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- I.—*Western Australia and its Goldfields.* By ALBERT F. CALVERT, M.E., F.R.G.S. *Read at Anniversary Meeting, 16th November 1893. (With Map, Plate I).*

IN presenting to your notice the following brief description of the Goldfields of Western Australia, I desire to convey to this Society my thanks for the honour you have done me in inviting me to be present before you this evening, and thus enabling me to deal with a subject in which I take such a deep interest, viz.:—the Goldfields of Western Australia. Little has been printed about this vast colony which I have not read; and I have likewise endeavoured in a humble way, within the last few years, to see for myself some evidences of her future greatness. Three times I have explored the North-Western district. On the first occasion I started from London early in April 1890, and made an expedition lasting three months. Again, in April 1891, I was engaged to make further investigations over the same line of country; and lastly, I visited the North-West in the present year. Then, from time to time, I have made a point of sailing to every port from Cambridge Gulf to King George's Sound, sometimes in regular coasting-vessels, and sometimes in small vessels which I hired for the purpose. From each of these ports I made journeys inland of varied duration, and with various objects in view.

Western Australia has at present three great obstacles to her progress. The first is physical—her lack of water, which can only be combated by science. The second, her scantiness of population, is being slowly removed. The third can readily be surmounted, if confidence in her great mineral resources is once inspired. I refer to her lack of capital.

As will be seen from the following particulars of the fields,
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every district is more or less hampered from the same cause. Mr Renou, the Superintendent of Water Supply, in his recent report on the water supply at Southern Cross and Coolgardie, draws attention to the disasters which drought may yet bring in its train. He points out that the district is the most arid in Australia. Natural watercourses, or permanent surface waters, there are none, not a single stream finding its way to the sea for many hundreds of miles on either side. The rainfall is not only slight but uncertain. If next summer turns out a dry one, a condition of things may result which may easily become appalling. The provision for water at Coolgardie is altogether insufficient, even for a usual summer, so Mr Renou tells us. Should the summer be a long one, the crowd of prospectors and miners may be actually caught like rats in a trap. Retreat, even for those at Coolgardie, will be difficult; but it will be impossible for them to stay. At this locality a couple of tanks have been made, of which the Superintendent of Water Supply says that one should hold 525,000 gallons, while another is a failure. In any case, he remarks, even should the tanks be filled, their supply cannot last through the ensuing summer. The attempt to sink wells has proved abortive, but the failure to make tanks is the more blameworthy because the ground seems to be excellently adapted for this purpose.

At Southern Cross, where Mr Rollo is at present engaged in boring operations, it is a question whether the labour which is being expended will be of much permanent use. Mr Renou recommends the utilisation of the lake at Southern Cross by excavations, for the supply of the principal mines, and he demonstrates convincingly that this can be done with comparative facility, and at moderate cost.

Science, however, has come to the aid of the miner and bushman in other quarters, and may be said to have vanquished this horror of the desert. Queensland and New South Wales have demonstrated that plenty of water may be obtained by artesian boring. Day by day fresh reports come in of the striking of water in one or other of the many bores now being drilled all over the dry belt of Western Queensland and New South Wales. An enormous area of that arid territory has been found to be water-bearing, and drought is fast losing its terrors for the farmer and squatter. As yet there is no indication of a diminution in the vast supply of under-ground water, owing to the number of vents which the hand of man has opened for its escape. Just as irrigation has proved the salvation of many a rancher on the prairies of Colorado, so has artesian water rescued from ruin many a pastoral property in Queensland and New South Wales.

Let me turn for a moment to the geographical aspect of the Colony.

A perfectly straight line north and south divides Western Australia from the other colonies. It includes all that portion of the great Island Continent westward of 129 degrees east longitude. Its greatest length from north to south is 1480 miles, and its breadth from east to west 1000 miles. Two thousand miles of her sea-board is on the Indian Ocean, and 1000 miles of her coast is washed by the Southern Ocean. There are six land divisions—viz., South-west, Eastern, Eucla, Gascoyne, North-west, and Kimberley.

The South-western Division is at present the most important, and by far the most thickly populated. It naturally subdivides itself into three sections. On the east, the line of river watershed separates the more settled neighbourhood from the wild interior; then the great forest lands, extending about fifteen miles from the sea; and lastly, the coast districts on the south and west. The Great Southern Railway runs from Albany to Beverley through the first-named section; the finest timber grows on the second, which is likewise rich in stream tin, while coal and other minerals only wait development. The third again is unrivalled as an agricultural settlement.

The vast Eastern Division is only partially explored, but is in many parts richly grassed, and suitable for raising cattle and sheep. This section, moreover, includes the Yilgarn Goldfields, to which I shall refer more fully hereafter.

Of the Eucla Division only a portion has been explored. It contains some excellent pasture-lands, and when the water difficulty has been overcome by artesian wells and other scientific resources, it will doubtless prove an advantageous field for settlement.

The Gascoyne Division is watered by several rivers—viz., the Gascoyne, Minilya, Murchison, Greenough, and Lyons rivers. Horses, cattle, and sheep are successfully raised, and gold has been found in large quantities on the Murchison, Gascoyne, and Ashburton rivers.

The North-Western Division is watered by the De Grey, Shaw, Coongan, Fortescue, Sherlock, and other rivers having their sources in the granite ranges of the interior. This is a very important grazing district, and here are the extensive Pilbarra goldfields.

The Kimberley Division, to the north of the Colony, covers an area of 34,000 square miles. Here the climate is tropical, but it is rich in pasture-land, and its gold resources have been abundantly proved. Distance and difficulty of access have of course prevented its full development.

According to the latest computations, the total area of Western Australia is 678,400,000 acres, or 1,060,000 square miles. This vast tract of country, nine times the size of England, Scotland, and Ireland combined, has just reached a population of 60,000 souls, entitling the Colony to an elected Upper House, in terms of "The Western Australian Constitution Act, 1890."

In dealing with the geological formation of Western Australia, it may be stated that the general character of the auriferous country in this Colony is a series of belts following in the south the coast line which is a little to the W. of N. and E. of S. The gold reefs traverse the lower Devonian schists which are more or less altered by the action of the dioritic bosses which have distorted them in many places. These schists lie directly upon the granite, which has lifted them to an angle of between 30 to 45 degrees. The granites do not appear in a mountainous form, but take the shape of low ranges which in many districts have not outcropped more than sufficient to give the country an undulating character. It is these north and south belts where the diorites and sometimes trachytes have played their part, which are of exceeding importance from an auriferous point of view.

As we leave these auriferous belts of Lower Devonian schists, we approach more level country, which may be characterised as Upper Devonian sandstones. These appear to be almost entirely devoid of animal and vegetable life, and there are vast tracts of these sandstones whose *fauna* might be reduced to the *spinifex* (*triodia irritans*). The annoyances caused by this plant the *spinifex* are not realised on this side of the globe; but the very name of this vile growth is enough to send thrill of horror through the Australian bushman. These sandstones occupy a large area, and here and there patches of clear plains have several inches of salt. In fact these sandstones are in many instances highly saline, and after sinking for water, it often turns out too brackish to be of any value for domestic purposes; whereas wells sunk in the schists near the granites yield a supply of pure and wholesome water.

These auriferous belts following the coast line, nearly north and south are deemed to be a system of parallels. Two of these have been already traced at intervals and proved to be very rich, but a third parallel may possibly exist further in the interior, though up to the present time its existence has not been fully demonstrated. Now these parallels extend northwards for about 1000 miles, when the coast suddenly alters its geographical contour and runs eastwards. The auriferous belt has accommodated itself to this change of circumstances, and

departing from its original line swerves round and follows the line of the coast, taking a direction of a few degrees north of east. This is an illustration of how the geographical features correspond with the geological; or rather, how the geological conditions have evolved the present coast line.

The old "travellers' tales," whether true or false, seem to have been utterly ignored by the early settlers in this Colony, and it was not until 1840 that rich deposits of lead and copper were found in the Champion Bay district. Several very rich lodes between Geraldton and the Murchison, and adjacent to the coast, were worked by English companies, in a raised belt of country, extending from the Geraldton mine on the Murchison river in the north, almost to Geraldton in the south. The ores in these lodes usually consist of galena (sulphide of lead) and cerussite, associated with quartz, calcite, barytes, and blende (sulphide of zinc). The galena occurs massive and crystalline, and contains very little silver, any which is found being usually granular. Where cerussite (carbonate of lead) has been found, lead poisoning has been prevalent, having in some instances caused a stoppage of the works. Most of the old workings are now abandoned and full of water. There are some lodes, however, which have never been touched, and others that have been little worked. Although a railway was constructed thirty-four miles in length from Geraldton to Northampton, these mines have been practically deserted for about thirteen years, the chief reason being the fall in prices of copper and lead. It is believed, however, that the lead mining industry would prove remunerative if proper smelting works were established, and the Government offers a premium of £10,000 for the first 10,000 tons of metallic lead produced. A small local company was formed some time ago, but collapsed through want of capital, after producing several tons of pig lead, and thereby proving the practicability of the scheme if adequately managed and supported. According to the Government geologist, lead ore dressed up to 83 or 84 per cent. can be obtained in this district, whilst the coal seams on the Irwin river, about sixty miles distant, are quite suitable for smelting purposes, and there is an abundance of ironstone. Since 1845, when the first shipment was made, 7917 tons of copper and 31,105 tons of lead ore have been exported from this neighbourhood.

In 1846, the Messrs Gregory found coal seams in the bed of the north branch of the Irwin; and Dr Von Sommer, who reported thereon, soon afterwards stated that there were two seams of six and eight feet in thickness respectively. Two thousand five hundred and sixty acres were declared, but nothing was done for many years; and although the authorities

sent the Rev. C. G. Nicolay to make investigations, his report was such as to discourage investment. This field, such as it is, has now passed into the hands of the Midland Railway Company, who intend to test its true value.

Other minerals in vast quantity are hidden beneath the soil of Western Australia. Of this we have abundant proof, although the tiny army of prospectors and miners who have tried to test her mineral wealth could make comparatively little investigation on a territory of 700,000,000 acres.

A few of the discoveries are as follows :—

Silver has been found associated with lead ores in the Northampton and Roebourne districts. Copper exists in large quantities in the Northampton district, and also at Mullewa, Murgoo, up the Murchison, near Roebourne; while at Whim Well there is an immense lode.

The Northampton district is rich in lead, which also occurs in smaller quantities near Roebourne. The Western Shaw and Pilbarra districts have produced tin. Iron is found throughout these districts, and one of the largest lodes in the world is in the Weld Range.

The Northampton district yields zinc.

Coal exists in many parts of the Colony.

The Gascoyne River and Northampton District show the presence of graphite in considerable quantity. Mica exists near the Shaw and on the Gascoyne.

At the Nullagine kaolin has been discovered.

These facts, I think, bear testimony to the incalculable store of mineral wealth which Western Australia's hundreds of millions of acres may be supposed to conceal from the eye of man.

Although the ancient charts and maps point to the existence of gold in Western Australia, modern geologists for a time denied that the metal was present in the colony.

Since the time when Sir Roderick Murchison proclaimed his disbelief in the existence of gold in the Colony, the great auriferous wealth of the western parallel has been abundantly proved. A belt of gold-bearing country extends from Phillip's River, in the south, up through the Yilgarn, Murchison, Gascoyne, and Ashburton Goldfields. Then there seems to be a parallel further to the east, extending from Dundas Hills in the south to Ularring and Kimberley Range, then passing the heads of the Murchison and Ashburton Rivers, and possibly reaching to Marble Bar and Nullagine, where the belt may possibly be intersected by another, which, running east and west, cuts it at right angles. This latter assumption is not put forward as an ascertained fact, but merely as a possible suggestion as to the general run of the Gold Reefs.

It is impossible to exaggerate the magnificent outlook on these vast tracts of auriferous territory. With the progress of exploration and discovery, new resources of wealth are appearing, and immense openings are revealing themselves for the employment of capital and labour.

Many of the alluvial deposits have already yielded large returns without the use of machinery. These cannot, however, be reasonably expected to last. The future prosperity and permanence of the West Australian Goldfields lies in the working of her great Quartz Reefs. To efficiently do this demands enterprise on a large scale, backed by capital and scientific skill. Then will the element of chance be reduced to a minimum, and gold mining be conducted on a basis of systematic calculation, like any other technical branch of industry.

Distance, drought, and scarcity of timber, from which some districts suffer, are difficulties of nature, which, however, can be largely overcome by science; and the vast mineral wealth to be secured will amply justify the employment of best means known to man.

In 1882 the late Mr E. T. Hardman examined the Kimberley district, and it was his report on the same territory, three years later, which led to the establishment of the gold mining industry in Western Australia.

The "Cinderella of the South"—as the Colony has been called—was the last of the colonies to come to the front as a gold-producing territory. Each of her colonial sisters had already passed through the ordeal of gold fever.

In dealing with the several Goldfields of Western Australia in detail, I propose, in the first place, to describe the last proclaimed field of Dundas Hills, which are situated about 120 miles north from Esperance Bay. They are extremely rugged in appearance, and consist of bare rocks, timbered here and there in patches. On the side of the dry salt lake they have a cliff-like aspect, and many rocks stand out from the waterless lake bed, through which run several well-defined reefs. These are wide, and seem to run regularly, the tract leading into a gully, which extends half-a-mile into the hills. Colours of gold have been got in these reefs; but little prospecting has been done as yet. The auriferous country is probably a narrow strip running north and south, and showing on both east and west sides of the hills, which are mainly of ironstone, with occasional glimpses of quartz. Several gullies intersect the hills, but do not exhibit alluvial, nor do the reefs seem rich enough for dolly-ing. In short, this ground, although very promising, is not the place for the poor man or amateur, at all events until the advent of machinery.

The camping ground is at a soak in the gully, surrounded by hills. Here water was forthcoming during several months this summer, sufficient for thirty men and twenty-five horses; but by last reports it was nearly dry.

The Yilgarn Hills consists of a low range about 250 miles east of Perth, on the western side of a series of salt lakes, of which Lake Deborah is the southernmost. They run for the most part north and south, their width ranging from two to three miles. On the eastern side they extend, with gradual declivity, towards the lakes, being separated therefrom by a plain four to six miles wide, consisting of red clay, strewn with ironstone and quartz.

The rocks are mica schist, mica slate, and flaggy quartzites, with many diorites and quartz veins. They have been tilted up from the west by a large mass of intrusive granite, which forms a rough face on the western side of the northern hills, and is again seen in the southern part, appearing above the plain in huge rounded masses. The quartz reefs follow the strike of the rocks, and show great variety of character, the white quartz being less clearly defined and in smaller masses than the more ferruginous reefs.

"Yilgarn" is the native name for white quartz, and the first discovery of gold in this district was made by Mr H. E. Anstey, at the end of 1887, at a place called Emun, about twelve miles north of Golden Valley. The next discovery was made at Golden Cross itself, a few months later. Then about the middle of 1888 gold was found some forty miles south, near the Central Mine in the Southern Cross district—the latter place so called from its first discoverer having been led thither at night-time by the aid of the stars. In December 1888, Mr Parker, guided by a native, made a further discovery some forty miles to the south-east, hence the name of Parker's Range.

Generally speaking, the stone is rich, often containing six ounces of gold to the ton; and trial crushings have shown that a very large mass carries a remunerative proportion. Rich alluvial deposits have likewise been found, but scarcity of water has proved a serious obstacle to progress. Plenty of brackish water, however, is obtainable, which, by the use of condensers, is rendered available for steam purposes. The conservation of the rainfall by the use of catch-dams, however, may yet supply the wants of the mining population for domestic and drinking purposes.

Coolgardie is, I believe, within the proclaimed boundary of Yilgarn; but as it is 120 miles to the south-east of Southern Cross, it may be treated as a separate goldfield.

In October 1892, Mr Bayley, a miner who was prospecting in

this neighbourhood, made one of the richest finds in the history of gold mining. The news of the discovery speedily sped to Perth, and in November of last year, Mr Sylvester Browne, who happened to be in the Colony, travelled to Coolgardie, and bought Bayley's Reward Claim from its original holder for £6000, and a one-sixth share in the mine.

Bayley's Reward Claim shows a reef, which consists of a small blow running in a north-westerly direction, and underlying to the north-eastward, striking across the line of country, which here runs nearly north and south. This reef is about nine feet broad in its widest part, but pinches towards either end of the claim. At the north end there is another blow of quartz, which strikes north and south, following the line of the strike of the country. This blow then dips under the alluvial flat, but a reef, on exactly the same line, is met with in a shaft in the gully, after which it appears to be lost. In one year Bayley's Reward Claim has yielded half a ton of gold, with no battery, and here I have a photograph showing 4205 ounces of this gold, valued at about £16,820.

In many parts of this colony specimens have been obtained on the back of the reefs giving half gold and half quartz; but at Coolgardie the record has just been beaten, as a sample of gold quartz, weighing 10 lbs., gave 9 lbs. of gold!

The Murchison Gold Fields are situated about 320 miles to the eastward of Geraldton, or about eight days' journey. The road for the first sixty miles is rather bad, the first thirty miles being chiefly sandy hills, where water is scarce; and the second thirty miles crosses a sandy desert quite destitute of water. The remaining distance, however, leads through the bush, and presents no great difficulty, water being obtainable at easy stages.

The territory begins to show auriferous signs within eighty miles of the diggings, and several belts are passed over which are well worth prospecting. The fields, as you approach, are full of such indications as gladden the eyes of a practical miner. Quartz and ironstone in fragments strew the entire surface, and outcrops of the same are visible in all directions.

The proclaimed area of the Goldfields is 32,000 square miles; the principal auriferous belt being situated at the eastern side of the district. It runs in a north and south direction, from West Mount Magnet to Austin's Lake, and then in a north-easterly direction to Lake Annean and Yagahong. Other rich patches exist farther east, and a few patches have also been discovered nearer the coast.

These fields were the result of a discovery by John Connelly, near Lake Annean, and his find is now being worked at the

Nannine Mine. It may be mentioned that at Mulga Mulga and Yuin in this district, gold had previously been found, but not in paying quantity; hence the search was abandoned for the time.

The geological features are described by the Government geologist as "the ruined remains of a vast, high, sandy tableland, presenting to-day a broken surface, consisting of salt marshes or lakes fringed by salt, sand, clay, and gypsum flats, from which rise low rough hills of metamorphic rocks or white cliffs, on the top of which are sandy plains, the remains of the ancient tableland. There are no well-defined rivers, but the few creeks discharge themselves into the salt flats, where the water evaporates, except after excessively heavy rains, when they overflow into rivers which run towards the coast. The hills are mostly small and low, consisting of ridges of hard metamorphic rocks, near which the rich finds of gold have been made. These are often capped by the same horizontally bedded formation exposed in the cliffs at the edges of the broken tablelands, which are generally covered with dense thickets of low scrub." As has already been said, nature's most formidable obstacle in the path of the gold-seeker throughout the Colony, is want of water; but the Murchison district is fairly well provided with the necessary of life. Near the salt lakes there is a scarcity, but even there, if the well be sunk a short distance from the edge, the water is found to be fresh.

In most of the mines good water has been struck considerably under 100 feet down, and in fact it does not appear that scarcity is likely to hinder the development of these fields. The lack of timber is more to be dreaded as an opposing factor, particularly at the south end of the field, where there is nothing but mulgar.

The River Ashburton, which is about 500 miles in length, has its source in the Gascoyne Division of Western Australia, and flowing in a north-easterly direction, discharges its waters into the Exmouth Gulf, in the North-West Division. Early in 1890, alluvial gold was discovered in this district, on a creek running down a gorge about 200 feet deep, between steep cliffs of clay slate, capped by almost horizontally bedded limestones. The point at which the discovery was made, is about 150 miles from the coast, and the Ashburton goldfield was duly proclaimed in December 1890.

The auriferous belt of country comprised in the Ashburton Goldfields, extends from the junction of the Hardey River with the Ashburton, a little to the north-east of Mount Clement, following the latter river in a south-eastern direction for about 150 miles. It is bounded on the south by the Barlee Range, and a flat-topped tableland, which follows at a distance of about

14 miles to the south, the main course of the river. To the north it extends across the Ashburton and Hardey Rivers to Mount Wall and Mount de Courcy, a distance in a northerly direction from the river of from about 20 to 30 miles, giving an auriferous area of some 1800 square miles greater than the proclaimed area—*i.e.*, about 10,000 square miles.

The rocks, for the most part, consist of clay and chloritic slates, sandstones, and quartzite (the slates occasionally showing good cleavage), and are intersected by numerous quartz and ferruginous lodes. I may remark that the rocks are very similar to those found in the auriferous areas of other Colonies, but differ from those in other countries.

In passing on to Pilbarra, it must be remembered that these fields suffer from the lack of opportunities enjoyed by the more fortunate southern fields. Coolgardie has been assisted by sensational discoveries; the Murchison has had the advantage of a certain reputation, and a more accessible situation; while Yilgarn has been supported by the favour of the Government. Moreover, all these fields are in the southern district, and are the first to catch the eye and ear of the speculator.

It is an extraordinary thing that with the exception of my own efforts to bring Pilbarra to the front, I am not aware of any other person outside the Colony who had attempted to describe or has even mentioned this important field. Even the Government Geologist, after devoting sixteen pages of printed foolscap to the Murchison fields in his report of 1893, dismisses this district in *one line* :—"Pilbarra and Ashburton," he says, "have neither proved yet to be large reefing districts, *so need not be mentioned*." Pilbarra has truly suffered from every ill that a distant, untried, and unknown goldfield could be heir to, but it has always possessed a few miners having pluck and knowledge to test its capabilities. It is to the courage, faith, and perseverance of these men that Pilbarra owes its recognised existence to-day, and the same pillar of strength which unearthed and supported it in the past, seems certain to carry it onwards to success and prosperity in the future.

The Pilbarra Goldfield has a proclaimed area of 32,000 square miles, and is situated in the north-west district of the Colony.

Its general features are alluvial plain, which follows the coast-line, broken occasionally by rocky hills, and a high table-land to the south and east.

On the northern edge of this plateau several rivers have their sources, and cut deep gorges through the upper horizontally bedded rocks, which expose crystalline rocks across the line of their channels. These gorges run towards the north and north-

west, first through limestone and quartzite rocks, then through flats bounded by rough sandstone and by deep ravines through broken hills of schists, slates, sandstones, quartzites, conglomerates, and amygdaloids, into alluvial plains, from which rise occasionally bold hills and small peaks of quartz, granite, and ironstone. These plains stretch to the sea-coast, where they are fringed by mangrove swamps, except where trap-rocks form a rugged coast. The amygdaloids in many places split into rough blocks, which become red or black on the surface, and then present the appearance of a huge heap of stones, without soil or vegetation. They contain vast numbers of agates, crystals, and other enclosures, so that the streams permeating them would be worth prospecting for precious stones.

There are many subordinate fields within this great area, which probably carries, sleeping within its veins, countless millions in the shape of virgin gold.

These fields, again, are divided and sub-divided as claims are taken up. I will endeavour to enumerate and describe the most prominent of these districts and properties.

The Marble Bar field lies in a nest of low sandstone and slate hills, to the east of the Coongan River, and is distant from Roebourne about 275 miles.

No field that I have visited, and no district of which I have studied the report, appears to me to hold out more brilliant prospects for the future.

Without that modicum of assistance accorded by the Government to other and far less deserving fields, the Marble Bar Reefs have abundantly proved their quality. Both this field and its neighbour, Bamboo Creek, were opened up by ideal pioneers among the gold finders, whose innate perseverance and indomitable courage led them to penetrate far into the wilderness, and encounter inevitable distresses in these distant wilds. To these men, whose chief capital was their strong arms and stout hearts, may be attributed the early success and development of these fields.

The Nullagine district is situated on a creek of the same name, which is a branch of the De Grey River. By road it is some 300 miles to the eastward of Roebourne, and about 120 from the coast.

Alluvial workings of three classes occur.

First, the alluvium of existing creeks.

Second, the alluvium of older creek beds, but in conjunction with present streams.

Third, old alluvium deposits, or deep leads, bearing no relation to existing streams or configuration of the country.

All three deposits are very rich, and the more recent deposits very easily worked.

There is probably a grand future in store for this neighbourhood.

One of the most extraordinary outcrops in the Pilbarra district, is an association of gold and antimony, called the Mallina Mine. Nine shafts have been put down in various parts of this reef, showing an increase in richness at the lower depths. I think a good deal of importance attaches to this reef, as without doubt here is a mine that will hold down to immense depths, and is probably the richest in the district.

I come now to the last of the great proclaimed areas of Western Australia under the "Goldfields Act, 1886"—viz., the Kimberley Goldfields. Although I place it last in sequence, owing to its geographical position, I might well have adopted a chronological method and placed it first.

The Kimberley Goldfield is situated in the north-eastern corner of Western Australia, and its principal workings are near the eastern boundary of the Colony, about 200 miles from Wyndham on Cambridge Gulf, and 300 miles from Derby on King's Sound.

So far back as 1882 the late Mr Edward J. Hardman, F.R.G.S.I., Government Geologist, had actually discovered the existence of gold in the Kimberley district. The subject may be said to have slept for three years, when it was revived, and gold prospecting began in earnest.

This country is traversed by the Margaret, Mary, Elvire, Panton, and Ord rivers, and comprises an area of at least 2000 square miles so far as observed, but it doubtless continues over a much greater extent of country. The formation is principally Silurian schists and slates, traversed by an enormous number of quartz reefs. In some localities many of these occur in the space of a few hundred yards, and it is quite usual to notice twenty-five or thirty large reefs while riding over a mile of ground, without taking into account the smaller reefs or veins. The quartz constituting these reefs is of a very promising character. It is a dull yellowish and grey quartz very cellular and vuggy, containing quantities of black and other oxides of iron, together with casts of, and often crystals of iron pyrites. From most of the surface quartz the enclosed minerals have been washed away however, although their traces are still apparent.

The quartz reefs have a general bearing of N.-E. Some run due N. and S. A few of them can be traced for several miles.

It is most probable that these quartziferous rocks are a spur or continuation of the gold-bearing metamorphic rocks of the Northern territory of South Australia, now being worked with success.

A comparison between the progress of the Western Australian Goldfields and the early results from the South African Goldfields, reveals that whilst seventeen years elapsed before the South African Fields produced £200,000 of gold, the Fields of Western Australia exceeded that sum in the seventh year. It also shows that the out-put for the first seven years of the West Australian Fields has been more than double the African out-put for the first seven years. Moreover, Western Australia has exceeded by nearly £70,000 the out-put for the first fourteen years from South Africa. These results have been attained, notwithstanding the fact that hardly any of the mines in Western Australia have (owing to lack of capital) as yet been efficiently worked, and that a very small portion of the gold-bearing area has as yet been prospected.

I must claim, your indulgence for the length of my paper, which perhaps has extended beyond the ordinarily allotted time; but I may say that it is difficult to deal shortly with a country containing nearly 700,000,000 acres; but which, in spite of all natural and other disadvantages, gives abundant promise of being in the near future the richest mineral territory in the world.