Creek above Minnie Downs. The whole of this country is quite first-rate; open rolling downs, with occasional small patches of gidya bushes. The camp moved on 7 miles towards Minnie Downs, being the only place in that direction where we could be sure of having water. Grant, Robinson, and I remained behind, to bring on two men who we had engaged as drivers, but who had not made their appearance before the morning of the camp (17).

28th August, 1881.—*Camp No.* 18, *Minnie Downs.*—A series of misfortunes occurred to-day. On our arrival from Lansdowne at the camp we found that No. 1 wagon had broken down last night, and was so much damaged that I had it unloaded and sent it back to Lansdowne and Tambo to get mended. Mr. Turnbull, who had kindly offered to pilot me to Minnie Downs, said that he would send on a wagon to bring in the load of No. 1. I then redistributed the loads, and started across the country. There being no track, and the

grass (Mitchell grass) growing in tufts, the jolting was terrible, and I feared for the wagons. After a march of about 4 hours, partly across open downs and partly over lightly-timbered country interspersed with patches of scrub, we fortunately met the overseer of Minnie Downs about 9 miles from there. As he offered to accompany us until we could get on a track, we took leave of Mr. Turnbull. The divide between the Ward and the Langlo is almost insensible, and one had to look at the beds of the creeks to see which way the water ran in flood time. N.B.—The Ward only ran from end to end once last year, and then only for a week. The "Minnie Downs" country is sounder, better and more sheltered for stock, and from the appearance of the beds of the creeks and of the two dams I saw, reservoirs are easily and inexpensively made. When within a mile of our camp this evening, the leaders came suddenly on a dead horse lying right across the track. This caused them to shy, and the new driver not being a good one, he broke the new pole short off. We managed, however, to get the wagon into camp just after sunset. I slept at the station, as I wished to gather information about the country. There was there Sub-Inspector Ahern from Blackall, who told me that he had travelled that day from Tambo with a man who had just taken up a selection of land not far from the last gate on the Lansdowne-Tambo road, and that he had found coal on it before applying for it, and that he and a doctor in Tambo had bought the land as a speculation. He also told me that a man named Elliot, of Blackall, who owned the land on which the "Old Nive" public-house stands (at the head of the Nive and on the old road from Nive Downs to Comet), had discovered coal at 40 feet below the surface there when sinking a well, and that the seam was 8 feet in width, and good gas-coal. I have asked Mr. Ahern to procure me specimens of both seams of coal, and to send them to Brisbane. If this should be true, and the coal good, the railway would greatly benefit by the discovery, as it would appear as if the coal followed the line of the range.

August 29th, 1881.—*Camp No.* 20 (on the right bank of the Elizabeth River).—Spent all morning with Mr. Archer making and fitting a new pole, and afterwards looking through his horses (about 200) to see if I could buy any, but they were all too young, or not suitable. I finished by buying two greys from his stockman. Started at 2.30. Mr. Archer accompanied us as far as the old station (eight miles). Just after leaving us the swingletree of No. 3 wagon broke. As the road was level and the track fairly sound, the wagon went on with a pair, and I sent back to get the carpenter at the old station to make a new swingletree. Arrived at this camp about three miles below the "Old Station" at Sundown.

August 30th, 1881.—*Camp No.* 2 (on "Nevins' Creek").—The road commenced to ascend the (so called) "Range" almost immediately after leaving camp. The road very rough and rocky until the ascent was over. The stones were all volcanic. The extreme height of the range, as taken by our aneroids was only 120 feet, and there appear to be no engineering difficulties in crossing it anywhere. We were told that our road crossed at the highest and worst place in the whole range. The summit was flat, and about eight miles across. At the western side it is precipitous in places, and the road is so badly engineered that it took us a long time to get the wagons safely to the foot of the pass. We then marched about a mile and turned due north along an almost invisible track up a waterway. We followed this track for about 13 miles before we could find any water, and then camped just before sunset.

August 31st, 1881.—*Camp No.* 22 (at a waterhole, about 12 miles from Ravensbourne Station, on the road to Lorne Station.—A quick march along the track from Listowel Downs to Blackall (which we struck about a mile from Camp No. 20) brought us in 10 miles to Ravensbourne Head Station, which has just been purchased by the Murphy Brothers. A splendid piece of country it is all the way from where we left the range

yesterday to our present camp. I have seen nothing so good hitherto. Plenty of "Mitchell" and "blue" grasses, and shelter and water for the stock. I believe that there is an easy pass through the range, by which the line could pass from "Minnie Downs" to the left bank of the Ravensbourne. No. 3 wagon broke the new swingletree about a mile from camp, and drove in with three horses. The nights are now much warmer, last night 44 deg., the night before 42 deg. To-day the weather has been all that one could wish. Distance marched about 22 miles.

September 1st, 1881.—*Camp No.* 23.—An early start and a good track brought us to Lorne Station on the Hope Creek about midday. Manager not at home. Underlings rude and disobliging. Pushed on another nine miles to a large water-hole on the Ravensbourne Creek, where we camped. Dew heavy and thermometer low again last night. Distance marched about 23 miles.

September 2nd, 1881.—*Camp No.* 24.—A good road to Malvern Hills Station, about 18 miles.—Dined there, and rested about two and a half hours. Pushed on ten miles on a *very bad* track along the left bank of the Ravensbourne, and camped just before sunset. Horses and everyone tired. Thermometer low again last night, but high during the day-time. There are now about 120,000 sheep and 5,000 cattle on this station, but it would carry more if the back country could be given water. Some idea may be had of the flatness of those portions of this country bordering on the Ravens-bourne by the following:—Mr. Stewart (manager at Malvern Hills) was told one night by his overseer, who had just ridden from Terrick Downs, down the Wooroolah Creek, that this creek was running. Now rain had fallen near Tambo and at the head of the main stream (Ravensbourne), but none had fallen anywhere near Malvern Hills or Terrick Downs. This rain had caused a flood in the Ravensbourne, and its waters

had run *up* the Wooroolah for four miles, thus causing the overseer, who had only seen the creek at night, to fancy that the Wooroolah was also in flood, whereas not a drop of water was running *down* it. All this confirms my belief that the railroad track should run at least eight miles back from the Ravensbourne.

September 3rd, 1881.—*Camp No.* 25.—A most trying and anxious day's journey. Mr. Stewart had sent out a black boy to guide us across the Ravensbourne and Barcoo to hit off the road leading from Blackall to Avington. There was no track, lots of dead logs and trees were concealed in the long grass, and though we spent nearly two hours in improving a crossing at the Barcoo, I never handled reins with so little hope of getting through safely. We had hardly started an hour before the swingletree of No. 2 wagon (Raff's) broke, and I had to splice it with copper wire and wedges. Then just before reaching this camp, the same wagon broke the pole short off, and had to be dragged in without one. Everyone was dead beat on arrival here, and I am determined to avoid rough country unless absolutely obliged to travel over it. These Brisbane wagons are built of too bad wood to admit of much dependence being placed on their stoutness. (March 18 miles.)

September 4th, 1881.—*Camp No.* 25.—Camp remained stationary to make good damages, and to rest the horses, who were much jaded. Cut a "dead finish" sapling for a pole, and spent all morning in fitting it. About 11 o'clock, Mr. Bell, manager of Avington, drove up on his way back from Blackall. I asked him to lunch. Soon afterwards Mr. Grant drove up with Mr. Murray, Inspector of Police at Blackall. After lunch, I left camp with Mr. Bell, leaving Grant in charge. He had had No. 1 wagon thoroughly repaired, and had sent it on straight from Blackall to Barcaldine Downs. Dismissed Henry (one of the drivers engaged at Lansdowne), and are once more short-handed. Had a long conversation with Mr. Bell in the

evening. From him I gather that he has to pay as much as from £18 to £19 per ton for goods from the Northern Railway at Withersfield to this station, and £10 per ton for wool going away

September 5th, 1881.—*Camp No.* 25, *Avington Water-hole.*—Mr. Robinson arrived at Avington about 11.30, and reported that Mr. Grant had been trying to mend one of the wheels of No. 2 wagon by steeping it all night in water, and roping it this morning. The waggons arrived safely about 2 p.m., and we went over and spent the afternoon at the camp, when I returned to dine at Mr. Bell's. The Barcoo is the most important river we have seen as yet. Mr. Bell says that it runs once a year, generally for three, and sometimes for four or even five months. In flood time it rises as much as 25 feet above its present level. There is a water-hole opposite the station about one mile long. Its summer depth has never been less than 16 feet in the deepest part. There is another water-hole about eight miles further down even larger than this one, and at both of these places a bridge could be made without any very great expense. From what I hear, however, I believe that the best crossing place will be between the junction of the Barcoo and Alice rivers, and Portland Downs station, as the downs come in close to the river on either side, and in flood-time there is no extent or pressure of flood water outside of the river bed, which is good clay overlaid with shingle.

September 6th, 1881.—*Camp No.* 25 (on the Alice River).—This has been a hard day, as we were obliged to wait till 10 o'clock for a black boy as a guide. Our track (one buggy had once been over it) lay for 11 miles across the bush, and three times we had to cut our way through thick scrub; and nearly the whole way the wagons had to be guided by signal from me, in order to steer clear of the logs in the high grass. We lost nearly an hour in finding a good place at which to cross the Alice. We crossed it just above a long and deep water-hole,

known as the 20-mile water-hole. After crossing the river, we ran up it for about two miles and camped. A tiring day, as the sun was extremely hot, and we all had hard work in clearing the way for the wagons.

September 7th, 1881.—*Camp No.* 26, *Barcaldine Downs, Hazlewood Creek.*—Made an early start, and trotted along a fairly good wood-getters' track for about 13 miles, where we halted to water the horses, and for the mid-day rest and meal. After this the track got worse and worse, sometimes being in deep reddish sand, and always very heavy on the horses. Except for the last five miles the track followed up the right bank of the Alice. Seeing some rising ground about half-way between our mid-day halting place and this camp, I rode up it and had an extensive view in every direction. The country to the west seemed fine "down" country, with plenty of shelter. Towards the east and north the country looked to be sandy and covered with stunted timber. A good deal of spinifex grass was on this hill. We reached camp about 5 o'clock, all very tired with a wearisome march in sand and scrub for 27 miles. We broke our pole in No. 3 wagon again to-day, and though we spliced it we had to take off the leaders about nine miles from hence. Lost a grey mare this morning.

September 8th, 1881.—*Camp No.* 26.—We remained here all day, mending and strengthening both wagons. We met our No. 1 wagon here, which had arrived on Monday afternoon from Lansdowne *via* Tambo and Blackall, and seems stronger than ever. Our black boys returned late last night without the grey mare, which had strayed away whilst the others were being harnessed. Mr. Henderson (the Government Hydraulic Engineer) came into camp at sunset, so I asked him to dine with us. We derived some very interesting information from him.

September 9th, 1881.—*Camp No.* 27, *Saltern Creek Station.* —A march of 23 miles over high open downs (about 250 feet

higher than Camp 26), brought the party to this fine station, on which there are now about 150,000 sheep, but which will carry 250,000 when fully supplied with water reservoirs. There is plenty of grass on the run, and the land appeared to be of first-rate quality, and much sounder and firmer than is most of "The Downs" country. The trial survey line made by the Government for the western prolongation of The Central Railway crossed our route to-day about 14 miles north of Camp 26.

September 10th, 1881.—*Camp No.* 28.—Started at 7.30 and reached this camp, "Rodney Downs," at 4 p.m., after a march of 33 miles, about 12 miles of it over a very rough track. The country from Camp 27, as far as the crossing of the Rodney Creek, was quite first-class, and well grassed, with a fair amount of boree and gidyah as shelter for the sheep, but after crossing the creek the country became thickly covered with jasper stones, and occasional patches of a sort of basalt. This basalt has all the outward appearance of being the outcrop of a dyke; but I have been informed by several persons that the stone seldom exists more than from 3 to 6 feet in depth, and after being quarried in large slabs about 6 inches thick gives out, the bottom layer having the appearance of having been water-worn or ice-ground.

September 11th, 1881, Sunday.—Remained in Camp 28 washing our goods, and "spelling" the horses in the good grass of the home paddock of this station. The owner, McWhonnell, is a good specimen of a self-made man. The son of a farmer on Loch Earn, he arrived in Queensland 18 years ago with £1,000. He now is the lessee of Rodney Downs Station with 60,000 sheep, and which, with ordinary luck, he should be able to sell for £80,000.

September 9th, 1881.—*Camp No.* 29, *Rodney Creek Lagoons.*—A very long and tiring journey, partly through scrubs which necessitated a track being cleared for the wagons, and for the

last 12 miles without any road. A charming camp by the side of a long water-hole in the Rodney Creek, and behind our camp a perfectly open, nearly circular plain, about four miles across, Mount Rodney (about 120 feet high) standing out against the sky about 10 miles' distance. This camp is at the extreme south-east edge of the Mount Cornish (cattle) Station, the largest station in Queensland in extent, and carrying at the present time over 60,000 cattle. It would carry 500,000 sheep with ease. It belongs to the Scottish Australian Investment Company, who contemplate, I believe, turning it into a sheep station, as they have done with the adjacent station of Bowen Downs.

September 13th, 1881.—*Camp No.* 30, *near Scarbury* (on the Aramac Creek).—A mile from Camp 29 we crossed the Aramac Creek, which evidently covers in flood time about 4 or 5 miles of land. The ground is in consequence very rough, full of deep cracks, and footprints of cattle and horses. About three miles' march brought us on the road leading from Aramac to the Far West. Unfortunately Mr. Raff was so ill with an attack of fever that I had to trust No. 2 wagon to one of the men, who said that he was a good driver. On crossing Sardine Creek he dropped one of his leaders' reins. The horses took fright, broke the swingletree, whisked round, and had not Mr. Grant been close at hand and caught them the smash would have been even more complete than it was. A new pole has to be made, a new bed to the fore carriage, the ring-bolt to be straightened, and the wheels to be taken to pieces and reset. After emptying the wagon of its load, and removing the injured parts, Mr. Robinson and I set out to ride into Mount Cornish, 33 miles further, in order to send out a wheelwright, if one could be found, and to get our English mails and answer our letters. We reached Mount Cornish about 6.45, and were hospitably received by Mr. Edkins, the manager.

September 14th, 1881.—*Mount Cornish Station.*—Received our

mails to-day, last dates from England, July 15. Went into Muttaburra early this morning and sent out a wheelwright to mend No. 2 wagon. Spent the afternoon in reading my letters, and the evening in talking with Mr. Edkins.

September 15th, 1881.—*Camp No.* 33, *Mount Cornish Station.* —Spent most of the day in writing letters. In the afternoon the wagons arrived. No. 2 wagon just patched up to be fit for the journey. No. 3 wagon with one of the springs broken; metal faulty and bad. As I fear that the necessary repairs will take three or four days I have decided to leave the wagons here until thoroughly fit for work. They will then proceed to Ayrshire Downs by way of Winton, whilst Mr. Robinson, Grant, and I will ride round by way of Culloden, Manuka, and Werna, so as to see the country through which the line should pass. The wagons having less distance to travel will be at Ayrshire Downs almost as soon as we shall be.

September 16th, 1881.—*Mount Cornish Station.*—Wrote to the Secretary to the A. T. Ry. Syndicate. Telegraphed to Colonial Secretary, Brisbane, that I did not expect to reach Point Parker till after 25th proximo. Wrote to McIlwraith begging him to abuse McCormick for having built such bad wagons. Wheelwright at work all day at the wagons. We inspected the horses got together for sale to us by Mr. Edkins, manager, and selected seven heavy, strong draught horses and two of a lighter type.

September 17th, 1881.—*Mount Cornish Station.*—Spent the forenoon in making arrangements to exchange some of our horses for fresh ones. Went into Muttaburra with Mr. Lyster to purchase stores. In the evening Mr. Docker and Mr. Smith (Victoria) having arrived late last night from inspecting the cattle station of Belkate (Upper Diamentina) and Manuka (Sheep), on the Mills Creek, made out a paper for me giving me the actual distances hence to Belkate, *via* Winton, and the

places where we might expect to find water. They also wrote to Mr. Jamieson, manager at Belkate, asking him to lend us a black boy as a guide to Cloncurry, or as far as we might require his services.

It may be useful to know that these gentlemen are prepared to give £13,000 for Belkate with 1,000 head of cattle. Mr. Edkins tells me also that the South Australian Investment Company have been offered £6,000 cash for some of their land between Muttaburra and the head of the East Darr River. This is reckoned a high price, being about 2s. per acre for an insecure leasehold, and without any stock and insufficient water supply. Mr. Edkins is strongly of opinion that the railway would confer great benefits on the squatters, as it would enable them to make arrangements for definite periods of lease, and give them an option of purchasing on fair terms. He informs us that the only other good crossing place of the Thompson is about eight miles below where the Aramac River joins the Thompson. By the adoption of such a crossing the Aramac River would be avoided, and the line would tap a greater number of stations, instead of running for about 50 miles through one property. Mr. Robinson took a section across the river between our camp and Muttaburra. The width of the river and billabongs is about three miles. There is, however, no current, and most of the flooded land is only covered once a year, and then only for two or three days. The township comes right up to the flood level of one of the two main branches of the river. There is plenty of room to extend the town, as there is a long ridge to the west which runs parallel to the course of the river, and is within a few hundred yards of the present houses. If the lower crossing-place be adopted the line would not run nearer than seven or eight miles from Muttaburra. A new township could be made at the crossing-place, and from it the large stations of Welshot, Beaconsfield, Barcaldine, and Saltern Creek would probably draw their supplies. Mount Cornish station pays about £2,000 per annum for carriage of stores from Rockhamp-

ton. If it should become a sheep station this amount would be nearly three times as much. The trade at Muttaburra (established three and a half years) pays, on about 500 tons of freight from Rockhampton, £18 and £19 per ton. The inhabitants are most anxious that the junction with the northern branch should take place here; but I think that if a suitable site for a township can be found on the "Mills" Creek, near Manuka, the junction should be made there, and thus secure to the railway company the advantages accruing from the possession of the site of a town whence all the stations to the west of the Diamentina must draw their supplies, and to which their produce must be directed. It has been hot all day, 92 deg. in our double tent, and 89 deg. in the coolest room of Mount Cornish station. I slept in camp.

September 18th, 1881.—*Camp No.* 33, *Mount Cornish* (Sunday).—A quiet day, except packing for my start to-morrow. Found out by accident that the gardener here (a German) was overseer at Magnolia for eight months, two years ago. How small the world is!

September 19th, 1881.—*Camp No.* 34, *Out-station, Mount Cornish.*—Started at 2 p.m., and reached this dam at sundown. Distance 16 miles, through a well-watered and grassed country. Passed Mount Cornish (about 50 feet high) range, bearing it to the east on the other side of the Landsborough river, which is only a succession of ponds, some of them many hundred yards apart, and entirely without connection. It is reported that the country on Bangall Creek and Jessamine Creek is the best in this district. Camped out; night cold.

September 20th, 1881. —*Camp No.* 35, *Culloden West.*—We were late in starting, as we could not get the horses. Passed two *slight* ranges about 4 miles on the left of our track, which led up the right bank of the Landsborough. Met Mr. Leslie (one of the owners of Culloden West, now called Lerida), who

gave us all the information he could as to the direction we should take to-morrow to go to Manuka. Camped under some trees, after a hot ride of 15 miles. No water. Started again at 2 p.m., and went 20 miles more across the plains before we reach water in Culloden Creek. Made the station at sundown, after a long and very hot march of 39 miles.

September 21st, 1881.—*Camp No.* 36, *Culloden Creek Dam* (12 miles above the station).—Spelled the horses till 2 p.m., as we knew that we could get no water beyond until we could reach unknown water on the watershed of the Mills River. We had no track to guide us to-day, and the country having been fed over in wet weather by cattle, was in a most dangerous state for travelling, being full of deep holes, now baked quite hard.

Camp No. 37, *on Nesbitt's Creek.*—We passed almost a sleepless night, as the wind rose about 9 p.m. to a heavy gale, and blew our fire all over the place, so that we were obliged to watch lest the grass should catch fire all round us. It rained also a little from time to time when the gale lulled. Made an early start; course west by north for the first 10 miles to the head of the Culloden Creek, then west for 6 miles until we hit off the head of Nesbitt's Creek, which we followed down for four hours before we reached any water. Camped at the junction of the last affluent on the right bank. Distance marched, about 30 miles. The pace very slow, as the country traversed was so parched that it was a network of fissures in the earth, many of them 2 feet deep. (September 22nd, 1881.)

Camp No. 38.—*Oondooroo* (Station Mills Creek).—Marched 31 miles; the first 16 across the bush, the remainder along the Hughenden and Winton road. Fortunately for us, after marching 9 miles, we came across a camp of men fence-making, who showed us that, owing to a fault in our maps, we were 18 miles south of the place we had intended to make

(Manuka Station), which had been marked as placed at the junction of the Mills and Nesbitt Creeks; whereas it is at the junction of Mills and Manuka Creeks. Mr. Schöllich, the lessee of Oondooroo, lives here with four of his six sons, and is making great improvements and adding to his sheep stock. He told me that he had paid £3,000 during the last 12 months for freight charges; being £18 from Townsville, and £9 thither. We found a good crossing-place for the railway about 4 miles below the junction of the Mills and Nesbitt Creeks, where the river runs in a single channel, and where there is slightly higher ground on both banks than elsewhere. The country traversed since we left Culloden West is not first-rate, the ground being evidently unsound, and the grass of indifferent quality and sparse. (September 23rd, 1881.)

September 24th, 1881.—*Camp No.* 39, *Ayrshire Downs Station*.—We steered a course of west by north for 22 miles across the plains, and after a slow and tedious march of 8 hours reached Werna Creek, where we got water for our horses, which were very tired with having to pick their way amongst the fissures in the parched soil.

The country is covered with small jasper stones about the size of a man's fist, which makes the horses' unshod feet very sore. Thirteen miles from Werna Creek brought us here about half-an-hour after sundown. This run and those of Oondooroo and Culloden West are all being rapidly developed into large sheep stations, but they have to contend against the high-priced labour and the careless independence of the labourers. This with the heavy charges for freight of wire, and the scarcity of fencing and other timber, makes the work of development necessarily very slow.

A railway would admit of a more rapid and a less expensive improvement of these properties out west. Here and at Oondooroo the houses are built of sandstone flags about three or four inches thick. This stone is found all over these plains in deposits seldom thicker than four feet, and mostly close to

the surface. Met Mr. Gordon, who gave us much information about this part.

September 25th, 1881.—*Ayrshire Downs Station.*—We remain here to-night, as our horses need rest, and our wagons have not yet arrived *via* Vindex and Winton. Mr. Robinson, Mr. Glisson (manager), and I rode off to explore the range of hills called the Lancewood Range. This range covers about ten square miles of ground, being about five by two miles. It is covered with lancewood bushes about 12 feet high, which grow on the bare rock. The formation is volcanic, and the rocks all bear traces of having been subjected to a most intense heat. My conjecture is that the present surface is composed of volcanic mud of various colours, which has been forced up through the apex of each conical hill (none more than 50 feet high), and then calcined. There is but little pure lava, and that is chiefly yellow or white. The bedstone appears to be a good sandstone, white in colour, and of fine grain. This appears stratified as far as we could see it exposed. The day was very hot, but the nights are still cold. My sponge was frozen hard the night at Camp 37.

N.B.—The term "Downs" is very misleading. The whole country should be described as a vast plain *slightly* undulating, traversed here and there by waterless creeks, which only run for two or three days each year. The grass grows in tufts, and has good fattening qualities.

September 26th, 1881.—The wagons were expected all day in vain. I worked at my return of the properties likely to be traversed by the line of railway. There is a good crossing place for the line at the large water-hole about half a mile above this station, and as Werna Head Station is only eight miles in a straight line from this point, the line would catch both properties in their most valuable parts. I forgot to mention that everywhere on the plains we found pieces of fossil wood in the most perfect state, showing even the grain

of the outside bark, and the finest markings of the grain of the wood. Where does it come from? as there are no signs of there having ever been a single tree on these boundless plains. (Camp 39.)

September 27th, 1881.—*Camp* 40, *O'Brien's Creek*.—The wagons arrived at Ayrshire Downs about 11.30, having camped at Cockatoo Creek, 17 miles hence on the Winton Road. I transcribe from the diary of Mr. Lyster, Camp 34, two miles south of Kensington, having marched about 28 miles, Camp 35, on the head of the East Darr, 20 miles only, owing to a late start, caused by the tents having been soaked by the rain in the night, Camp 36, on one of the heads of the Western River, distance 31 miles, Camp 37.

One of the new horses bought from the carriers at Muttaburra died this morning, supposed to be from some disease of the kidneys. Marched 17 miles to Vindex Station, and camped six miles further on the Western River—Camp 38, Sunday—Raff and Lyster rode into Winton (eight miles distant) to find two men to replace the two lads who came to us at Douglas Ponds, and who suddenly declined to proceed any further. The boys left, Camp 39. Started late, being short-handed. Reached Winton (eight miles) at 10 a.m. Reached Cockatoo Creek, 25 miles further, at sundown. Still short-handed, though one man promises to join the camp at Ayrshire Downs.

The combined camp started afresh from Ayrshire Downs at 2 p.m. Halted about seven miles further, opposite Lancewood Mount, whilst Grant and I searched for, and cut two trees for spare poles, and got three other shorter pieces as spare bars. When we reached O'Brien's Creek, we found some men encamped on a water-hole, where there was not sufficient water for our large number of horses, and we only succeeded in finding another water-hole after sundown. The water very scarce and muddy. The man engaged at Winton joined us here after supper, having ridden out about 50 miles. We had also

engaged another man, whom we found out of place at Ayrshire Downs. The country here is exactly similar to all the rest of the so-called Downs country—good where not subject to flood.

September 28th, 1881.—*Camp No.* 41 (on the north bank of the Diamentina River).—A long and wearisome march of about 20 miles over rough and "tussocky" country, made us glad to camp early, as the day was hot and oppressive. Thermometer, 98 deg. in the shade.

September 29th, 1881.—*Camp No.* 42 (on the south bank of the Diamentina).—(E. long. 142 deg. 10 min.) About four miles from Camp 41, we came upon an excellent site for a town, and well suited from its position, and from the ease in which water could be stored, to make it the place of junction of the Northern Branch with the Main Line. There is already a long water-hole about, quarter of mile in length, in a creek which here joins the Diamentina. We halted for dinner at Dagworth, where we had to cross to the south bank. The river and its billabongs are over a mile in width, and the crossings very bad. Another 10 miles over rough country brought us to camp about 5 p.m., after a march of about 22 miles.

September 30th, 1881.—*Camp* 43 (on the Diamentina river, about E. long. 141 deg. 50 min).—Grant and I rode on at daybreak, to try to get some information from a camp of blacks, said to be about 8 miles from Camp 42. Found the camp at Kynona, and close by it a young fellow (Curr), who, with a German shepherd, had been travelling with about 1,500 sheep all over the country north and north-west of this place, in search of a piece of country to take up. From him I obtained much information as to the distances of the water-holes from one another, and their positions. Marched 17 miles to-day.

October 1st, 1881.—*Camp No.* 44.—Recrossed the Diamen-

tina about one o'clock this afternoon. Seven watercourses had to be crossed, four of which necessitated the use of the axes and spades to avoid accidents. Notwithstanding all my precautions and orders, the driver of No. 1 wagon chose to get out of the wagon without waiting for some one to stand at the horses' heads. Off went the team at full speed, dragging the wagon over the most terribly rough ground, till the leaders broke the swingletree, and galloped off until brought up owing to their having tried to go on different sides of the same tree. The cook was thrown out, and escaped with a bad shaking and a few bruises. The axletree of the wagon was bent, as also was the ring-bolt. Besides this, a broken swingletree, and some breaks in the harness, no damage was done. Camped near the broken wagon, having marched only ten miles. Fortunately, there are two puddles of muddy water. Spent all the rest of the day repairing the wagon. Thermometer 102 deg. in the shade.

October 2nd, 1881.—*Camp No.* 44 (Sunday).—Remained here all day, prior to separating from the wagons, which we send three days' journey by the shortest route to get on a road again, whilst we continue our course across the plains to reach Cloncurry by the line I have selected as the best for the railway. Thermometer 109 deg. in the shade.

October 3rd, 1881.—*Camp No.* 45 (on a rocky water-hole (limestone) in a billabong on the right bank of the McKinlay river).—Messrs. White has fixed here the station of his run called Beaudesert. He has only 3,000 head of cattle now, and is only holding on in order to sell the lease at a good price. The country we passed through to-day is some of the best I have seen for sheep since we left Saltern Creek, there being plenty of bushes and small trees dotted about on the downs. For the first five miles our route (a horse track) passed between isolated hills (about 100 feet above the plain) of sandstone and volcanic mud, which had been exposed to the action of fire. I

saw a fire-place built of this sandstone, which had been sawn into shape with a cross-cut saw. Without, however, making a close inspection of these hills, I should not like to say that the sandstone was sufficient in quality for the construction of bridges, and other heavy works, other than houses.

About 18 miles from Camp 44 my attention was drawn to some gypsum lying on the surface of the ground. Mr. Grant and I found a considerable number of specimens, but could find no deposit *in situ*. I learnt, however, this evening from Mr. Scafe (of Rangeview, at the head of the McKinlay River, that there is a great quantity of gypsum in many places between our track and the ranges. Mr. Scafe also tells me that the river, which here is a network of billabongs, and in flood covers nearly five miles in width of its banks, runs in one channel about 15 miles above this place. Our journey was a long one to-day, as the track was in many places worn out, the country too stony for our unshod horses to travel out of a walk, and the distance, without water, 35 miles. The thermometer between 98 deg. and 106 deg.

September 10th, 1881.—*Camp No.* 46 (on a lagoon, between Nora and Gidyah Creeks, 20 miles west north-west of Camp 45).—Mr. Scafe very good-naturedly offered to pilot us all day, and has promised to take us within sight of that part of the McKinlay Range to-morrow whence the Fullarton issues. After travelling for about $1\frac{1}{4}$ hours across billabongs and flooded country only fitted for cattle, the country improved, and between the Nora and Gidyah Creeks would make excellent sheep pasturage, whilst water could be easily and economically stored. Our camp is on the Strathfield run occupied by Mr. Bell, who has not as yet built even a "humpy," and moves about his camp with his cattle. Marched about 18 miles to-day. Pace slow, the ground being tussocky and full of fissures, and no track. Weather not too hot.

October 5th, 1881.—*Camp No.* 47.—Mr. Scafe accompanied us

for the first nine miles this morning, and having pointed out a conical mountain, which he said he had been told marked where the Fullarton comes out of a gorge in the range, left us to our own resources. After two hours' travelling over well-grassed plains, we came into a country pretty thickly covered with gidyah scrub, with a lot of dead and fallen timber on the ground. About 10.30 (we started at 7.30) we crossed the Gidyah Creek, which here ran in a single channel, deep sandy bed, and between banks averaging about 20 feet in height. The stones, &c., in the creek (dry) were micaceous, and showed traces of granite. About an hour's travelling brought us into the spurs of the range, a very rough country, seamed with dykes of diorite, slate, and veins of quartz, but no granite, although all the slate was highly micaceous. The spinifex and the rough country obliged us to make frequent and wide diversions from our course, west north-west, half north. After crossing two spurs about 200 feet high we reached most unexpectedly the Fullarton, and after running up its very wide sandy bed for about a mile, found a large water-hole and camped after a very long and tiring day. I estimate the distance at about 22 miles, and although I cannot see the conical mountain, we cannot be far from the gorge of the Fullarton.

October 6th, 1881.—*Camp No.* 48 (on the Williams Creek).—We marched north-west by west for about four miles, and after crossing a rocky spur, came upon a plain surrounded by rocky hills. Here we found cattle tracks, and followed them for about four miles until, to our great surprise, we hit off a branch of the Williams, with plenty of water in it every mile or so. The ground traversed to-day has every appearance of being highly metalliferous. The formation is chiefly granite, alternating with mica schist upheavals, and traversed with dykes of diorite and veins of quartz. The country was so rough, that we were forced to travel for miles in the sandy bed of the river, and to cross and re-cross it at least ten times during the day.

Towards sundown one of our spare riding horses knocked up, and we had considerable difficulty in getting him as far as this water-hole, which is very small and shallow. We got good drinking water by sinking a small hole one foot deep in the sand. The course of the branch of the Williams we followed down was north by west. It received one large affluent and many small ones from the south-west, but at no part is its course north-east, as laid down in the map.

October 7th, 1881.—*Camp* 48, *Cloncurry*.—We reached this township at 7.15 this evening, after a long and tiring day of 35 miles, with horses tired out and footsore from the last five days' journeying over the rough country. After travelling down the Williams for about four miles, I found the river turning away to the east of north, and determined to push westwards through the rocky and spinifex country, which had hemmed us in all yesterday. Fortunately I found a gap which brought us into good travelling ground, and having ridden back, brought the rest of the party through. An hour's travelling over well-grassed plains (crossing the Elder and Weatherby, two large branches of the Williams) brought us to a bark humpy which does duty for a station on Mr. Sutherland's run of Elder's Creek. This was indeed a most lucky find, as we had eaten our last piece of bread this morning, and, as we found out, we should probably have been much puzzled as to where we were. A halt of two hours at Elder's Creek refreshed the horses, and enabled us to bring all our horses into Cloncurry except the one which knocked up yesterday. The track, a very faint one, led us across very rough ground to Bishop's Creek, which we followed to its source, thence over an easy divide, into this valley. At Bishop's Creek, and again four miles nearer this township, are abandoned gold mines. "The Gilded Rose" quartz mine has still got its machinery and engine on the ground, and a large quantity of tailings. These being full of mundic, are said to contain still a considerable percentage of gold, which could be obtained by

treating the ore properly. Some of these tailings, of which there are now over a thousand tons "at bank," were assayed and found to contain 19dwt. This with the 2oz. 1dwt. which the ore has already averaged, would give about $3\frac{1}{4}$oz. to the ton. The quality of the gold is good, having realized £3 16s. 0d. per ounce. This mine is about 10 miles from the township, and there are two other reefs which have been "scratched" close by. Litigation, and want of capital to provide efficient plant, are stated to be the causes for the stoppage of the works.

October 8th, 1881.—*Cloncurry.*—Visited the "Great Australian" copper lodes in the morning, and worked at chipping off pieces of ore here and there as specimens. This mine is not 100 yards off the road; and it is difficult to imagine richer ore than is obtained from this mine. I chipped out two specimens containing a large percentage of pure copper, and to all appearance there seemed to be plenty of it. The mine has not been worked beyond opening trenches along the seven lodes which meet in one spot, and no workings are deeper than about 20 feet. This group of mines is now under offer to a group of Glasgow financiers, whose representative, in the person of Dr. Robertson, came out here personally to inspect and report on this country three months ago.

In the afternoon we made the ascent of Mount Leviathan, one mile from the west bank of the Cloncurry river, and about three miles from the township. The mountain, which is about 250 feet in height, is entirely covered with immense boulders of magnetic ironstone of a very high specific gravity. The whole mountain is said to be a mass of this magnetic ore; and to all outward appearances this would seem to be the fact. Mr. Jack (geologist) accompanied us all day. He has been here since the 20th ultimo, and has been usefully employing his time, whilst awaiting my arrival, in exploring the neighbourhood.

The view from Mount Leviathan was very extensive, as it stands straight out of the plain.

The valley of the Cloncurry appears to vary in width here between two and five miles, and is well grassed. Here and there outbursts of rock and quartz make isolated hillocks in the plain of about 50 to 100 feet in height. The ranges open outwards like a V towards the north, and towards the north-west to run in a north-west direction. There seem to be thousands of square miles of mountainous country, which, from all I can learn, ought to be productive of gold, copper, bismuth, antimony, iron and galena.

To my dismay I find that none of the stores which I sent on here have as yet arrived, so that I must perforce remain here some days. These can be, however, profitably employed in exploring this country, and in learning all I can about the neighbourhood from Mr. Hart, who is a storekeeper here now, but who knows intimately all the country between the Leichhardt and the McKinlay rivers. Mr. Uhr, police magistrate for the district between this township and Hughenden, being also warden of this gold field, has kindly placed his services at my disposal, and rode about with us all to-day.

October 9th, 1881.—*Cloncurry* (Sunday).—A fearfully hot day, so I remained all day questioning various experienced miners and old inhabitants of the district. Amongst others McPhail (now a publican), who discovered many of the reefs and alluvial gold deposits here.

Camp 50, *on Fisher's Creek.*—Mr. Uhr, McPhail, Mr. Jack, Mr. Robinson, and I started out to camp here to-night, so as personally to inspect and try the various gold quartz veins, alluvial deposits, and copper lodes already known in this neighbourhood, which is 13 miles east by north from the township of Cloncurry. We visited Pumpkin gully, which runs into Fisher's Creek from the north, and inspected the "Homeward Bound" gold and copper quartz mine, "Flying Dutchman" gold and copper quartz mine, and we washed two 50 lbs. bags of earth taken at hap-hazard by me in Pumpkin

gully, and one bag taken from the bed of Fisher's Creek at our camp. This latter showed gold, one piece being about this (0) size and shape. The other two bags of dirt produced a very good show of gold. Although McPhail says that he has hardly ever failed to obtain bismuth here when washing for gold, we did not find any in our wash-dirt to-day. Early in the afternoon we met Mr. Lyster, who had ridden on in advance of the wagons to report the disasters which have resulted in No. 1 wagon being left in the bush on the Gilliat river, about 110 miles from here, and No. 2 wagon being utterly useless, the wheels having entirely collapsed about 15 miles from here. Later on Mr. Raff appeared, driving No. 3 wagon. He camps with us to-night. I subjoin an epitome of Mr. Lyster's journal during the time the wagons have been separated from us. The drawbacks to the workings of gold and copper in this district are, the want of surface water (there is plenty of water in the wells deeper than 30 feet), and the absence of good machinery and capital. The tailings from the old quartz mill here contain more gold than was originally obtained from the crushings, owing to the presence of mundic in the quartz.

November 11th, 1881.—*Cloncurry.*—Up at sunrise, and off to visit the other mineral selections here. Went down the quartz mine "Uncle Tom," out of which 800 tons of mundic and gold ore was got, which averaged only 18 dwts. per ton. The workings seem to be very inefficient, and the total depth is only 80 feet. The vein is about 3 feet to 3 feet 6 inches in thickness, and some of the best gold has been obtained from the calc spar found in this mine, as well as in many places on the surface. In this mine there is much black tourmaline, and too much mundic to enable the mine to pay without better appliances for separating the gold from it. Returned to Cloncurry about three p.m. Started Grant off with a dray to bring in the loading from No. 2 wagon, and to go on thence to Eddington (90 miles) to make arrangements to bring in to that station No. 1 wagon, and to bring here some of its loading, which I require.

October 12th, 1881.—*Cloncurry.*—Busy collecting saddle-bags and pack-saddles to enable us to proceed on our journey, as we must not depend on our only wagon, No. 3, which was always looked on as the worst of the three. Sent on nine horses for Grant's use on his journey. Mr. Jack joins his camp, eight horses and two men, to our's.

In the afternoon Mr. Uhr accompanied us in a ride down the river to select a good crossing-place for the railroad, and afterwards we visited two lodes of copper ore, on which a little work has been done. Some of the ore looked good, but the average percentage would, I think, hardly exceed 30 per cent. If the railroad should come here it will be advisable to establish a new township at the crossing-place and on the river instead of being laid off, as at present, away from water, and three miles from any permanent water, except that obtainable from wells. The whole of this district ought some day to become well and thickly populated ; thickly populated because of its mineral wealth; and well populated, because with its mountain scenery, salubrious climate, and, above all, the excellence of the water supply, it would attract many people as a place of summer resort. Building materials in the form of timber, good limestone and sand, are abundant all over this district, so that good stone houses could be built here at a comparatively low cost. All that is requisite to push this place is the judicious expenditure of about £20,000 in the erection of first-class machinery in three places for the extraction of gold from the mundic and quartz reefs, and the introduction of labour to develop the mines. Mining was impossible with the following prices:—Flour 6d. before the rains, and 1s. during the rains. Tea, 3s.; sugar, 8d. and 9d.; tobacco, 7s. to 7s. 6d.; salt, 6d. The three stores here are kept by men with very little capital, and unable therefore to lay in any large quantity of stores before the rainy season (the mining season here), and once that sets in all traffic along the roads is at an end for six weeks or two months at the least.

October 13th, 1881.—*Cloncurry.*—I have sent on (28 miles along our track) twenty of our weakest horses, so that they may get a good start, and be on better grass than they can get here.

Yesterday's mailman from Normanton should have brought me some letters, but none came, and a similar disappointment awaited me this evening by the arrival of the mail *via* Hughenden without a letter or telegram for me or for Mr. Robinson. I spent most of to-day in writing letters for the mail. Wrote to the Board, sending copies of my journal sheets up to page 34 inclusive. Wrote to McIlwraith, telling him of the intended change in my plans, and that he might expect to see me in Brisbane at the end of November if I could catch a steamer at Thursday Island. Wrote directions to the Post-master-General, and a letter to Mr. O'C——, H.M.S. *Alert*, asking him, if possible, to come from Thursday Island to give me and my staff a passage from the Gulf thither. Weather hot all day and until late at night. Thermometer ranging from 90 deg. at 7 a.m. to 108 deg. about 2 p.m. No. 2 disabled wagon came in to-day, so I moved the camp about half a mile lower down the river at a large water-hole called the Four-mile water-hole.

October 14th, 1881.—*Cloncurry.*—Up at daybreak to finish my letters, &c., for the mail which left at 8 a.m. *via* Normanton, and for the Hughenden mail which left at 4 p.m. I then rode with Mr. Uhr to the native police camp, and thence to our new camp to make arrangements about our start to-morrow.

October 15th, 1881.—*Camp No.* 51, *on Duck Creek.*—Accompanied by Mr. Ernest Henry, we arrived here just after sundown, after a long day. This place is 30 miles from Cloncurry, but we have visited and inspected six lodes of copper ore on our way. The track, as far as we followed it, was made by Mr. Henry as a wagon-track to Boulia, where he established a store, from which he hoped to supply the settlers in that far

western district; but want of capital has caused him to fail in this effort. There appears to be no engineering difficulty in making a tram or a railway right through from Cloncurry township to Boulia on the Hamilton.

The track crosses the Cloncurry River about 2 miles from the township, and passes at the foot of Mount Leviathan, and between it and the river. Thence in a north-by-west direction across a fairly grassed plain, with bloodwood and gidyah trees on it, for 13 miles, where we came to a gorge whence Slaty Creek issues from the mountains. Camped for dinner and to rest the horses, as the day was hot and oppressive. Followed up Slaty Creek Gorge for about 2 miles, and then left it, to follow up one of its affluents on the left bank. This led us, by an almost imperceptible ascent, to the watershed between Slaty and Duck Creeks. The country here became open, interspersed with bloodwood and gidyah-trees, and fairly well grassed for cattle, except where the ground was rocky, when, of course, spinifex was the only grass. All along our route to-day I was much struck by the metalliferous appearance of the country, numerous veins of quartz crossing our path, or within sight of it. Veins of slate of every colour, and upheaved at every angle, formed walls to the quartz veins. We found some manganese ore, and plenty of ironstone. In the copper lodes visited to-day there were traces of antimony. The water very bad to-night, being discoloured by the cattle, and tasting strongly of cow, even after being filtered and boiled.

October 16th, 1881.—*Camp* 52, *Upper Diggings, Cloncurry River.*—After a restless night from the heat during the first part, and from a thunderstorm and rain towards morning, we got off by six this morning; rode over some very rough (rocky and spinifex) country to inspect six lodes of copper, very similar in character to those we saw yesterday. All these lay in the immediate vicinity of Duck Creek. Reached the junction of the Duck and Malber Creeks with the Cloncurry river about 11.30, where we bathed, and then rode on six

miles down the river to this camp, which, though now composed of one dilapidated bark humpy, used to be the head-quarters of the diggers. Now there is only one old man, who has been digging on steadily here alone for the last three years. He has been finding gold in payable quantities, and was rewarded by finding a six-pound nugget not long ago, which he has still in his possession. All the gullies leading from a hill called "Mary Douglas" have been searched for gold, and the ground is pitted with circular shafts from 3 feet to 30 feet in depth, from which the dirt has been got, and washed in successive summers so long as the water in the gullies lasted. The old digger now here has to carry down the earth to the Cloncurry River (about one mile) and wash it there. I made the ascent of the "Mary Douglas," and had a fine view of the country round. Range rises behind range in every direction, all having the same metalliferous character.

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October 17th, 1881.—*Cloncurry.*—A ride of 30 miles brought us back again here this afternoon. There would be no difficulty in making a tram or railway along the track by which we rode to-day, as the track crossed no pass, and only one creek (Slaty Creek at its junction with the Cloncurry). On my return I found that during my absence the whole camp had been disorganised. The cook had been dismissed for drunkenness and insolence, and on searching his "swag" it was found full of stolen goods. One of the drivers who had come all the way from Brisbane was also dismissed for drunkenness. The native constable and our Kanaka lad (Walter) also got drunk. The former was sent to the police and placed "on the chain" there. I had a long talk this evening with Richard Goodfellow, a Cornish digger, who has been an exploring digger in Queensland for fourteen years, and here for four years. He discovered the copper at Mount Norma, and is now managing the mine there for a company in Sydney, he being a large shareholder. I am sorry not to have time to get out there with Mr. Jack, but I have instructed him to report on this mine,

and on the gold mine at "The Soldier's Cap" on the return journey. This man (Goodfellow) reports the whole of the country between the head of the Williams and Mount Norma has been gold bearing, and says that he found tin whilst trying for gold in the upper waters of the Fullarton. He reports the ore from his mine as averaging *all through* from 30 to 35 per cent. His mine was inspected by a man sent up for that purpose by Messrs. Bolitho, bankers of Cornwall, who were intending to purchase the mine, but owing to copper having suddenly fallen at the time, the negociations were broken off.

October 18th, 1881.—*Cloncurry.*—The depot stores arrived this morning, and we spent all day classifying them and placing on one side those intended to form a reserve for Mr. Jack on his return journey. Now that no one but Mr. Raff and a few men will be required to go back with the horses to Townsville, there will be some surplus stores, and these I will sell by auction here. I had a long conversation with Mr. Henry over a map which he has constructed of the mineral deposits on the upper waters of the Dugald, Cabbage Tree Creek, and the Leichhardt, and have obtained his consent to visit some lodes which he has discovered, but not registered. Mr. Jack will accompany us, but we are to take no one with us three. The excursion will take about four days, and we shall then have to catch up the camp. I should like to have started to-morrow, but fear to do so lest to-morrow's mail may bring some letters requiring reply. Besides this, Mr. Grant is not back yet, and the wagon will not be fit for another two days to go on the road. We succeeded in finding a Chinaman to act as cook, and a lad about 16 to replace one of the other dismissed men.

The more I see of this district the more I feel convinced that the true policy would be to construct the railway from Point Parker to this place as rapidly as possible, as population would flock hither.

October 19th, 1881.—*Cloncurry.*—Spent the day in arrang-

ing the depot stores, so that Mr. Raff and Mr. Jack should find a reserve here on their return; and the remainder are to be sold by auction on Friday. The mail *via* Normanton came in this evening, without however any letter for Mr. Robinson or myself. I must therefore wait till to-morrow's mail *via* Townsville, as there cannot surely fail to be some letters from England. I had long conversations with Goodfellow (a practical Cornish miner), who is managing the Mount Norma Copper Mine for some Sydney capitalists. He has been a gold digger and copper miner all over the North of Queensland, and also on Lake Superior, U.S.A. The great difficulty to be got over here is the cost of labour and materials. This would be met by the railway, especially if constructed by Indian Coolie labour, as these men would, when the railway is finished, work in the mines, and many of them would settle down along the rivers and cultivate rice, Indian corn, &c., on a small scale. Miners are now getting £4 per week and rations.

October 20th, 1881.—*Cloncurry.*—Busy making arrangements for the departure of the camp; myself and Mr. Jack in one direction, Mr. Robinson in advance of the camp, and the remainder to follow as soon as the wagon is mended and Mr. Grant shall have returned with the stores.

October 21st, 1881.—*Camp No.* 53 (on the William (or Kerella) Creek.)—Left Cloncurry Camp with Mr. Jack, a Kanaka and two pack horses, and arrived at this water-hole about 2 p.m., distance about 22 miles. The track leaves Mount Nicholson (flat-topped sandstone) about half a mile on the left, and kept a NW direction; crossed Tommy's Creek about 10 miles and overtook Mr. Henry and his camp of blacks about 3 miles further on. For the first 8 miles the country is rocky, granite and quartzite alternating. Several large "blows" of quartz reef appeared across and near the track. There appears to be no engineering difficulty in following with a railroad the

course adopted by us to-day. Tommy's Creek runs in a single channel and is insignificant, whilst this stream also runs in a single channel, and is narrow, without being of any great depth. After crossing Tommy's Creek the country is fairly well grassed and may be classed as second-class pastoral. The ranges appeared to be about 15 miles distant to the W and WNW.

October 22nd, 1881.—*Camp No. 54, Dugald River.*—Up before daybreak, but three of the horses being missing, we did not get under weigh until 8 o'clock. The mob of horses I had sent on to spell on the William from the Cloncurry came to water last night, and looked remarkably well, having picked up wonderfully on the feed and the good water of the William. Three miles from the William we crossed Ghost Creek, small and sandy water in a lagoon 200 yards from it. Four miles further on we threaded our way through a low detached range of rocky hills, which a railway could easily avoid by passing one-and-a-half miles further to the east. Eleven more miles brought us to the Dugald. This we crossed, and visited the No. 1 copper selection, which is about half a mile on the other side. This lode is certainly a very important one, the red oxide of copper cropping out for more than half a mile along the strike. I picked out of a cutting in the mine one piece of native copper quite pure, and several other pieces nearly pure. The width of the mineral-bearing ground appears to average 40 feet, although for 100 yards on each side of the outcrop the vegetation is remarkable for its scarceness, and from its differing from that in the neighbourhood. The mine is easy of access, being about 50 feet above the bed of the river, which runs in a single channel about 15 feet in depth. A large piece of pure native copper was found on the surface, about one mile from the main outcrop and in the prolongation of the strike. This piece weighed 8 cwt., and was sent to the Philadelphia Exhibition. After examining the ground we searched the bed of the river for water, and found a small quantity of greenish tinge for the horses. For ourselves we

sunk a small hole in the sand, and obtained fairly good water. After dinner and a rest we started at 4 p.m. to visit the lead ore lode; about two miles from the river we came upon it running north and south (nearly). At the south end it shows rich copper ore, whilst in the centre and for the rest of its outcrop (one mile in extent) it is rich in lead (yellow oxide and plumbago). Mr. Jack and others think that this yellow oxide will below water level change into a silver-bearing ore, as in other mines in this colony. The lode appears over 50 feet wide on the surface. Two shafts (one 20 feet and one 8 feet deep) have been sunk on the west side of the lode, just to enable the finders to secure the freehold. This lode is only about 1 mile north of the copper lode visited this morning, and is much the same in appearance *outwardly*. The whole neighbourhood is seamed with well defined quartz reefs, and slates appeared at every possible angle.

October 23rd, 1881.—*Camp No. 55, on the Dugald River.*—A long march of 30 miles over rocky and spinifex country brought us to this rocky water-hole. The Dugald issues here from the main range through a gorge only about 80 yards wide. The water is like green pea-soup, but it becomes drinkable when filtered through sand and boiled. Horses tired, having been on the march for ten hours over rough ground. On our way we visited some copper selections where the ore appeared to be rich and plentiful. In one place there were five distinct lodes. All the ground traversed to-day is worth careful searching, as it has a most mineral conformation and appearance. We had to sleep with one eye open, as there are traces of blacks having been here recently.

October 24th, 1881.—*Camp No. 56, on the Aragylla River* (a tributary of the Upper Leichhardt).—Our track to-day was along the course taken by a dray brought from Cloncurry hither by Mr. Henry, to do the work on the copper selection here to entitle him to make it a freehold. Unfortunately the dray capsized, and he had to abandon it within 2 miles of the lode.

Our march, though only 9 miles, occupied about five hours, as the country traversed was extremely rough and rocky. The saddle in the range which made the divide here between the Cloncurry and Leichhardt waters marked 28·66 on the aneroid. The views which we obtained from time to time showed the whole country to be a network of ranges, rocky, chiefly quartzite with outbursts of quartz, and seamed with outcrops of walls of slate. In the afternoon we rode $2\frac{1}{2}$ miles from camp to inspect the copper lode, which may fairly be termed the monster lode. It forms the crests of three hills, and the visible outcrop is $\frac{3}{8}$ of a mile in length by 100 feet, minimum, in width. It forms quite a feature in the scenery. In many places it stands up like a built-up wall with a malachite face on it. Several small caverns lined with green carbonate deposit strike the eye half a mile off. The ore is mixed in character, some being red oxide, some grey, and some carbonate. The percentages of the pieces we broke off at hap-hazard along the outcrop seemed to range between 35 and 60 per cent. On our return to camp we were visited by some blacks, who, on our making friendly overtures, insisted on camping within 20 yards of our fire. One had to sleep lightly, as these wild blacks are not to be trusted, and there were only three of us.

October 25th, 1881.—*Camp* 57 (55 *bis*).—Returned to our Camp 55. Reached camp at 12.30. I remained behind to cook, wash, and watch the camp, whilst Mr. Henry and Mr. Jack climbed the mountain north of the river to prospect and to get a view. They returned at 6 p.m., Henry with a badly broken rib, occasioned by a fall on some rocks. We set and bandaged the rib as well as possible, and determined to get him back to his own camp on the Dugald by easy stages.

October 26th, 1881.—*Camp* 58 (on the Portal Creek, branch of the Dugald).—A march of four hours, 12 miles, brought us to a small puddle of water. The country traversed to-day was mineral in character, nothing but rocks, some granite, some

slate, and some quartzite, and spinifex, with a small flat of good grass along the banks of the small creeks.

October 27th, 1881.—*Camp* 59 (54 *bis*).—Returned to our first camp on the Dugald after a weary march of 22 miles without water or halt. In the afternoon I went out and blazed a line to show the wagon where to cross the river. Found that Mr. Robinson had passed, but that the remainder of the camp was still behind.

October 28th, 1881.—*On the Dugald.*—Marched 5 miles down the right bank of the Dugald to where Mr. Henry and his blacks had formed a camp. Sent over in the evening to our last camp to see if the wagon had come and found it just arriving. Gave them a rendezvous at Walsh's camp on the Leichhardt for to-morrow.

October 29th, 1881.—*Camp* 61, *Walsh's Camp* (on the Leichhardt).—Made a northerly course until Cabbage Tree Creek was reached, then crossed and ran it down to near its junction with the Leichhardt, then struck north again until the Leichhardt was reached. Henry insisted on accompanying us, being very anxious to show us the copper selections west of the Leichhardt. The camp joined ours at sundown, and Mr. Grant gave me a recital of his expedition to the Gilleat to place No. 1 wagon and its stores in safety. He only returned to Cloncurry on the 26th inst., and started off again on the following day.

October 30th, 1881.—*Camp No.* 62, *on Dobbin's* (or Coppermine) *Creek.*—Struck a north-westerly course for eight miles across a fine alluvial plain well grassed. We then entered the ranges (quartzite rocks and slate) and took a more westerly direction until we came to a saddle which formed the head waters of Sunday Creek. About seven miles after we entered the ranges we reached the Crusader copper lode. It is situate about three miles up Sunday Creek from its junction with the Coppermine or

Dobbin's Creek, and amidst most striking scenery from a mineralogical point of view. The hills on either side are capped with walls of quartz for nearly three miles, and these walls send out other walls of quartz across the intervening valley. This country has not been prospected for gold, or indeed for any mineral except copper, as Mr. Henry only cares for "copper hunting." Three miles from the Crusader we crossed Dobbin's Creek, and about 200 yards to the north-west came to the Dobbin's Creek copper selection, where there was some rich ore lying about. The outcrop could be easily traced a quarter of a mile. It probably is an offshoot from the Crusader group of lodes. Both these selections are under offer to some Melbourne capitalists, and Dr. Robertson has the first refusal after them. These mines could be easily worked, being very accessible up the valley of Dobbin's Creek. We only reached camp after sundown. Close to where we camped a small creek joins the Dobbin Creek, coming through granite from the north near its junction. Colours were obtained in two dishes out of three washed there by Mr. Curr, of Kamileroy station.

October 31, 1881.—*Camp No.* 63, *on the Leichhardt.*—A march of eight miles across a fairly grassed open forest flat brought us to this long water-hole (four miles long). I forgot to mention that coarse gold had been obtained by Mr. Percy Walsh, and by two other prospectors, in the gullies of the ridges which we crossed between Camp 60 and the crossing of Cabbage Tree Creek. These ridges have a most mineral appearance, and they, as well as the range between the Dugald and Cabbage Tree Creeks, will, I feel sure, become a great mining centre so soon as the prices of labour and the cost of transit of stores and produce shall have been lowered by the opening of a railroad to the Gulf.

November 1st, 1881.—*Camp No.* 64, *Kamileroy Station* (Leichhardt.)—Crossed the river to the right bank, and parted with Mr. Henry, who turned south towards his camp on the Dugald.

A long and hot march of 23 miles brought us here. On our way we had to find a crossing-place of a creek for the wagon, and this took us a mile further at least. The rest of the camp (with Mr. Robinson) rejoined us about 5 p.m., so that we are altogether again for the first time for a month. The heat yesterday and last night culminated in a thunderstorm about 10 p.m. last night. The thermometer marked 104 deg. in the verandah here this afternoon. Mr. Curr informs me that he has found some "blows" of copper ore up St. Paul's Creek, not 3 miles from the "Dobbin" selection we saw the day before yesterday. He thinks also that there is copper at the head of Gunpowder Creek. If this be the case, a township should be placed on the left bank of the Leichhardt, close to Camp 63.

November 2nd, 1881.—*Camp No.* 65, *Leichhardt River*.—The wagon broke down finally this morning about four miles after leaving camp. The off hind wheel broke at the nave, and the whole wheel collapsed. We sent the pack horses on to camp at this place, the nearest water, with orders to send six horses back to take on such of the stores as were absolutely necessary to be carried. We then sent a messenger back to Mr. Curr, asking him to send out his dray to take some stores, &c., back to Kamileroy, where Raff will pick them up on his return. We then took the remainder to camp, put up one of the carts, and made a depot of flour for Mr. Raff's use on his return journey.

November 3rd, 1881.—*Camp No.* 66, *Lorraine Station*.—Wrote to Mr. Curr, telling him of my having made the depot at Camp 65, and asking him to take the stores back to Kamileroy if he thought the depot unsafe. The owner of this station was away, and no one was here except a Mr. Carolan, who is a sort of stockman with Mr. Hugo Percy, who is camped with some cattle on Sandy Creek. The land is good loam and well grassed, and the river does not appear to overflow its bank along this side. It did so, however, in the great flood year of 1870. I left five horses here to rest until Raff's return.

November 4th, 1881.—*Camp No.* 67, *Sandy Creek.*—Followed the right bank of the Leichhardt for eight miles (six miles off the track), and then, crossing to the left bank, followed it for $2\frac{1}{2}$ miles, and then camped for two hours during the middle of the day. Re-saddled and off again at 1.45, and, steering a NNW half N course across the bush, reached Sandy Creek at sundown. Distance marched to-day about 20 miles. The country traversed was bad, being swampy and low-lying. Sandy Creek seems well watered, and offers no difficulty to being bridged, as it has only one deep channel about 50 yards wide. But I feel confident that the line must go at least 20 miles further to the west, close under the ranges, as this country will never carry sheep; and from my observations I find that the grasses are better, and the country more valuable, in the pockets between the spurs of the main range.

November 5th, 1881.—*Camp No.* 68, *Cutaway Creek* (an ana-branch of Fiery Creek).—A seemingly endless journey of about 20 miles without water. Time occupied 6 hours. No water after the first 5 miles, when we struck the track taken by stock travelling to Port Darwin. Country unfit for stock, being evidently little better than a swamp after wet weather. Just round our camp there is some good grass, and so I shall leave here six more horses which would not be able to go much further. I leave also with them three of my men, so as to have less rations to carry; and I made arrangements with Mr. Gibson (the owner of Fiery Downs Station) to ration them until Mr. Raff's return.

November 6th, 1881.—*Camp No.* 68 (*bis*).—Before sunrise this morning I moved the camp quarter of a mile to a better water-hole, and as it was Sunday, determined to rest every animal in camp. The day has been very hot, thermometer ranging between 108 deg. and 110 deg. till sundown, when it fell to 90 deg. The water in a deep hole where I bathed was 88 deg.

November 7th, 1881.—*Camp No.* 69, *Gregory Downs.*—I roused

the camp an hour before daybreak, as the full moon was very bright. Mr. Jack and I started for this place at 5.25 and reached here at 11.30. I left instructions for the rest to camp at the water-hole on Cartridge Creek for four hours, and come on here late in the afternoon. The country traversed is all subject to flood. Finding the owner of this station absent, and no one here except the Chinaman cook, I must remain here to-morrow, as I require some meat and other rations to supply Mr. Jack, who runs up the Gregory from here, and Mr. Raff for his return journey. It is difficult to convey the feeling of pleasure I experienced at seeing this ever-flowing river of the clearest water, fringed with tropical trees. The pack-horses arrived in camp in the middle of one of a series of thunderstorms which have raged here all afternoon.

November 8th, 1881.—*Gregory Downs.*—Busy all morning writing and giving final instructions relative to Mr. Jack's route. By this means I shall get a complete report of the heads of the streams running into the Leichhardt from the west, and also get two reports as to the best place for crossing the Gregory. At 9.30 Sub-Inspector Armit (native police) arrived, having come right through from Sandy Creek in the hope of catching me up, so as to accompany me to Point Parker. This arrival is most opportune, as three of his black troopers have been to Point Parker by way of Burke Town and know the country between this place and the Nicholson just above its junction with the Gregory. Besides this he will be a companion, and his troopers a great assistance to Raff on his way from Point Parker to Lawn Hill. Heavy thunderstorms from 4 till 11 p.m.

November 9th, 1881.—*Camp No. 70, Gregory River.*—The camp moved off about 7.30 after seeing Mr. Jack take his departure up the right bank of the river. Marched about 20 miles (NNW half N) across highly timbered and well grassed plains. Reached camp about 2.30, a beautiful site, quite tropical in its

verdure and general appearance, and just the spot required as a rest after a very hot day's march. We had to keep a look-out for natives, as they are plentiful between this place and the Gulf.

November 10th, 1881.—*Camp No.* 71, *Lagoon* (between Gregory and Nicholson Rivers.)—Marched for 15 miles along the left bank of the most westerly branch of the Gregory; then as it turned too much to the east, we followed an anabranch (nearly waterless) for about 3 miles, and then struck water again at a place where the river appears to run through a swamp in many channels. Here we lunched and spelled the horses for two hours. Started again, this time under the leadership of the native corporal, who brought us about sundown to this lagoon, about 10 miles distant from our midday halting-place. A very tiring day for horses and men, as the ground traversed was extremely unsound and full of deep holes hidden by the long grass.

November 11th, 1881.—*Camp* 72, *Nicholson River.*—Got a good start at 6.30, and marched NNW, striking the Nicholson at a place where it runs in a sandy bed in six small and one wide channel. Water almost dried up, and we had to sink two wells in the sand for our own drinking. All along our line of march to-day we came across recent traces of the presence of natives; but saw none. In the afternoon I sent Mr. Armit and two troopers down the river to scout, but they reported the coast as clear. The country traversed to-day was worthless for the purposes of pasturage or settlement, being subject to flood and without any rising ground to afford refuge.

November 12th, 1881.—*Camp No.* 73 (on a branch of the Nicholson, which runs into the sea at Point Tarrant).—Off at 6.30 and marched without stopping, being without water till 5.30 p.m. The route laying for the most part in thick "tea tree" scrub, which, whilst affording no shade from the sun, kept us from all wind. Just before reaching this camp we crossed the

track of Mr. Watson's wagon, which went to Point Parker from Burke Town early in May last. Distance covered to-day 36 miles. We all suffered from hunger and thirst to-day, as our water bags leaked dry early in the day and I did not dare to halt for luncheon, not knowing how far we should have to go to strike water.

November 13th, 1881.—*Camp No.* 73 (*bis*).—To-day being Sunday I was glad to spell the horses on this good grass.

November 14th, 1881.—*Camp No.* 74 (lagoon near Rocky Creek).—Got off about 7 a.m.; followed Watson's track for a short distance, but finding it too circuitous we struck out straight for some large lagoons, reaching them after a march of about 8 miles. Here we spelled the horses till 12.30, and then started off, marching rapidly in a NNW direction till 6.30. The country traversed was a network of salt pans, salt water creeks, some of these muddy and difficult to cross, and estimate our march to-day as about 40 miles.

November 15th, 1881.—*Camp No.* 75, *Point Parker.*—A march of 18 miles over salt pans and through lightly timbered forests brought us to the beach. The Q. G. schooner "Pearl" was at anchor off Allen Island, about 3 miles off. We had considerable difficulty in finding a camping place, as the only water here is in native wells, and the natives either could not or would not show us where they were. We came suddenly on about 150 natives; but the men all ran away, leaving 52 "gins" and children. We finally attracted the attention of the "Pearl," who, after shifting her berth into the inner harbour, sent off her whaleboat with Capt. Pennefather and Mr. Elliot, an official of the Harbour Survey Department. I returned with them to the ship to get the telegrams which had been sent by the pilot cutter from Kimberley. From these telegrams I gather that our letters will be found at Thursday Island.

November 16th, 1881.—*Camp No. 75, Point Parker.*—I returned to camp this morning and found that about midnight the camp was discovered to be partly surrounded by natives with hostile intentions. These were frustrated by the vigilance of Mr. Armit's native corporal, who woke up his master and comrades. A volley was fired over the heads of the natives, who rose up and scuttled away as fast as their legs could carry them. Under these circumstances I decided on shifting the camp here (about half a mile further north), where the country is more easy to supervise. We dug a well and got good water between blue clay and shell sand, about 2 feet from the surface. We then dug and puddled a small drinking trough for the horses, who had been sadly in want of water at the other camp. The "Pearl" sailed for Sweers' Island to fill up with water. I brought off with me some flour, sugar, and meat from the stores sent on board the "Pearl" for my use by the Queensland Government. In the afternoon I walked about the Point and its neighbourhood so as to get a good idea of its capabilities, &c.

November 17th, 1881.—*Camp No. 75, Point Parker*—Mr. R. Armit and two troopers accompanied me in a ride all round this neighbourhood, and I was agreeably surprised with the result of my inspection. The place is well situated as regards health, as there is always a breeze which comes from the sea. In the morning the wind varies from E to SE and at night from the NW to NNW. As far as I could judge there should be about 7,000 acres fit for settlement; about 1,000 acres I should call first-class agricultural land. This, however, is split up in patches of from 5 to 100 acres in extent, and would all require draining by means of a wide, open ditch or small irrigation channel, to utilize the water which would be found at depths of from 2 to 4 ft. below the surface. The soil in these patches is dark in colour and would grow anything. These patches are, I should think, swampy in winter, although now they are quite dry and sound. The ridges which separate them are sandy, but with so much humus mixed with it that with

irrigation it would make excellent garden soil. Were it not rich soil it would not support the trees and shrubs which grow on it almost everywhere. The presence of the screw pine (*Pandanas Convolutæ*) also shows that water is not very deep below the surface. As to the shape of the settlement I can best liken it to the wing of an eagle with the pinion towards the sea coast and the deep part of the wing towards the north. Towards the sea the coast is highest at the extreme southerly point of the wing, but the land available for settlement is at this point too narrow. It would, however, hereafter furnish admirable sites for suburban residences, being only $1\frac{1}{2}$ mile from the Point. Behind this narrow strip, which is not more than $\frac{1}{3}$ of a mile in depth, is an immense sandy salt pan at least 2 miles in extent. This salt pan, and another nearly as large, 3 miles in rear of Point Parker, are separated by a low ironstone and desert sandstone ridge about $1\frac{1}{2}$ mile in width, so that the settlement will virtually be on a peninsula. The peninsula itself is from 30 to 12 ft. above the highest high-water mark. The whole of it has formed part of the gulf at no very distant geological period. This is evidenced by the presence of shelly sand both above and below the layer of the mud which immediately overlies the fresh water. A most picturesque and healthy town could be built here if properly laid out, as the streets could be made in the direction of the ridges, irrespective of the regularity, whilst at the back of each house could be a garden of the best soil, with water available at the cost of digging a well 3 or 4 feet in depth. Facing the sea an esplanade backed up by good houses could be made for about 5 miles. The cocoanut tree, which grows well at Sweers' Island (only 22 miles distant), would grow anywhere. The streets could be bordered by avenues of them, and I have a strong suspicion that they would grow freely in the salt pans. Should my surmise prove correct, ten years would entirely change the appearance as well as the value of the country round the settlement.

There will be some difficulty at first on the score of firewood, as there is not any extent of forest country on the peninsula and the trees are stunted in growth. There is, however, abundance of timber on the islands north and east of the harbour. The mangrove also is an excellent firing wood, and its destruction would materially assist the sanitation of the settlement.

November 18th, 1881.—*Point Parker Harbour, Q. G. schooner "Pearl."*—The schooner returned about noon to-day; and I went on board about 3 p.m. with Mr. R. and Mr. Armit, having given orders that three saddle-horses should be sent round to Point Bayley to start at daybreak to-morrow. It is my intention to inspect Point Bayley as a possible terminus and harbour, and to try and discover a ship channel from its harbour to deep water without passing by Point Parker. The wind has, however, fallen and we are becalmed about half-way between Allen Island and Bayley Island. These islands are geologically of desert sandstone, overlaid in places with an iron-stone nodular conglomerate. Their extreme height above high-water mark nowhere exceeds 20 feet. In extent they are: Bayley Island $2\frac{1}{4}$ miles in length by an average width of $\frac{3}{4}$ of a mile; Allen Island $4\frac{1}{2}$ miles in length by an average of 1 mile in width. They are both covered with grass and stunted timber, shrubs, and pandanus; and in both fresh water can be got about 3 feet below the surface. I spent the evening in the inspection of the survey work done in the harbour of Point Parker by Captain Pennefather and Mr. Elliot (of the Harbour Survey Department) since October the 8th. The survey is most complete and, on the whole, satisfactory. There are two channels by which vessels, drawing 20 feet, could enter or leave Point Parker at ordinary high water. During the wet season, however, the tides (which here are only once in 24 hours) are much higher, from 10 to 12 feet above ordinary high-water marks. These high tides probably last so long as the NW monsoon, and the floods in the rivers. During this period,

about 2½ months (January, February, and part of March), vessels drawing 26 feet could use Point Parker in perfect safety. If a coaling station were made on Bentinck or on Sweers' Island, vessels could take in their coals and water there, and by these means the largest vessels could load and discharge cargo inside the harbour.

November 19th, 1881.—*Q. G. schooner "Pearl."*—The wind was too light to enable us to beat up to Point Bayley, so that the vessel sailed about all day filling up lines of soundings in the channel between the harbours of Point Parker aud Point Bayley, and we anchored, becalmed, close to the place we were last night. Thunderstorm and heavy rain till nearly midnight.

November 20th, 1881.—*Q. G. schooner "Pearl," off Point Bayley.*—We had to beat up against a light wind and a strong tide, and only came to anchor at midday. Landed at Point Bayley at 4 p.m. and walked about till nearly sundown. The land available at Point Bayley is too limited in extent to make the site suitable for a large town or settlement. The land is somewhat higher than at Point Parker, but the good soil is small in area and would require much drainage. I think, however, that Point Bayley and Bayley Island ought both to belong to the Railway Company. The harbour is better than that at Point Parker, being deeper and more sheltered from the NW and SE monsoons. It is, however, not so large. It could be utilized as a subsidiary harbour, being only eight miles distant from Point Parker, and an excellent dry dock could be easily cut out of the sandstone on the western shore of Bayley Island.

November 21st, 1881.—*Q. G. schooner "Pearl."*—Set sail at sunrise and went in quest of a ship channel between Bayley and Allen Island. This we found and beat outwards until the wind failed us, when we anchored in 4½ fathoms. The Captain

and Mr. Elliot completed the preliminary survey until they reached the deep water, eight fathoms ; when they returned we weighed anchor and reached Point Parker about 1 p.m. Landed at 2 p.m. and having given Mr. Raff his instructions and bid him and Mr. Armit good-bye. I re-embarked Mr. Robinson, and taking Grant, Lyster, and Willie Jones on board, we sailed away for Sweers' Island. The breeze having died away we anchored off the NW end of Bentinck Island.

November 22nd, 1881.—*Q. G. schooner "Pearl," Sweers' Island.*—Under weigh at sunrise and beat against tide with a light wind all day, reaching the roads here about 7 p.m.

November 23rd, 1881.—*Q. G. schooner "Pearl," at sea.*—At sunrise we went ashore on Bentinck Island to inspect a chain of lagoons said to be near the coast opposite our anchorage. The chain of lagoons is evidently a watercourse of fresh water in the wet season, but it ends in a salt pan. In the Admiralty chart a large lake is marked as being at the head of the chain of lagoons, but this was too far for a morning's walk, and it would not have been wise with our small party to attempt a lengthy exploration on foot, when the paths and deserted camps showed the natives to be in large numbers. After about four hours' exploration we returned to the boat and rowed back to the ship (two miles). We then visited Sweers' Island, which until last November was the Customs station for all vessels going to Normanton. The settlement now consists of one man (an old soldier), his wife and family. On the island there are 250 cattle, 750 sheep, 200 goats, and about 100 pigs. These are watered entirely by hand from wells and troughs. Water can be got anywhere by sinking from 10 to 14 feet, and in the wet season these wells are full almost to the brim.

There are cocoanuts and date palms growing and fruiting here, and guavas and lemons are ripening on well-grown trees. In the garden I found a gardenia growing like a large shrub.

The presence here of so much live stock would be of great

advantage to the settlement at Point Parker in its early state of existence, whilst Bentinck Island would furnish firewood for many years to come, and serve as an excellent station for the rearing both of cattle and sheep. I mean, therefore, to include in my contract Bayley, Allen, and Bentinck Islands, and as much of Sweers' Island as a water and coaling station. Weighed anchor at 2.30; no wind; but the tide is strong in our favour.

November 24th, 1881.—*Q. G. schooner "Pearl," off Kimberley.* —The name would suggest a town and a harbour at the mouth of the Norman river. In reality, Kimberley is represented by the telegraph station built in 1871, when the Queensland Government were induced to carry their telegraph system to this point to meet the cable which Captain Sherard Osborne promised to lay between Queensland and Singapore. We sighted the coast between the Norman and Flinders' rivers about 4 p.m., and got over the Norman bar just before sunset. No telegrams for me. I sent off telegrams to the General Manager, Queensland National Bank, for transmission to the Syndicate—to the Colonial Secretary, informing him of my safe arrival and of my expectation of reaching Brisbane about December 20th.

November 25th, 1881.—*Off Kimberley.*—Received telegram from Colonial Secretary. Mr. F. Urquhart (about whom Sir Andrew Clarke had spoken and written to me) came on board about 8.30 p.m. I like the man's history and his appearance, and think that he may be of great use in the formation of the Company's settlements. He is at present employed as assistant telegraph and postmaster at Normanton, with charge of the repairs of the lines thence to Kimberley 50 miles, and eastward 35 miles.

November 26th, 1881.—*Q. G. schooner "Pearl."*—Aground on a bank in the Norman Channel. Got under weigh at 4.30 a.m. in charge of the coxswain of the pilot cutter. Got

ashore at 5.30 and remained aground 12 hours. Got outside the bar about 8 p.m., and now on our way to Batavia river.

November 27th, 1881.—Run 84 miles since we got off last night. Wind died away.

November 28th, 1881.—Wind NNW to NNE, with a heavy sea; close hauled all day and all last night.

November 29th, 1881.—A fair wind all last night, but it died away towards midday and the sea became calm. We are hoping to get off the entrance to the Batavia River to-morrow at daybreak. Anchored about 10 miles from the entrance, nearly opposite an inlet marked in the map as being the entrance to the Coen River, but which Captain Pennefather, who explored it, avers to be only an inlet about six miles in length and very shallow. From what he tells me of the Archer River, which runs into the gulf 35 miles south of the mouths of the Batavia River, these two rivers should form a sort of peninsula with an isthmus about 25 miles inland. If this surmise should prove correct and the land good, the Railway Company would do well to accept land on the Batavia River in lieu of taking it along the railway line between Point Parker and the Nicholson River. By a proclamation dated October 16th, 1880, the whole of the coast lands from Cape Sidmouth on the east coast to Cape Fitzmaurice on the Gulf are open for selection at 5s. per acre.

November 30th, 1881.—*Q. G. schooner "Pearl," Batavia River.*—Weighed anchor at daybreak, and sailed with a light wind and a flood tide to this place, which is about 20 miles up the river. This is certainly the finest river in Australia, as there are 5 fathoms at low water at the entrance, and we were able to beach up with from 3½ to 10 fathoms all the way here. The mouth is about 2 miles wide, it then spreads to 5 miles, and then into a large estuary of about 10 miles in extreme width.

This brings one to a point about 11 miles from the mouth, and here there appears to be another stream coming into the estuary from the east, whilst the main river comes from the SE. As far as this place the stream is never less than one-third of a mile wide, and though drawing 8½ feet of water we were able to go about so close to either bank as to touch the mangrove trees from the deck. The point at the south of the entrance is low, but there are 10 fathoms of water within biscuit throw of it. Immediately inside this point the land bends away to the southward, making a nicely sheltered harbour. Capt. Pennefather informs me that there are springs of fresh water in this bay. At the other head of this bay, which is about four miles up the river, the land is high, the formation is the usual ironstone conglomerate overlying the sandstone, and the vegetation chiefly bloodwood and a sort of stringy bark called "messmate." This would, I think, make a good site for a port and place of settlement, as a very short pier would enable large vessels to load and unload in five fathoms of water. Beyond this last mentioned point and the point of high land, opposite which we are anchored, I did not see any place suitable for settlement, as the shores on both sides are low and covered with mangroves to a depth of from a quarter to half a mile. After tiffin we went ashore and explored the country on the south bank for about a mile. The land is patchy in quality, and though there is plenty of bloodwood, ironwood, and messmate, there are but few trees more than 18 inches in diameter. Near the river the soil is a black sandy loam, and grows a thick scrub, with ferns, palms, and the immense creepers common to most tropical scrubs. It came on to rain, and the mosquitoes and sandflies were so thick and so vicious that we were forced to retreat to our boats.

Although we had seen large mobs of natives at the mouth, and there were numerous traces of their presence here, we did not see any of them during the three hours we were away from the ship.

December 1st, 1881.—*Q. G. schooner "Pearl," Batavia River.*—Weighed anchor at daybreak, and beat up another 20 miles with a flood tide and a light and contrary breeze. There are two splendid reaches between this place and our anchorage last night. These reaches are between two and a half and three miles in length, and nearly half a mile wide, with deep water all across from bank to bank.

There is another good site for a settlement at the exterior angle between these two reaches—provided fresh water be obtainable. At the spot where we are anchored Capt. Pennefather says they drew their water from the stream, which, at low water, was quite fresh and sweet. Although it was only 1 p.m. when we got here, the wind had died away and the tide was nearly high, so we anchored here and pulled up another five miles to a place where the river banks alter their character. The mangroves entirely disappear, and give place to low-growing palms with leaves from 20 to 40 feet in length. There are also islands in midstream, though the water continues between three and four fathoms. On the north side the right bank rises gradually from the river to about 80 feet in height, and is covered with timber, some of it really splendid, both as to size and quality. Where the scrub ceases, bloodwood and stringy bark appear to grow to a considerable height. We landed here to look at some of the trees, but the scrub was too thick to admit of much exploration. Alligators seemed tolerably plentiful. The three we shot at and wounded were estimated at about 20 feet long.

December 2nd, 1881.—*Q. G. schooner "Pearl," Batavia River.*—We are anchored at the mouth, having no wind to make it safe for us to drift out with the tide. It has been almost a dead calm all day, and we drifted down on the tide. A canoe—made of the bark of stringy-bark sewn together at the ends with grass—came out to the vessel; it had two men on board. We gave them a knife and a biscuit a-piece, with which they seemed to be delighted, and gave us a couple of spears and a

piece of tortoiseshell in exchange. There were several natives on the shore, but I had to resist the temptation to go ashore, being anxious to get my letters, &c., at Thursday Island.

December 3rd, 1881.—*Q. G. schooner "Pearl."*—Weighed anchor at 5 a.m., and carried a fair breeze till about 2 p.m., when we lost all wind, and had to anchor in sight of Prince of Wales' Island, and about 35 miles south of Booby Island.

December 4th, 1881.—A high wind all the morning; sighted Booby Island, and had to anchor again for want of wind. Off again, and reached Thursday Island about 4 p.m., and were housed by Mr. Chester.

December 5th, 1881.—At 10.30 last night Mr. Chester came to tell me that the s.s. "Menmuir," from Hong Kong and Port Darwin to Adelaide, had just arrived and would wait till 8 this morning to take my party on board and convey us to Brisbane. This is indeed an unexpected bit of luck, as we ought now to reach Brisbane on the 12th inst.


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APPENDIX.

FIRST PRELIMINARY REPORT

BY

PROFESSOR ROBERT L. JACK,
GOVERNMENT GEOLOGIST,
TO
MAJOR-GENERAL THE HON. W. FEILDING,
Leader of the Survey Expedition,

ON THE GEOLOGICAL FEATURES OF PART OF THE DISTRICT TO BE TRAVERSED BY THE AUSTRALIAN TRANS-CONTINENTAL RAILWAY.

CLONCURRY, 13*th October*, 1881.

Having received instructions from the Hon. the Colonial Treasurer to join the Trans-Continental Railway Survey party at Cloncurry Township, and there to place myself under your directions, I left Townsville on the 26th of August, and reached Cloncurry, a distance of 558 miles, on the 20th of September. My start was delayed for ten days by an accident which I sustained while riding out to purchase horses for the journey, but I was still in time to join you, as you only arrived on 7th instant.

The following notes embody my observations (1) on the journey; (2) on excursions made from Cloncurry, while waiting for you; and (3) on excursions made in your company.*

It may be remarked that the aneroid measurements quoted are only approximate, and are subject to corrections, which

* The district to be described is included in sheets 2 and 4 of the new map of Queensland, on the scale of 16 miles to the inch.

must be made when I have access to the official reports containing the readings of the barometer at the coast.

It will be readily understood that my opinions on points of geological theory may be modified by further evidence in the course of the investigation which is still going on.

In view of a possible junction of the Trans-Continental Railway with the line, which is now nearly completed, to the Charters Towers Goldfield, and the further extension of which to Hughenden has recently (as I learn) been authorised by Parliament, my notes on the journey from Hughenden, down the valley of the Flinders to the Cloncurry, may possess some interest for the Syndicate. Moreover, it is quite possible that the evidence bearing on geological questions of commercial importance relating to the district to be traversed by the proposed railway may be looked for and found in distant parts of the colony.

The granite range dividing the Brudekin from the Flinders is crossed by the Hughenden road at an elevation of 3,040 feet. It is flanked by a deposit of basaltic lava, in nearly horizontal beds, which extend to Dalrymple on the east, and to Tatoo Camp, seven miles above Wongalee Station (1,840 feet) on the west. Here a gully cuts through the lowest bed of the basalt, and exposes about 50 feet of the underlying "Desert Sandstone." The sandstone is of the usual type, white or yellowish, with false bedding, and with soft ferruginous portions apt to weather into caverns. The only fossils observed were some twig impressions. Spinifex grass at once takes possession of the soil when the desert sandstone comes to the surface. It, however, covers on the Hughenden road only a narrow belt of country.

The basalt occurs in outlying table-mountains between Porcupine Creek and the Flinders, as far as Mount Beckford, and in all probability once covered the greater part of the downs.

Twelve miles from Hughenden a gully, rising in Mount Beckford and falling into Porcupine Creek, exposes a section of about 12 feet of horizontally bedded grey shales (or "blaes"

in the language of the coal-miner), with thin bands of grey flags and damper-shaped nodules of magnesian limestone, each enclosed in an envelope of glittering carbonate of lime. This is the first section of the strata which underlie the desert sandstone, and which have been determined from the fossils collected by Daintree to be of cretaceous age. I can see no evidence, however, that the desert sandstone overlies them *unconformably*, as Daintree supposed, but rather the contrary.

Similar strata are exposed at Hughenden in the Chinaman's Gully, and at the washpool from which Daintree obtained some of his fossils. I could see, however, only a few belemnites and some shells, all in bad preservation.

Hughenden, 1,600 feet above the sea level, situated on the left bank of the Flinders, is a thriving little township, which has sprung into new life within the last three years, chiefly owing to the stocking with sheep of the stations on the Flinders and Diamentina. It possesses a court-house, post-office, forge, three hotels, a bakery, three general stores, two saddleries, a bank, and a number of private residences. Since the date of my visit Hughenden has been connected by telegraph with Charters Towers and the Cape diggings. When the township becomes the terminus of the Townsville Railway it will supply the sheep stations of the West, and enable them to send their wool to the coast without crossing the stony basalt country and the formidable coast range. I could form some idea of the extent of this traffic, which is yet in its infancy, from the number of wagons met with between Townsville and Hughenden, each groaning under its load of four tons of wool bales. Carriage by dray for five or six hundred miles, it is needless to say, is very expensive. The loads are on the road for months, and each dray involves the employment of a score of bullocks, or an equivalent number of horses.

The Flinders at Hughenden has a sandy bed, 200 yards wide: 80 miles down the river at Richmond Downs it is only 30 yards in width.

The Cloncurry road hugs the left bank of the Flinders as far

as it is possible, viz., to near the mouth of Neelia Creek, going considerably more to the north than is necessary. The object of this deviation is to get water for camping purposes, and water can be found at all seasons, either in holes in the river bed or in anabranches.

The road passes Telemon and Marathon stations, and at Richmond Downs, 83 miles from Hughenden, may be seen the rudiments of a township. Besides Messrs. Bundock and Hay's head station there are a Chinaman's garden, store, public-house, and post-office. Here the road branches off to Cambridge Downs sheep station, the upper Saxby, and the Woolgar Goldfield. The latter, which was only discovered in 1879, is already rising into importance as a reefing district; 39 miles below Richmond Downs is Low's public-house and store. From Low's to the crossing of Neelia Creek is a distance of 40 miles. Thence to Julia Creek, an affluent of the Cloncurry River, is 25 miles, without water in the dry season (Julia Creek is incorrectly located on the map). The creek has a fine water-hole at the crossing of the road. Edington station is 12 miles further, on Eastern Creek, which has also large permanent water-holes.

Eight miles south-west of Edington station the Gilliats River is crossed. Water is to be found in each of its tributaries, viz., Gidya Creek (4 miles), Holy Joe's Creek (6 miles), and Box Creek (4 miles). These creeks are not shown in the map. Ten miles from the creek last named is the Fullarton River, on which Messrs. Nesbitt and McEacharn are forming a new station named "Strathfield." Thence to the Williams River is a distance of 16 miles (water). Fourteen miles from the Williams, the "rolling downs" come to an end at the first crossing of Fisher's Creek, a tributary of the Williams, and auriferous and cupriferous country begins. In ten miles more Fisher's Creek is again crossed near its head. Here are two wells, and the "Queensland" quartz-crushing machine. The township of Cloncurry is about 12 miles distant from the wells.

The "rolling downs" extend from Wongalee to Fisher's Creek. They are well grassed, mainly with the nutritious Mitchell grass, but singularly bare of timber. When a line of trees is seen in the distance it may safely be presumed to mark a watercourse or chain of lagoons—more likely to be dry than not. The soil is excellent, being derived (except in alluvial bottoms) from the waste of shales, sandstones, and limestones, with a happy mixture of the *débris* of the basaltic table-land. It is capable of being turned to good account for agricultural purposes if water can be made available. At present its pastures support sheep and cattle in numbers which, though immense, still come far short of their capacity.

Without entering fully into the question of the geological age of the downs, I may mention that I believe the strata to form one continuous series, representing part of the cretaceous and oolitic formations. Apparently they form from east to west a large synclinal trough, with an axis crossing the Flinders in the neighbourhood of Marathon. At the head of the Flinders the lowest beds do not crop out, as they overlap the palæozoic and metamorphic rocks of the dividing range, and are covered by the basalt of the table-land. To the west of Richmond Downs, however, a gentle dip to the east brings up to the surface a series of strata which apparently occupy a lower horizon than those in the centre of the trough. From Hughenden to Marathon the strata consists for the greater part of grey shales, with nodules of magnesian limestone and grey and brown sandstones, which are occasionally calcareous and nodular. Near Richmond Downs, where an easterly dip is for the first time distinctly observable, the limestones take a different character, and are distinguished by a prevalent cone-in-cone structure. Further west there are fewer shale beds, and thicker and browner sandstones. The latter are extensively veined with gypsum, and I have been informed by squatters and others that *beds* of gypsum are frequently met with in sinking wells. The whole series is fossil ferns. I should not be surprised if the strata west of Richmond Downs

should be pronounced on palæozoic evidence to be of older date than those to the east, although some of the fossils are common to the whole series. It is, however, premature to speculate on this question till the fossils which I have collected shall have been worked over by a palæontologist. My friend and late colleague Mr. Robert Etheridge, jun., of the British Museum, will probably undertake this task, for which his previous labours in Australian palæontology peculiarly qualify him.

Near Fisher's Creek, where the "Downs" beds abut on the metamorphic rocks of the Cloncurry district, the strata are upturned and altered, the limestones becoming crystalline and the sandstones assuming the character of hard quartzites. Even in the crystalline limestones, however, some fossils were obtained in a state of exquisite preservation.

At intervals to the west of Hughenden the desert sandstone occurs in isolated table-mountains, capping the strata of the downs. Notable among these are Mount Walker, between the Flinders and Walker's Creek—a table-land between Porcupine and Bett's Gorge Creek, and two table-mountains between the Flinders and the Dutton. Another outlier of the same sandstone rests on gneiss between Mount Leviathan and Chinaman's Creek on the left bank of the Cloncurry. Others occur, I believe, resting on metamorphic rocks in the neighbourhood of the Soldier's Cap, although I have as yet only seen that locality from a distance. There can be little doubt that the desert sandstone formerly extended over the length and breadth of the downs.

Two questions of the utmost importance arise with reference to the "downs" strata, viz., the supply of water and coal.

To connect the pastoral downs into rich agricultural country (for which the soil is admirably suited) would enhance the market value of the land to an extent which I hesitate to express in figures. This conversion, however, is only possible through a comprehensive system of water-raising and distribution which would permit of systematic irrigation. Wells would have to be sunk under the directions of a competent

hydraulic engineer; the land to be disposed of would have to be portioned out in suitable water districts, and the agricultural settlers would have to purchase or rent their water privileges. If my theory that the downs strata form a great synclinal trough be correct, we may expect to find the greater part of the drainage of the dividing range between the Flinders and the Brudekin, and of the Mackinlay ranges, lodged in the more pervious beds of the series under conditions favourable for artesian wells. It will be necessary, however, to investigate the geological structure of the downs much more minutely than I have been able to do, before a reliable opinion can be arrived at on this point.

The other question—that of the existence of coal under the downs—is of no less importance.

Coal seams have been discovered at Tambo Aramac, Vindex, and Winton, at no great depth below the superficial "cretaceous" strata of the downs. Two coal seams, respectively 6 feet and 8 feet thick, have been found in the same well. I observe with pleasure that the terms of your instructions will give me an opportunity of visiting some of these localities, when I hope to find out something definite regarding the age of the coal. If, on the one hand, the coal seams are truly interstratified with the "cretaceous" rocks, there will be every reason to believe that they extend over an immense area beneath the downs. On the other hand, if at the localities referred to the "cretaceous" strata overlie unconformably the palæozoic coal measures of Newcastle, Ipswich, the Mackenzie, and the Bowen River, we can rest assured of the existence, under the proposed line of railway, of immense stores of coal, regarding which we already know something definite, and which are of proved value.

It now only remains for me to add a few notes on the metalliferous district, in the centre of which you are now camped. The details must be reserved till my survey has been completed, as I expect to spend some little time here on my return from the North.

From Cloncurry, as a centre, my travels have extended (while waiting for your arrival), north-westward to the Dugald River (45 miles), southward up the Cloncurry valley for 30 miles to the "Top Camp" Gold Diggings, and eastward to the copper and gold mines, near Mount Douglas. I may mention here that I am under deep obligations for guidance and assistance to Mr. Reginald Uhr, Police Magistrate at Hughenden; Mr. Ernest Henry, the discoverer and part owner of most of the copper mines in the district; and lastly, to Mr. A. Macphail, whose experience as proprietor and miner is extensive and practical.

In latitude 20 deg. 10 sec. south, a porphyry range divides the Dugald from the Leichhardt waters. Some copper lodes occur, I am informed, in the porphyry. Between the range and the Dugald is a belt of nearly vertical black slate and quartz ore greywacke, with a bed of limestone. In this belt are some copper and lead lodes which I visited in company with Mr. Uhr. The lead selections lie nearest the range, and occur in a wide load which can be followed on the surface for nearly a mile from north, 20 deg. west to south, 20 deg. east, not only by the continuous outcrop of gossan, but also by the absence of vegetation. At the north end is a mass of gossan stained with carbonate of copper, and mixed with plumbago. From this point for three-quarters of a mile to the south, a wide belt of lead gossan is seen, containing red oxide of iron, and yellow lead ochre, along with decomposed plumbago shale. Two shafts have been sunk, one of them to a depth of 20 feet, with a trench at the surface 17 feet long and 8 feet deep. Trench and shaft alike exhibit a gangue of what may be described as graphitic shale, foliated and contorted, and all more or less impregnated with yellow lead ochre and peroxide of iron. Some red oxide of lead occurs in places. One tongue of lead ochre extends from the top to the bottom of the shaft, with a slight underlie to the east. At a depth the usual change from lead oxides to carbonates, and finally to galena, may be confidently expected to take place. Assays of the ore

by Mr. Karl Staiger showed antimony and traces of silver as well as lead. Lead lodes of such an extent are very rare, and as most Australian lead ores contain a payable proportion of silver, I consider that the prospects of the Dugald Mine are very good.

At the south end of the lode its character alters. It shows there a red gossan with stains of carbonate of copper.

A mile to the south-east of the lead lode is the "No. 1" copper selection. It lies among upturned and altered stratified rocks. Near the river is a white crystalline limestone 50 or 60 feet thick, with siliceous granules and specks of black mica, dipping at 75 deg. to east, 10 deg. south. Below the limestone is a series of grey siliceous and talcose slates or shales, impregnated and coated with carbonate of copper. This series is of varying thickness—at least 100 feet—and is accompanied by a weathered granular siliceous and hornblendic rock, impregnated with green carbonate of copper ("green gossan"), especially in the form of amygdaloidal kernels. These masses evidently are not part of the stratified series, but vein deposits or gangue, as they intersect the bedding in places, although their general tendency is to follow it. Two trenches have been cut across the out-crop of the cupriferous zone or lode (which runs north, 10 deg. east). One trench is 22 yards long. It discloses a considerable quantity of the "green gossan," which cuts in and out of the bedding of the stratified rocks. The second trench is 20 feet long and 8 feet deep. It shows towards the bottom large blocks of ruby oxide, coated with green carbonate, and frequently containing veins of native copper. The oxide is remarkably pure. Besides the "green gossan," large masses of ferruginous gossan occur on the cap of the lode. Large lumps of carbonate and oxide of copper can be picked up loose in the gullies near the lode. Williams' Creek rises in granite country, which should be prospected for tin ore.

Mount Leviathan, on the left bank of the Cloncurry river, opposite the township, is a mass, say 200 feet high, and a quarter of a mile in diameter at its base, of the purest possible

iron ore. The greater part of it is massive or granular, specular iron ore, with only a few grains of siliceous sand. Specimens of foliated specular iron may be picked up, and parts of the mountain are of magnetite. The specular iron is frequently magnetic. From the summit a number of quartz reefs and ironstone lodes may be seen radiating from the mountain. Such an inexhaustible mass of ironstone would be invaluable if the carriage to the manufacturing districts were not excessive. Two hundred miles of railway would connect the ironstone with the Winton coal, when the rest of the railway might be constructed of locally manufactured steel. It is not impossible that, with a short line connecting the Cloncurry with Point Parker, manufactured iron might even be exported at remunerative rates.

Half a mile south of the township is a smaller hill of specular ironstone, equally pure.

The "Great Australian" copper mine lies between the last-mentioned ironstone hill and the township. It may almost be described as a mountain of copper. It occurs as a ridge about 30 feet in height, and over 100 yards in length, with a general trend from north to south. It is intersected by two cross lodes, and has several branches. A detailed description is in preparation. At present I can merely say that numerous trenches and shafts only lead to the conclusion that "there is no end to it." The most valuable ore is the red oxide, which is obtained in great purity, and often contains large masses of native copper. The cap of the lode is composed of a siliceous matrix with green carbonate.

About a quarter of a mile to the south-west is another large deposit of copper, known as the "contra lode." It occurs in diorite country. Its trend varies from west to west, 15 deg. north, and the lode is traceable for about 400 yards. It is at least 10 feet wide, and has a large ironstone cap, with much green, and some blue, carbonate of copper. Not much has been done beyond some stone-breaking on the surface, a little trenching, and the sinking of a shaft about 20 feet deep. The latter

shows a thickness of about 2 feet of pale red oxide of copper, locally, but incorrectly, known as "grey ore," with some copper pyrites, and some green carbonate. At its eastern end the lode is crossed by a gully, whose alluvium obscures the out-crop. When it is next seen it has become almost entirely an ironstone lode, and a little further it changes to a vein of white calc-spar, impregnated with carbonate of copper.

The country in the immediate neighbourhood of the Cloncurry copper lodes and township is composed of vertical slates and sandstones, with some crystalline limestones; the whole intersected by intrusive masses of diorite.

Eastward, towards the Mount Douglas mines (which I visited before your arrival, and afterwards in company with you), similar country prevails, with the addition of peculiar rugged knobs of granular quartzite. Unless these latter be the discharge-pipes of "geysers," which poured out hot water containing silica in solution, I am at a loss to account for them.

On the north bank of Pumpkin Gully a copper lode (nearly vertical) runs from south-west to north-east. It has a large cap of red ironstone and green fibrous carbonate of copper, with some very blue azurite. Part of the gangue (which is siliceous) is mixed with red oxide of copper and "grey ore" (sulphide of copper and antimony). The lode is traceable for a quarter of a mile across Pumpkin Gully. Only one hole has been sunk about 4 feet deep.

Half a mile to east-south-east is the "Flying Dutchman." It runs east and west, and underlies to the north. The country is sandstone, with fine grains of mica. The matrix of the lode or reef is sandy (siliceous). The mine was originally taken up as a gold reef; and Mr. Macphail informed me that the stone, when crushed at the Queensland machine, averaged 1 ounce 3 dwts. of gold to the ton. All that remains to be seen at the shaft is a quantity of glassy quartz, with green fibrous (radiated) carbonate of copper, and some grey copper ore.

Three hundred yards east of the Flying Dutchman is the Homeward Bound copper lode. It runs north and south. The

shafts have become unsafe, but a little of the ore is lying about —green and blue carbonates, and some red oxide with native copper. The copper ore is said to have contained gold. A good deal of ore from this mine lies stacked at the Queensland machine.

North-east of the Homeward Bound is the "Uncle Tom" gold reef. Guided by Mr. Macphail, I explored in your company the galleries of the mine, and visited the bottom of the shaft (80 feet deep). The lode runs north, 10 deg. west, and has an underlie at about 70 deg. to the west. North of the shaft the country is gritty hard sandstone or greywacke, and south of the shaft slate crosses the reef, with an east and west strike. The reef averages 2 feet 6 inches in width, but the stone frequently penetrates the footwall. The stone is a white glassy quartz, with pockets of hematite iron ore, and numerous veins of calc-spar, and some chalybeate (carbonate of iron). About 800 tons of stone have been taken from the reef, which averaged 16 dwts. of gold to the ton. I have in my possession at Townsville some specimens of free gold in calc-spar from this mine. A peculiarity of the reef is that the stone is apt to go off in floors or shelves, which dip to the north where the reef traverses sandstone country, and to the south in the slate country. At the bottom level there was no sign of water, but "mundic" (meaning in this case copper pyrites) had begun to make its appearance, an indication that the water-level was near. The reef was abandoned in 1877, when rations and everything else were at famine prices. As examples, Mr. Macphail informed me that flour was £7 10s. per 200 lb. bag, sugar was 1s. per lb., candles 2s. 6d., powder 2s., fuse 3s., and steel 3s.

The Uncle Tom Reef is on the divide between Pumpkin Gully and Fisher's Creek. All the gullies draining into Pumpkin Gully have shallow wash, containing gold throughout at the rate of $2\frac{1}{2}$ dwts. to the load. The whole of the gravelly surface is auriferous in about the same degree. The great difficulty is water, which is obtainable for only a month or two

in the year. With water, the whole hill would pay for sluicing. Mr. Macphail dug out from bags of dirt (say 280 lbs.), and we packed them to the well at Fisher's Creek, where he washed them in your presence and mine. The result was about 7 grains of gold, and a few specks of metallic bismuth. The gold was scarcely at all worn, and was evidently not far from its source. It is evident that the whole of the gold which is so evenly distributed over the drainage area of Pumpkin Gully cannot have come from the few reefs which are now visible. Its chief source is perhaps to be found in reefs whose out-crops have been completely denuded and covered with surface wash.

Mr. Macphail also washed "colours" of gold from Fisher's Creek below the well in our presence.

As you have arranged to visit the Duck Creek copper mines, and return to Cloncurry *via* the "Top Camp" gold mines, and this will afford me another opportunity of seeing the latter, I shall defer reporting on them till our return.

Robert L. Jack.

SECOND PRELIMINARY REPORT

BY

PROFESSOR ROBERT L. JACK,

GOVERNMENT GEOLOGIST.

On the 15th, 16th, and 17th October I accompanied General Feilding and Mr. Robinson on a visit to the copper mines of Duck Creek and the gold diggings of the Top Camp on the Cloncurry, under the guidance of Mr. Ernest Henry.

After coming to the left bank of the Cloncurry, opposite Mount Leviathan, the road to the township of Boulia (on the Bourke River) keeps a general SSW course, crossing Chinaman's Creek (three times), Slaty Creek, Duck Creek, and the Malbon River.

Copper lodes occur on the western side of the road in a belt of country extending from Slaty Creek (near Mount Sheaffe) southward to the Malbon, a distance of about 13 miles. This country is for the most part slaty, but is bounded on the east by quartzite ranges, which run north and south. The quartzites are probably beds of altered and upturned sandstone. They still bear traces of vertical stratification.

On the roadside, two miles south of Mount Leviathan, thick beds of limestone were observed. They were vertical, and had a NE and SW strike. The limestone was of a magnesian variety, with a slight admixture of siliceous granites. This lime ought to form a good hydraulic cement.

About three miles further we saw, in slate country, on the roadside, a number of quartz reefs and hæmatite lodes striking to the north-east.

In a gully between the last crossing of Chinaman's Creek and Duck Creek waters (say 13 miles from Cloncurry town-

ship) I picked up large blocks of psilomelane (hydrous peroxide of manganese).

The road crosses the watershed between Chinaman's Creek and Duck Creek by an easy gap, in slate country, between two ranges of quartzite, which run, roughly speaking, parallel to the road. Supposing the railway to cross the Cloncurry River near the township, the ore from the copper mines about to be described would naturally (and I believe easily) be brought down to the railway by road, tramway, or branch railroad.

The northmost of the copper lodes (selection No. 9) is situated on the west side of the road, about 20 miles from the township, and within the drainage area of Slaty Creek, a large tributary of the Cloncurry. It is about one mile to the north of Mount Sheaffe.

The slate of the country in which the lodes occur strikes WSW to ENE. Near the lode is a mass of diorite. Its relation to the slate is not very clear, but it is in all probability intrusive, and may be suspected to have influenced the production of the copper ore. The principal lode strikes WNW to ESE. For about 20 yards it stands 7 or 8 feet above the ground. It has a quartz matrix, with great pockets of green carbonate of copper, red oxide, and "tile ore." A branch lode strikes off to the south-east. It contains some green carbonate, which I should estimate to contain 40 per cent. of metallic copper and some red oxide, mixed with silica, which I should reckon 30 per cent. ore. From what can be seen at the surface I should say this mine is capable of turning out a large quantity of payable ore.

The Rainbow Lode (marked No. 2,454 on the map) lies about $3\frac{1}{2}$ miles to the south of selection No. IX. on the fall of Cone Creek, a tributary of Duck Creek. It occurs in the flat country, and shows a "blow" (striking to WSW and underlying to SSE) of green carbonate of copper and gossan. A shaft has been sunk to the depth of 25 feet. The ore now lying at grass came from the bottom of the shaft, and is of

very good quality. Red oxide and green carbonate of copper (the latter enclosing quartz crystals) and "silver-grey" copper ore (sulphide of copper and antimony).

The lode is traceable for over 100 yards. At its west end it is crossed by a quartz reef, running NW and SE, and showing some red oxide of copper and antimony. I consider the Rainbow quite a payable mine.

A selection, No. 2,455, adjoins the Rainbow to the north-east, and is understood to be on a continuation of the latter, but we had no time to visit it.

Two miles to the SW, on the eastern or left bank of Cone Creek, we saw a large reef of quartz with "pockets" filled, or cavities coated with green carbonate of copper. The reef runs east and west, through slate, which has the same strike. It is more than likely that payable deposits of copper ore exist below the surface in this reef.

A selection has been taken upon the right bank of Cone Creek, on what is supposed to be the prolongation of the reef or lode last referred to.

A quarter of a mile further down the creek (left bank) is a similar reef, striking east and west, in a country of chloritic slate, having the same strike. The reef is at least 25 feet wide. It shows green carbonate and red oxide of copper of good quality, and, I have no doubt, will prove a valuable property, the large cavities, lined with green carbonate, in all probability representing "bunches" of ore. The ore, as well as the slate, is chloritic.

The selection, No. 2,459, is taken up on a little outcrop of green carbonate of copper, in a quartz reef running east and west, apparently not of much account. It lies on the right bank of Cone Creek, near its junction with Duck Creek, and about a mile SSW of the reef last described.

The Chinaman's Lode occurs on the left bank of Duck Creek, about a mile and a half south-east of No. 2,459. It runs from west 30 deg. south to east 30 deg. north. It is a quartz reef, standing from three to fifteen feet above the

general level, and measuring 17 feet across. It runs for nearly a quarter of a mile through slate, whose strike is parallel to the lode. The quartz has its cavities filled with green carbonate of copper, and very often the quartz, when broken up, is found to be intimately mixed with carbonate of copper. Both slate and ore are highly chloritic.

In the selection numbered 2,458 (two miles WNW of the Chinaman's Lode), I saw two lodes. The first runs west 10 deg. south, is well defined, and about three feet wide, with a dip to south 10 deg. east at 75 deg. Besides green carbonate of copper and some nodules of hæmatite iron ore, a good deal of very fair "grey ore" is visible. This is a sound payable lode.

A second lode, parallel to that described, is said to occur in the same selection, but we were too pressed for time to visit it.

One hundred yards to the south, still in the same selection, is a third lode, with two quartz reefs running to the SW. A considerable quantity of green carbonate of copper is visible on the surface of the lode. The country is chloritic slate and greywacke, turned up on end, and having a strike to WSW.

Selections Nos. 2,457 and 2,456 are taken up on continuations of the lodes in selection No. 2,458, and carry their outcrops on to the ENE for about half a mile. We had not time enough to inspect these properties.

Nine miles SSW of the group of lodes last described, two copper selections (Nos. 3 and 5) have been taken up on the south or right bank of the Malbon. As the time at our disposal, however, was very limited, we did not inspect them. They lie about 33 miles from the Cloncurry Township, by the Boulia track, which is a good practicable road. Probably, however, if the railway should touch at the Cloncurry Township, a tramway or branch railway would supersede the road, and it might keep a pretty straight course and yet need never be more than a mile from any one of the whole chain of mines extending from Slaty Creek to the Malbon River.

From the copper selection No. 2,458, we ran down the right bank of Duck Creek for nine miles in a general south-easterly

direction to the point where the Malbon River comes in from the west, and the Cloncurry River from the south-west. Then, keeping down the valley of the Cloncurry for eleven miles further to the north-east, we reached the Top Camp, which is about 30 miles up the river (south) from the township.

At the Top Camp the country is of slate and greywacke, both chloritic, in nearly vertical beds, which strike SE and NW. The slate makes very bold and striking features on the tops of the hills, very often standing up in fantastic knobs. The slates and other stratified rocks are often pierced by enormous dykes or reefs of quartzite, which stand up in lofty walls on the crests of the mountains.

At the head of Armstrong Gully, in slate country, is a hill named the Mary Douglas, in which a quartz reef was taken up and worked for some time (up to 1878). A good deal of gold was obtained in association with native bismuth. Owing to the tumbled-in state of the workings I could see little of them.

The quartz of the reef which was worked is very peculiar, being coated with botryoidal and stalagmitic masses of glossy black limonite. Sometimes the quartz is marked with impressions of large cubical crystals (probably of pyrites) which have weathered out.

The surface-wash on the slopes and base of the Mary Douglas hill yields "colours" of gold, and from the hill there radiate in every direction gullies and alluvial flats which have yielded gold extensively. Prominent among these are the Chinaman's Flat, in which a 28lb. nugget of gold was found, Red Jack Flat, and Sharkey's Flat. Chinaman's Flat runs to SSW, and has been worked for nearly half a mile. It takes its rise in some gullies known as the Jeweller's Shop, Dycot's Gully, Ironstone Gully, and the Secret Lead. Sharkey's and Red Jack Flats run ENE, and have been worked out for about half a mile each. Linger and Die Gully runs to the west of and parallel with Chinaman's Flat, and has been worked for a quarter of a mile. The workings generally have bottomed on the slate rock at depths varying from 20 to 40 feet.

I have been informed that all the gold obtained from the alluvial diggings at the Top Camp was heavy and nuggetty. It must have been derived from the denudation of a number of quartz reefs in or about the Mary Douglas hill.

On my previous visit to the Top Camp I returned through the mountains on the right bank of the river, and saw much similar country with alluvial flats apparently promising equally well; but this ground is still untouched by the miner, and I could not prospect it for the want of time.

From 21st to 30th October I accompanied General Feilding on an inspection of another metalliferous region to the west of the Cloncurry Valley, under Mr. Henry's guidance.

Camping in the afternoon of the second day on the Dugald River, we visited the No. 1 copper mine and the lead mine described in my previous report. On the third day we continued our journey up the left bank of the Dugald in a general SSW direction.

Three miles from the camp we passed a large "blow" of quartz running north and south, with a ferruginous gossan on its east side, containing specks of lead ochre. This reef is probably the continuation of the lead lode.

Three miles further another large "blow" occurs. It strikes north and south (the vertical slates of the adjacent country having the same strike). On both sides of the reef, and especially on the east side, are seen the caps of copper lodes.

A quarter of a mile to the SE we saw another good copper lode (iron-cap and green carbonate). It ran E and W, with an offshoot running to the SE.

About five miles further (to the south) we passed a singularly barren piece of bare, rocky country. Fine-grained greywacke beds, about six feet in thickness, stood on end, with a north and south strike, and a marked east and west cleavage. The greywacke varied in composition and colour, being sometimes blue and calcareous, and sometimes nearly black, and full of iron pyrites.

From our camp near the No. 1 copper mine, our general

course up the Dugald was SSW for the first 30 miles, when the valley narrowed to a ravine, which we ascended for three miles to WNW. Up the river the slates and greywackes gradually become more altered, sometimes to mica schists and gneiss, but they always have a recognisable north to north-west strike. Huge quartzite dykes or reefs cross the valley. Where one of these crossed the river, near Mount Eurie, we found a water-hole and camped.

Accompanied by Mr. Henry I ascended Mount Eurie and some higher eminences in the neighbourhood. Here Mr. Henry broke his rib by falling on a pointed stone. Mount Eurie is capped by a thick vertical bed of limestone, a good deal altered, but full of a fossil-like *lithostrotion*, which on microscopical examination may possibly afford some clue to the geological age of the altered rocks of the district. The limestone is accompanied by slates with a north and south strike.

I obtained from Mount Eurie an extensive view to the south over a tumbled wilderness of slaty mountains intersected by great dykes of quartzite and reefs of white quartz. The features of the country strongly reminded me of the Hodgkinson gold-field. Very few, I think, even among northern miners, have any idea of the extent of this tract of possibly auriferous country.

In a valley to the west of Mount Eurie Mr. Henry and I found some fine almandine garnets, Labrador felspar of the beautiful irridescent variety used in jewellery, some micaceous iron ore, and some lumps of rotten ironstone with slight copper stains, such as generally yields gold in the Cloncurry district.

In 12 miles to the SW, we reached and camped on a water-hole in Argylla Creek, a tributary of the Leichhardt. Our camp was shared by a small party of aboriginals. They treated us with civility, after their fashion, and stole nothing. Mr. Henry's dray, which had been left near the place for two months, was found to be untouched.

From the Mount Eurie to the Argylla Camp the country was

somewhat broken and ridgy. The rocks were slates and greywackes (striking north and south), sometimes chloritic and sometimes siliceous, occasionally altered to schists and gneisses, and traversed by huge "blows" of quartzite and smaller reefs of quartz often iron-stained and cavernous—likely country for gold, I thought. Three miles from the Mount Eurie Camp we passed a little rock-bound water-hole near the head of the Dugald, and shortly afterwards crossed some ridges to the Leichhardt waters, passing on the way two or three small outcrops of copper ore.

The Argylla Mine is a wide belt of copper-bearing country, running NNW to SSE. The dominant feature of the belt is a wide reef of rather open and friable quartz, standing up as a crest on a hilltop for about three-eighths of a mile, and nearly 80 feet above the general level of the slate country. The western side of the quartz reef at its north end is stained with carbonate of copper, its numerous caverns being conspicuous from a long distance from their bright green colouring. Traced to the south, the whole hill is seen to be a belt of copper lodes, generally running parallel to the dominant quartz reef, but sometimes running out obliquely from it, and abutting against parallel veins of quartz. We saw a good deal of green carbonate of copper, often radiated and fibrous and of the highest possible percentage. We could also knock out, or pick up on the hillside or the gullies, heavy boulders of red oxide of copper and grey ore.

The ore would come down to the railway by the valley of the Dugald. Supposing the railway to cross the Dugald near the copper and lead mines, the distance from Argylla would be about 45 miles. Or the ore might possibly come down the Cabbage Tree Creek valley to the west; but that would naturally depend on the course taken by the railway.

Mr. Henry has taken a loaded dray from the Leichhardt to Argylla *via* Cabbage Tree Creek. The track down the Dugald would be quite practicable either for road or tramway.

On the divide between the Dugald and Argylla Creek waters, Mr. Henry pointed out a hill (about a mile north of his dray track) where he had found manganese ore.

In eight miles to the north we camped on the Postal Creek branch of the Dugald. Our course for the greater part of the northward journey lay through granite country. As in its general features this country resembled the stanniferous district at the head of the Walsh River, I prospected for tin after we had camped, but found only "nuggetty," specular, and magnetic iron in the wash.

At this camp we left the dray-track and followed the river down, passing out of the mountains about two miles ENE to the camp by a gorge (slate and greywacke striking north and south, with much specular iron strewn over the ground); then, after travelling NE through open timbered country and well-grassed plains fringed with gidya, we struck in about six miles our former track up the Dugald, at the singularly barren piece of bare rocky country about 11 miles from our camp near the copper and lead mines.

On the 28th of October we travelled down the right bank of the Dugald for about five miles, part of the way through granite country, and camped beside a mob of Mr. Henry's horses, which were spelling under charge of a black boy. At this camp were some cabbage-tree palms, the first tropical vegetation we had seen.

The following day we crossed (WNW) from the Dugald to the Leichhardt, a distance of about 10 miles. On the divide were some ridges of slate and sandstone (vertical, with a strike to NNE) intersected by large quartz reefs and "blows" of hæmatite. About a mile from Cabbage Tree Creek we passed on the left a tower-like mass of hæmatite standing up 20 feet high.

We followed Mr. Henry's dray-track for about six miles to the north-west, when the road began to rise into broken country—black hornblendic slate and sandstone altered to greywacke, vertically bedded, and striking north and south, with enormous

"blows" and reefs of quartz. In three miles more the road turned more to the west, and ascended a valley, on the south side of which was a mountain capped with a gigantic quartz reef (east and west) weathering into fantastic shapes. On the north side of the valley was a similar though smaller reef. Narrower reefs ran across the valley in every direction between the two dominant reefs, often standing up like ruined masonry. By a gap we passed westward into the valley of an affluent of Sunday Creek, the same features continuing. In one place I counted five quartz reefs crossing at a single point, and near this I observed an outcrop of copper ore.

A mile further, the CRUSADER COPPER LODE (12 miles from Walsh's Camp) stands up boldly above the surrounding country. Its matrix is quartz, which can be seen from a distance to be stained green with copper ore. The lode runs north, 40 deg. west, and is about 50 feet wide. On the surface and sides are seen large masses of copper ore and gossan. I broke out some fair samples of red oxide, malachite, and grey ore. The ore is more intimately mixed with silica than is usual in this district. A cutting has been driven into the north-east side of the lode for a distance of about 15 feet. Besides copper ore, the cutting shows a large quantity of specular iron in a matrix of pale green talc. The association in the same lode of copper ore and ironstone is suggestive, considering the number of enormous outcrops of ironstone which occur in the district.

Four miles to WNW (after crossing Sunday Creek and Dobbin's Creek, which join to form a pretty large tributary of the Leichhardt) we came on DOBBIN'S LODE. It runs north and south, and is the continuation, on low ground, of a large quartz reef or ridge, which stands up at its south end. The lode is about 15 feet wide. It shows a promising gossan of green carbonate of copper mixed up with quartz. Our visit was made within an hour of sunset, and we had to hurry on, as the nearest water was six miles off. I much regretted that I had no more time to bestow on these interesting mines, as I could not help thinking that many of the quartz reefs in the

district were just as likely as the Crusader and the Dobbin to become locally metalliferous lodes.

Mr. Curr, the managing owner of Kamileroy, informed us that he had obtained "colours" of gold in a small affluent of Dobbin's Creek, in granite country, and that copper lodes occur in the valley of St. Paul's Creek, a tributary of the Leichhardt west of Dobbin's Creek.

At Kamileroy and the "Grass Gunyah," 12 miles to the south, we observed extensive outcrops of magnesian limestone. At Kamileroy the limestone yielded specimens of sharks' teeth, echinus' spines and plates, belemnites, mollusca, &c., enough to prove that it formed part of the "Downs" formation—the same which extends from Cloncurry to Hughenden.

Thirty miles below Kamileroy we passed Lorraine Station (Brodie's). We crossed the Leichhardt for the last time six miles below Lorraine.

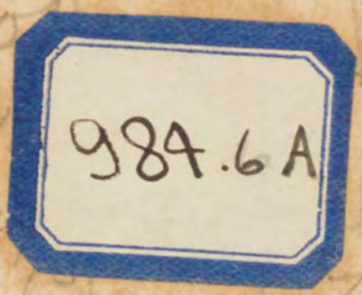
The Leichhardt is a very large river, which rises nearly 100 miles south of where it is shown on the map. Its head overlaps that of Wills's Creek. The river has chains of large water-holes, which are sometimes connected by a trickle of water.

Down the right bank of the Leichhardt, so far as we traced it, the soil is a light sandy loam, and grows rich grass. The country is sometimes open and sometimes lightly timbered. From the Cloncurry, as far as our lowest crossing place of the Leichhardt, there is a practicable route for a railway over country which is not subject to floods.

ROBERT L. JACK.


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Diary of journey of the Trans-Continental Railway Survey Expedition from Mitchell to Point Parker, Queensland

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