NEW SOUTH WALES.

DEPARTMENT OF MINES.

GEOLOGICAL SURVEY.

E. F. PITTMAN, A.R.S.M., Government Geologist.

MINERAL RESOURCES.
No. 21

THE ADELONG GOLDFIELD.

BY

L. F. HARPER, F.G.S.,
Geological Surveyor.

SYDNEY: WILLIAM APPLEGATE GULLICK, GOVERNMENT PRINTER.

1916.

† 52287—a

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LETTER OF TRANSMITTAL.

Department of Mines,
Sydney, 24th December, 1915.

Sir,

I have the honor to transmit for publication a pamphlet on "The Adelong Goldfield," (being No. 21 of the *Mineral Resources Series*) by Mr. L. F. Harper, F.G.S., Geological Surveyor.

Adelong is typical of a number of goldfields which were opened soon after the discovery of gold in Australia, and which enjoyed a large measure of prosperity for a time, to be followed by a period of depression when the more easily won alluvial gold was exhausted.

This field is also of interest by reason of the fact that it was here that a depth of 1,000 feet was first reached in an Australian gold-bearing lode, as the result of a reward of £1,000 which was offered by the Government for the purpose of stimulating deep prospecting. It is to be regretted that mining operations have not reached a much greater depth during the thirty-five years which have supervened since the payment of the reward, and that the present outlook for gold mining in this district is not more hopeful.

I have the honor to be,
Sir,
Your obedient servant,

EDWARD F. PITTMAN,
Government Geologist.

The Hon. John Estell,
Minister for Mines.

PHOTO-LITHOGRAPHED BY W.A. GULLICK, GOVT. PRINTER, N.S.W.

View looking down Adelong Creek, from Gibraltar Mine, 1899.

† 52287

THE ADELONG GOLDFIELD.

INTRODUCTION.

In response to a letter from the General Superintendent of the Gibraltar Consolidated Gold Mines, the writer was instructed in May, 1915, to make a careful examination of the mines and tender advice. Subsequently authority was given to describe the Adelong Field generally, and the following is the outcome of the investigations made.

Acknowledgments.

Special mention must be made of the great obligation under which the writer is placed to Mr. N. Holman, General Superintendent of the Gibraltar Consolidated Gold Mines, Limited. Mr. Holman placed his services almost entirely at my disposal both underground and in discussing mine plans and problems.

The details of many of the theories advanced, or deductions made, were worked out in conjunction with him, whilst his intimate knowledge of the mine and vast experience enabled him to thoroughly grasp the problems met with, and make many valuable suggestions.

Plan B is taken entirely from the Companies Mine Plan.

Thanks are also due to Mr. John Perkins, of "The Post Office Hotel," Adelong, who afforded me much interesting historical information, and identified the various old mine workings on the ground.

Mr. Geo. Card, A.R.S.M., Curator, Mineralogist and Petrologist to the Geological Survey, examined the various rock specimens collected, and furnished Petrographical descriptions, thus greatly facilitating the work.

HISTORY AND GENERAL REMARKS.

The town of Adelong, from which the goldfield derives its name, is distant some 314 miles by road and rail to the South of Sydney. Mount Horeb, situated on a branch railway from Cootamundra to Tumut, is the nearest railway station, the distance from the railway to Adelong being 7½ miles.

About three miles from Mount Horeb, the road passes through the village of Grahamstown, and a mile further on lies another small village called Shepherdstown, both of which sprang up as mining centres. The latter is the postal town for The Gibralter Consolidated Gold Mines, the workings of which extend up the range on the opposite side of Adelong Creek.

The Field ranks amongst the early reef mining localities of Australia, for gold was discovered there about the middle of 1857. At Adelong proper the Victoria line of reef and the Old Hill Line, situated on the hills rising from the North bank of Adelong Creek, as are all the important lodes in this belt of country, were the scene of active mining operations in the past, and a large amount of work was carried out on them between the years 1857 and 1902. At one time eighteen reefing claims were being worked along these two lines, and large yields of gold were obtained from the upper levels. The Great Victorian Mine was the first in the State to reach a depth of 1,000 feet from the surface, and the Company earned a Government reward which had been offered to encourage deep sinking.

A distinct line of reef, known as the Currajong, is situated about midway between the Victoria and the Gibraltar lines, but only one claim appears to have been worked, and results were not encouraging.

On the crest of the range separating the Adelong Creek watershed from that of Gilmour Creek, and on the south side of the Adelong–Tumut road, a line of reef has received some attention, and several claims were taken up, but work appears to have been confined to a mine known as the Lady Mary. Miners who worked in this say that the material in the ore channel was very soft, and open spaces were frequently met. Good results were obtained from the upper levels, but although a considerable amount of money was spent in prospecting the lower levels, the channel opened up failed to yield payable returns, and operations were discontinued some years ago after reaching a depth of from 500 to 600 feet.

Mining on the Gibraltar Hill commenced shortly after the discovery of the field, but all work was practically abandoned after about five years prospecting. There were a number of small claims, but the deepest working was only 50 feet below the surface, when prospecting ceased for about ten years. The Gibraltar Syndicate then started work, and after four years succeeded in finding some rich makes of ore.

There was an old-fashioned public battery here at that time, with ten head of wooden stamps shod with iron, each weighing about 160 lbs. The crushed material was passed over plates and fed into a Chilian mill, without mercury, only the free gold being recovered. The sulphides estimated to yield at the rate of 10 oz. of gold per ton were emptied into the creek.

The tailings were frequently put through the Chilian mill again with mercury, and yielded as much as an ounce of gold to the ton.

The Adelong gold-field has not received much attention in the way of mining or geological reports from either Government officials or private individuals.

The following report by Mr. W. H. J. Slee, late Chief Inspector of Mines, is taken from the annual report of the Department of Mines for 1876 :—

Report of the Inspector of Mines upon the Mines at Adelong.

(W. H. Slee, Inspector of Mines.)

I have the honor to inform you that I have inspected several of the principal quartz mines at Adelong.

The whole of the Adelong Gold-field comprises a succession of hills and mountain ranges, there being very little level country throughout the district; the hills are of granite formation, the reefs or veins numerous and rich, and their course generally north and south with few exceptions.

The reefs or veins are found in channels varying from 2 to 10 feet in width, with walls of granite formation. The veins or crushing stuff in these channels vary from 6 inches to several feet, and consist of quartz largely impregnated with pyrites, and encased in a mixture of black slate and quartz; the quartz is often crushed separately, and called first the slate mixture, second-class crushing stuff.

Sometimes several gold-bearing veins are met with in one channel, and it is for this reason as well as for the proper security of working a mine that the whole width of the channel has to be taken out, no matter how narrow the actual crushing stuff may be; therefore, these wide channels often cause great expense, and retard the progress in opening and stoping the levels in the Adelong mines.

The principal channels at present opened up, and in which the richest veins are imbedded, are situated on the western and eastern sides or slopes of the Victoria Hill. That on the western side is called the Victoria line, and that on the eastern side the old line of reefs, and there is a reef between these two called the Middle Reef.

Upon the Victoria line of reefs there are at present the following mines :—

The Great Victoria Gold-mining Company (Limited) has made a name for itself, by having laid claim to the Government reward of £1,000, and which was on the 20th January fully reported on by me. This mine, which consists of two 5-acre leases, is now down about 818 feet; a trial crushing of 6 tons from the 810 feet level yielded 15 oz. 2 dwts. 12 grains, in addition to which about 60 lb. of specimens were sent by me to the Department of Mines, Sydney, 3 tons of quartz will now be raised under my personal supervision, to be crushed at the Mint as a further test.

In June, 1873, this mine was only 370 feet deep; in July, 1875, the depth was 565 feet; but since September, 1875, when the Government reward was first offered up to date, the shaft has been sunk 253 feet, making a total of 818 feet. The quartz at the lowest depth looks certainly payable, and should yield at least 2 oz. per ton, of which 1 oz. per ton will pay all expenses for raising, carting, crushing, &c., and leave a clear profit of 1 oz. per ton.

South of the Great Victoria is the Research mine, an 8-acre lease, worked by a private company; depth about 470 feet. The company work at present on a vein about 14 inches wide, which within the last fortnight has turned out some very rich crushing stuff. This mine, with capital properly invested, and work systematically carried on, should not fail to be a good dividend-paying one.

The Union Company's mine, a 6-acre lease, greatest depth 420 feet, has a little water in its workings. It formerly yielded as much as 14 oz. per ton for several crushings in succession, although idle now for some time. If capital, ability, and economy were brought to bear on this mine, and machinery erected for winding and for raising water, it would not fail to pay a large interest upon the capital judiciously invested.

The Little Victoria Company's mine, a 20-acre lease, is now lying idle, although hundreds of tons have yielded 10 oz. per ton. The deepest part of this mine is not more than 200 feet deep, and it seems strange that such a large piece of ground should lie idle. I would, therefore, respectfully draw the attention of *bona fide* capitalists to this mine, as it must prove a profitable investment.

North of the Great Victoria are the following mines:—

Annett's (a private company), a 3-acre lease; greatest depth, 635 feet. This company worked for about eight years without any returns for capital and labour expended, but within the last twelve months they have crushed as high as 6 oz. per ton. They are now crushing, and expect fully 1,000 oz. out of about 300 tons. The quartz they are now raising is expected to yield better than their present crushing.

This mine is now one of the best-paying gold mines in New South Wales, and has every appearance of permanency, although its payable capabilities only commenced at the depth of over 500 feet below the surface.

The Flagstaff, or Amos Bros.' mine, an 8-acre lease, greatest depth 815 feet, at present not payable. I am of opinion the company should have crosscut, because, although they may be in the Victoria channel, the same as Annett's in the south, and the Williams Gold-mining Company's on the north of their boundary, still, as there are several channels running parallel through the Victoria Hill, there is a great probability that a shoot or run of gold may miss one channel and be found parallel in another. To use a miner's phrase, "jumping from one channel or vein into another," leaving in a zigzag fashion barren and gold-bearing parts alternately.

Throughout the Australia goldfields this zigzag fashion in the runs of gold is very often observable, whether in quartz or alluvial, and it is through this that rich deposits are often found opposite the barren places of a rich, but patchy, lead of gold. Therefore, cross-cutting should be more adhered to, and, until the contrary is proved, Adelong should not be considered an exception to the above rule.

The Williams Gold-mining Company, Limited, own a 6 acre lease; greatest depth, 635 feet. The mine has given several dividends, but is at present worked on tribute, the company finding all tools and material, carting and crushing for half the gross yield of gold obtained by the tributors. The company have a fifteen-head battery worked by water-power; also two of Denny's pulverisers in connection with their mine. The pulverisers, although not so successful on other goldfields, the manager of the Williams Gold-mining Company highly recommends as a successful gold-saving machine. The shaft in this mine is substantially skidded, and all raising and lowering is done by cages instead of the slow method of using buckets. This alone must be a great saving to the company.

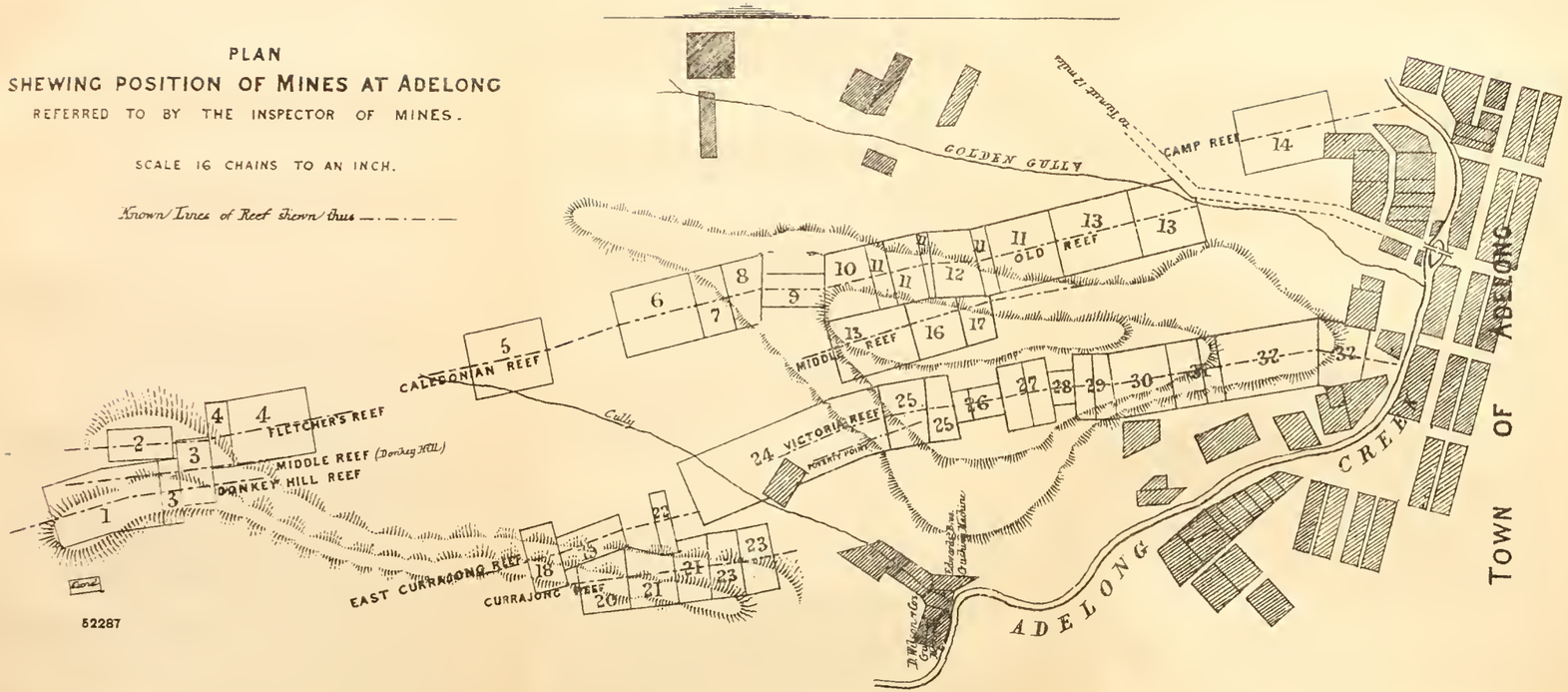
Hamilton
M. Hodge and party
R. E. Thomas and party
N. Emanuel
Currajong" G. M. Co.
W. Hendon and party
D. Wilson and party
Leviathan" G. M. Co.
North Williams G. M. Co.
Williams G. M. Co.
"Flagstaff" G. M. Co. (Amos and party)
W. Annetts and party
"Great Victoria" G. M. Co.
"Research" G. M. Co.
"Union" G. M. Co.
"Little Victoria" G. M. Co.

A. GULLICK, GOVT. PRINTER, N.S.W.

PLAN
SHEWING POSITION OF MINES AT ADELONG
REFERRED TO BY THE INSPECTOR OF MINES.

SCALE 16 CHAINS TO AN INCH.

Known Lines of Reef shown thus — . — . — .



1. J. Watson and party.
2. T. Channon and party.
3. J. Nott and party.
4. J. Tonking.
5. R. Trudgen and party.
6. J. Gale and party
7. Kennedy and Mc Gutchen
8. R. Crandell
9. "Old Reef" G. M. Co.
10. "Crown of Old Reef" G. M. Co.
11. "The Adelong United" G. M. Co
12. "Our Own" G. M. Co.
13. "Welcome Home" G. M. Co.
14. "Camp Reef" G. M. Co.
15. A. Bruce
16. R. Rogers
17. Hamilton
18. M. Hodge and party
19. R. E. Thomas and party
20. N. Emanuel
21. "Currajong" G. M. Co.
22. W. Hendon and party
23. D. Wilson and party
24. "Leviathan" G. M. Co.
25. North Williams G. M. Co.
26. Williams G. M. Co
27. "Flagstaff" G. M. Co (Amos and party)
28. W. Annetts and party
29. "Great Victoria" G. M. Co
30. "Research" G. M. Co.
31. "Union" G. M. Co.
32. "Little Victoria" G. M. Co

PHOTO-LITHOGRAPHED BY W. A. GULLICK, GOVT. PRINTER, N.S.W.

The North Williams Gold-mining Company, Limited, has an 11-acre lease; greatest depth, 590 feet. The company is at present cross-cutting at the 425 feet level, a very sensible plan. Although the country is hard, and the progress tedious and expensive, there is a great probability of success.

Everything in connection with this mine is substantial, the air good, tools and ladder-way faultless, the shaft securely skitted and worked by cages, which is a great saving to the Company; the vein or lode has a steadier underlay to the east, and is more of a solid, uniform, and less bunchy nature than the veins in the mines on the southern slope of the Victoria Hill. The country is very hard at present, but as the mine has been rich and well managed, I have no doubt when sinking and cross-cutting is carried on, payable veins will again be met with, and dividends paid as formerly.

There are but two or three other leases further north on this line, but as nobody has been at work on them for a great length of time, I could get very little information concerning them.

Although most of the mines on the Victoria line of reefs are over 500 feet deep, they are still worked by whims and horses, which at the best is but slow work. The principal reason in favour of horses is that these mines have not enough water to supply an engine, and the cost of making tanks or drawing water for the use of the engine would exceed the cost of horseflesh. However, if these mines keep on sinking, machinery for winding purposes will have to be erected.

About 300 yards east and running parallel to the Victoria Reef is the old reef, which has been very rich.

The crown of the Old Reef Mine, as its name indicates, is on the crown of the hill. Several thousands of ounces have formerly been obtained out of this mine (as annexed statistics will show, but the mine is at present idle. It contains a little water in its workings, which, though long standing, overflows, and thereby injuriously affects and impedes the progress of sinking in Prowse and Woodward's mine; greatest depth, about 400 feet. South of the crown of the Old Reef is Prowse and Woodward's mine (at present held in connection with the Adelong Company), a 5-acre lease; greatest depth, 610 feet, and still sinking. For about 90 feet there has been only the channel, but no sign of vein visible. During the last fortnight, however, great improvements have taken place. At first a small mundic vein, about 1 inch wide, was struck; this has in the last few feet enlarged to 4 inches wide, thickly impregnated with pyrites and showing gold. This is the deepest shaft on the whole line of the Old Reef; therefore, this discovery is of the greatest importance, and there is now every indication that under the present able mining management this mine will again be one of the best in the colony.

At the 470 feet level there is a drive from the main shaft about 220 feet, part of which is let by contract, and within the last week gold was struck in this south drive; at present the vein is about 6 inches wide, and shows gold at the rate of $1\frac{1}{2}$ oz. per ton.

Our Own Company's Mine, a 5-acre lease (greatest depth, about 400 feet), is now lying idle (while the Adelong United Company are prospecting north and south of this mine). There were several thousand

ounces of gold extracted from this mine, and surely it cannot be said that to sink a shaft to a depth of 400 feet has proved the intrinsic value of a mine.

The Adelong Gold-mining Company, now united under the same proprietory and management as Prowse and Woodward's, and called the Adelong United Gold-mining Company, owns a 10-acre lease; greatest depth, about 480 feet. There is a winding engine of about 12-horse power in connection with this mine; the only winding engine at present at work on the Adelong Gold-field. Although this mine and the Prowse and Woodward's are held by a few gentlemen in Sydney, they fully intend to prospect and develop these mines. The mine is under able management, and there is every probability that the owners will be rewarded for their pluck and perseverance.

These are all the mines at present at work on the line of the Old Reef; there are, however, some leases north and south of this line lying idle, the proprietors acting the dog in the manger; they will neither work nor yet give up possession of their leases, a system, I am sorry to say, adopted throughout our gold-fields, which is injurious to the *bona fide* miner, a fraud on the revenue of the country, and detrimental to the true interest and advancement of our gold fields. A strong remedy should be adopted, and the labour conditions stringently enforced.

Middle Reef.—This reef runs between and lays parallel to the Victoria and the Old Reef. As much as 4 oz. per ton has been crushed near the surface, but the mine now lies idle. The deepest shaft is about 200 feet.

The Victoria Reef underlays to the east, the Old Reef to the west, and the Middle Reef slightly underlay to the west, but is almost perpendicular, and as the greatest distance from the Victoria to the Old Reef is only 300 yards, there is a probability that these three reefs will join at a great depth, and so form one and the main reef of this district.

About 1 mile north of the Victoria Hill there are several lines of reefs.

The Caledonian, North Caledonian, North and South Curragong, Eureka, Victoria Extended, and Donkey Hill.

Most of these mines are now prospecting, but I am glad to state that the Victoria Extended has lately come upon quartz at the depth of about 180 feet from the surface, which would realise about 3 oz. per ton.

About half a mile east of the Victoria Hill is the Camp Reef, greatest depth 180 feet, now idle, although crushings of 3 oz. per ton have been taken out of it.

There are also the Gap Reefs, about 1 mile south by east from the Victoria Hill; greatest depth 150 feet. Very little work has been done on these reefs for the last fifteen years, although Boyd and party and others crushed as high as 4 oz. per ton for several crushings. Some of the Adelong residents have enclosed these reefs by fences, which should not be allowed, because, although the ground is not purchased, the fencing in of the same will prevent many miners from testing the reefs, especially as there is always a great trouble and expense to the miner if he wishes to enter for the purpose of prospecting these so-called improved auriferous lands.

In the alluvial there are also some mines worthy of notice, such as Shepherd's Sluicing Mine at Shephard's Town, about 2 miles from Adelong; but so far I have had no time to visit the same. I cannot give any authentic information. I will, however, do so at the first opportunity. I hear Mr. Shepherd employs at least seventy men about his mine.

Annexed will be found statistics extending as far back as 1859, clearly showing the great amount of gold taken out of the Adelong mines from the surface down to about 200 feet.

The claims in 1859 were very small, but they are now converted into leases of large dimensions.

The Adelong Reefs, although very rich, were almost deserted for several years, and considered worked out by the miners of that day. There were also some writers predicting and setting forth theories through the principal journals of this colony that the Adelong Reefs, being embedded in granite country, would not prove payable at a greater depth than 200 feet below the surface. However, this theory predominated only for a time, and practice has proved that these reefs are now payable over 800 feet, with a prospect of an almost unlimited depth. Taking a common sense or practical view of the history of this gold field, one feels astonished that such wealth should lay within our reach, while men clamour for work or capital lays dormant awaiting good investment.

This argument might be met by saying there are now companies on Adelong not paying, and, therefore, my opinion cannot be correct, to which I can only give the following answer:—"As long as companies will persist in the suicidal practice of starting the working of a mine with a nominal instead of actual capital, as long as they persist in declaring dividends without leaving any capital in hand for times of need, so long will there be almost a certainty of failure."

When a mine is paying, sinking and cross-cutting should be forced ahead, but instead of which the bunch, run, or patch of gold is generally worked out, dividends declared, and no capital left to meet the expenses of future development, such as sinking, &c., consequently as soon as the gold-producing powers of a mine diminish, development is stopped, or, perhaps, a call of 1s. per script made, after which the mine is often condemned as worthless, no matter how shallow or undeveloped it may be; and last, but not least, this system discourages the mining manager, and gives him no justice, and affords him no opportunity of bringing his ability and practical knowledge to bear on the development of the mine under his charge.

There is one feature in the Adelong Reefs which deserves special notice, that is, that the fissure, cleavage, or channel runs regularly with well-defined walls to whatever depth they have as yet been sunk, whether they contain payable veins or not; and this is one reason amongst many others why I firmly believe the Adelong Reefs will prove payable at a very great if not an unlimited depth.

Adelong has at present two crushing machines of fifteen stampers each, worked by water power. One belongs to the Williams Gold-mining Company, the other to Messrs. Wilson and Ritchie (Wilson & Co.); both machines have improvements for gold-saving purposes, but that of Wilson & Co. is certainly one of the best, if not the very best, on the gold fields of New South Wales.

The returns of gold received at the Mint by escort for the year 1876 places Adelong, with its small population, third on the list, as the following will show:—

	Ozs.		£	s.	d.
Hill End	17,299.03	Value	68,042	17	0
Parkes	17,342.98	„	66,120	2	3
Adelong	16,432.54	„	62,580	11	9
Gulgong	16,236.78	„	62,985	3	6

In conclusion, I beg to state that the Adelong Gold-field deserves better attention by *bona fide* capitalists. With capital judiciously invested, and prospecting carried on in a systematic manner, Adelong would take the first rank amongst the gold-fields of New South Wales. No doubt money has been squandered here during the mining mania; nevertheless, it cannot be said that these gold mines are worked out or even developed, but a time will assuredly come when the Adelong Mines will pour out their wealth and cause a reaction in the public mind in favour of gold mining.

My practical experience of gold-mining during twenty-two years on the principal gold-fields of the Australian Colonies has led me to form these opinions, and I have no other object in view in writing this report than to place our gold-mines on a sound and legitimate footing, to provide an antidote for the after effects of the late injurious mining mania, not to induce the capitalists to waste their money, but simply to place before them the intrinsic value of such mines as are worthy of their attention.

The following statistics show the quantity of gold won from the two principal reefs on Adelong, extending as far back as 1859, although some crushings undoubtedly have taken place, of which no record has been kept, and of which no return can now be obtained by me. Still even these returns will show the richness of the Adelong mines, and the insignificant development most of these mines have undergone since 1859:—

Date.	Name of Party.	Number of Tons.	Yield of Gold.	Remarks.
			oz. dwt.	
From 1859 until 1863..	Baker & Co.	500	4,000 6	The whole of these claims are now immersed into a 5-acre lease called the Crown of the Old Hill Company; present depth, 400 ft., and idle. Thickness of reef, from 1 foot to 3 feet. Rate per ton, 7 oz. 9½ dwt.
	Thos Channon	800	6,400 14	
	W. Williams	700	5,600 18	
	Bullock & Co.....	300	2,400 11	
	Fallon and Bunn	300	2,400 4	
	Viegue and Harri's.....	700	5,600 7	
	Greville & Co.	400	4,000 14	
	Jenkins and Bull.....	650	3,900 9	
	Edward Bros.	300	1,350 16	
	Bagg & Co.....	100	400 18	
	Williams	200	1,100 12	
		4,950	37,056 3	
From 1864 until 1876..	Several parties, including the present company.	3,667½	9,400 15	
			Old Reef, Adelong.	
From 1859 until 1863..	Jenking and Bull	500	2,000 0	These claims are now immersed into an 8-acre lease, known as the Old Reef Company, now idle, 300 ft. deep. Thickness of reef, from 1 to 3 feet. At the rate of 4 oz. 8½ dwt. per ton.
	Carrea'as	300	1,500 0	
	Rutter & Co.....	90	450 0	
	M'Gilvery	40	200 0	
		930	4,150 0	

STATISTICS showing the quantity of gold won, &c.

Date.	Name of Party.	Number of Tons.	Yield of Gold.	Remarks.
From 1864 until 1875..	Several parties, including the present company.	1,475	3,308 10	
From 1859 until 1863..	Lind & Co.	400	3,200 0	These claims are now immersed into a 5-acre lease known as Prowse and Woodward's. Still working. (See Report on Adelong Reefs.) Thickness of reef, from ½ ft. to 3 feet, 7 oz. 16½ dwt. per ton.
	Mitchell & Co.	400	3,200 0	
	M'Larragan & Co.	300	2,100 0	
	Skinner & Co.	20	160 0	
	M'Leman & Co.	18	72 0	
	W. Williams	20	80 0	
		1,158	8,812 0	
From 1863 until 1876..	Several parties, including the present company.	1,480½	3,147 0	Now 5-acre lease, known as Our Company; idle; 400 ft. From 1 to 3 ft., 4 oz. per ton.
	Hargraves & Co.	25	87 0	
	Carter & Co.	20	70 0	
	Wilkenson & Co.	12	60 0	
	Pearce & Co.	60	80 0	
	Iredale & Co.	60	360 0	
	Hillhouse & Co.	500	2,750 0	
	Griffith & Co.	450	2,475 0	
From 1859 until about 1865, idle for many years, depth 460 feet.	Leaman & Co.	350	1,750 0	These mines are now in a 10-acre lease, known as the Adelong, which, united with Prowse and Woodward, is called the Adelong United; still working. From 1 ft. to 3 ft., at the rate of 5 oz. per ton.
	Dent & Co.	200	1,000 0	
	Lewington & Co.	80	400 0	
	Cumberland & Co.	100	500 0	
	Lismore & Co.	60	300 0	
	Hay & Co.	50	250 0	
	Kennedy & Co.	48	144 0	
	McCord & Co.	20	80 0	
		2,018	10,009 0	
			Victoria Reef.	
From 1859 until 1875..	South of Research Gold-mining Company.	4,335	9,599 13½	Two leases, one 6-acre, one 20-acre both idle; 2 oz. 4 dwt. per ton. Thickness of reef, 1 to 3 ft.
From 1867 until 1872..	Dawson	8	35 0	These mines are now included in a 5-acre lease, the property of the Great Victoria Gold-mining Company, 2 oz. ½ dwt. per ton.
	Trudgeon	120½	444 19½	
	,,	143	251 9	
	,,	129½	633 0	
		124	294 10	
		63	85 0	
		96	174 13	Thickness of reef, from 6 in. to 2 ft.
From 1873 until 1876 (both inclusive).	Great Victoria Gold-mining Company.	816	923 3½	
		961½	2,923 10½	Great Victoria Gold-mining Company, first crushing in 1873.
		1,583¾	2,536 9½	
		4,085¼	8,301 15	
From 1866 to 1867, not payable for 3 years, 1876.	Annett's	189½	1,004 11	Annett's Gold-mining Company (a private company) 4 oz. 7¾ dwt. per ton. Thickness of reef, from 1 to 3 ft.
	,,	22	27 13	
		108	592 0	
		133	362 0	
		452½	1,986 4	
From 1867 until 1875..		489	1,113 12¾	Flagstaff Gold-mining Company (a private company) an 8-acre lease, still working, 815 ft. deep; 2 oz. 2 dwt. per ton.
		796	1,534 2¾	
		98	251 0	
		1,383	2,920 2½	
From 1867 until 1872..	Williams, senr., and party.	579	3,108 4½	
1872	Williams' Gold-mining Company (Limited)	400	2,455 11	Williams' Gold-mining Company (Limited) 6-acre lease, worked on tribute, but no sinking carried on; 635 ft. deep; 5 oz. 6½ dwt. per ton. Thickness of reef from 6 in. to 2½ ft.
1873		1,554	4,018 11	
1874		160	144 18	
From 1874 until 1876..		2,114	15,863 0½	
March, 1876		4,807	25,590 5	

STATISTICS showing the quantity of gold won, &c.

Date.	Name of Party.	Number of Tons.	Yield of Gold.	Remarks.
1874	North Williams Gold-mining Co.	110	528 16	North Williams Gold-mining Company (Limited) an 11-acre lease; depth 950 ft., not sinking, but the last crushing a great improvement; paid several dividends; 1 oz. 12 dwt. per ton. Now improving.
1875	.....	3,753¾	7,196 16	
March, 1876	.....	555	821 17	
May	.....	827	1,183 9	
July	.....	576	380 16	
September	.....	295½	164 8	
November, 1877	.....	323	113 8	
February	.....	288	337 0	
		6,728¼	10,726 10	

As the following information, gathered by me, might be of public interest, I append it to my report on the Adelong mines.

The quartz on the Adelong Gold-field is so strongly impregnated with pyrites and mundic that extraordinary skill and care is required to treat this mundic stone.

Years ago a commission of scientific gentlemen visited Adelong for the purpose of making inquiries as to the best means to be adopted, to not only separate and save the gold from the mundic, but also to prevent the great loss of quicksilver then taking place, the immediate cause of such loss being the large percentage of sulphur and mundic in the quartz; but very little was done in this matter, so that machine owners were left to their own resources; they, therefore, tried all sorts of experiments and have gradually improved their machinery so as to adapt them to the peculiar nature of the Adelong quartz. If these machines save the gold in the Adelong district they must be of the same or even greater value in such districts as Grenfell, Hill End, Parkes, &c., where there are hardly any pyrites in quartz as compared with this district.

Williams' Gold-mining Company machine is in connection with the Williams' Gold-mining Company, Limited, and is under the able management of Mr. Harford. The machinery is worked by water-power, and is equal to 50 horse-power; there are three batteries, two to six stampers, and one of four stampers; each box is 5 feet long and has four temporary liners or iron plates inside for the double purpose of saving the boxes from wear and retaining the amalgam in the boxes; the liners are taken out every time a crushing is finished; the tables are 10 feet long, 4 feet wide, and have a fall of 1½ inch per foot; there are copper plates over the whole length of the tables; at the end of these are three ripples containing about 200 lb. of quicksilver; from these ripples the tailings pass over copper plates into two Chilian mills; the wheels of these mills are 5 feet 8 inches in diameter, 9 inches wide, 2 feet 9 inches apart from each other, and weigh about 25 cwt. each; the tailings after leaving the Chilian mills pass over the blanketing tables, of which there are three, 12 by 3 feet each. The blanketings are saved and put through the grinding process in two of Denny's pulverisers, which discharge outside instead of inside, as is generally the case. Mr. Harford recommends Denny's pulverisers as a powerful gold-saving machine, and I might here mention that a separate waterwheel drives the Denny's.

Crushings for the public is done by the hour instead of by the ton—8d. per hour for each stamp, or 10s. 8d. per hour for the whole machinery. The parties crushing pay for all loss of quicksilver, and have the option of crushing with screen (gratings) 195 or 169 holes per square inch.

Messrs. Wilson and Ritchie's Battery. Erected between 50 and 60 years ago, and crushing up to 1914.

Wilson and Co.'s machine, Messrs. Wilson and Ritchie, proprietors :— This machine is on the self-feeding principle, and is worked by water-power equal to 35 horse-power nominal, but can be worked up to 50. The machine is beautifully arranged to work with ease all the different gold saving apparatus ; the main iron shaft connected with the waterwheel is 60 feet in length ; by this shaft the batteries, Chilian mills, berdans and buddle are worked ; each can be disconnected when required without the least interference in the working of the others. The machine has three batteries of five stampers each, and each stamp weighs 7 cwt. ; length of boxes, 5 feet 4 inches ; inside each box there are four temporary liners or iron plates for the double purpose of saving the boxes from wearing too fast, and for forming recesses or catches to retain the amalgam in the boxes ; these iron plates are taken out every time a crushing is finished ; length of table, 10 feet, width 4 feet, fall $1\frac{1}{4}$ inch per foot. There are four separate copper plates on these tables, the first 4 by 3 feet, the others 4 by 1 foot ; at the end of these tables there are three ripples containing about 200 lb. of quicksilver ; depth of ripples 9 inches, 8 inches, and 7 inches respectively ; after the tailings leave these ripples they again pass over copper plates into the Chilian mills, of which there are three—one to each battery ; the wheels are 5 feet in diameter, 1 foot wide, weigh 30 cwt. each, and are 2 feet 9 inches apart from each other, giving a grinding service of 400 feet per minute ; from the Chilian mills the tailings pass to three blanketing tables ; length of table, 13 feet by 3 feet each ; the blanketing tables, Chilian mills, &c., are disconnected from each other so as to enable three parties to crush at the one time ; from the blanketing tables the tailings pass through concentrating shoots, where the heaviest material is gathered, brought back, and reground with the blanketings in the improved berdans. These berdans, of which there are two, have a stationery chain-drag of $1\frac{1}{2}$ foot grinding surface. After the blanketings and tailings pass through the whole process of grinding they run into one of Munday's patent puddles, 24 feet in diameter, with eight arms, eight feeders, and twenty-four scrapers, and work eight revolutions per minute ; the light tailings are now allowed to pass into the creek while the pyrites or mundic saved in this buddle is from 2 to 3 per cent., and by assays made in Sydney contain from 9 to 14 oz. gold per ton.

Messrs. Wilson and Ritchie are now erecting a reverberatory furnace for the treatment of pyrites and mundic. The furnace will be on the principle of that on the New North Clunes Co.'s Mine in Victoria.

The crushing for the public is done at per hour instead of per ton. The machine owner, as at Williams' Gold-mining Co.'s machine, breaks the quartz at the mill to the proper size for crushing ; the cost per hour for fifteen stamps, three Chilian mills, two berdans and buddle, is 10s. 6d. The parties crushing have the option of using the following screens or grating : 195 or 169 holes per square inch.

The following statistics will show the amount of amalgam or gold saved after the quartz has been crushed through gratings 195 holes per square inch, and, therefore, the public will be able to judge whether it is well to have appliances to treat the tailings after they leave the tables, or to be satisfied with the amalgamating barrel, which is very often the only apparatus by which blanketings are treated at the quartz-crushing machines on different goldfields of this State. These amalgamating

TABLE.—Williams' Gold-mining Company's Quartz-crushing Machine.

Name of Party.	Year.	Tons.	Amalgam.					Gold.					Yield at per ton.
			Boxes.	Plates.	Mills.	Denny's.	Total.	Boxes.	Plates.	Mills.	Denny's	Total.	
			oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.
Willliams' G. M. Co.	1875	400	4,076 0	4,133 12	1,184 2	.....	9,393 14	783 0	1,377 0	394 0	.....	2,554 6½	6 9
Annett's	1876	133	114 18	624 16	171 11	80 0	990 5	77 8	208 5	57 3	20 0	362 16	2 4½
Do	1876	108	236 15	855 10	321 14	97 15	1,511 14	174 17	283 3	107 5	26 15	592 0	5 9½

Wilson and Company's Quartz-crushing Machine.

Name of Party.	Year.	No. of tons.	Amalgam.						Gold						Yield at per ton.
			Boxes.	Plates.	Ripples.	Mills.	Berdan.	Total.	Boxes.	Plates.	Ripples.	Mills.	Berdan.	Total.	
			oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz. dwt.	oz.	oz.	oz.	oz.	oz. dwt.	oz. dwt.
North Williams' G.M. Co.	1874	56	208 0	300 0	25 0	77 0	8 0	674 0	109 18	120	10	30	3	272 18	4 17½
Do do	1875	3,535½	2,668 10	11,529 10	266 5	2,574 15	578 0	20,950 10	2,551 15	4,411	106	509	193	6,770 15	1 18
Do do	1876	2,021	1,659 5	2,271 5	111 5	528 0	151 0	6,741 15	614 5	908	45	211	50	1,828 5	0 18
Do do	1877	279	285 10	454 5	13 10	79 0	14 0	864 5	95 17	161	5	31	4	296 17	1 1¼
Great Victorian G.M. Co.	1874	806¾	557 4	1,120 0	104 1	371 16	82 8	2,236 13	318 3	448	51	148	27	992 3	1 4½
Do do	1875	961½	1,209 6	4,467 7	119 7	1,090 0	246 19	7,155 0	589 11	1,787	48	436	80	2,940 10	3 1
Do do	1876	1,583¾	2,001 7	2,815 12	104 14	575 19	115 16	5,680 0	758 5	1,126	41	230	38	2,193 5½	1 7½
Do do	1877	213	581 14	416 1	18 19	92 15	16 15	925 18	133 4	166	7	38	5	358 6	1 12¼
Prowse & Woodward's (now Adelong United) G.M. Co.	1874	558½	1,349 18	2,205 6	77 10	461 15	78 6	3,972 15	781 12	802	30	136	26	1,825 12	2 5
Do do	1875	888½	393 6	438 7	13 14	109 18	29 17	991 2	169 10½	195	5	44	10	433 10½	.....
Do do	1876		96 4	213 1	20 12	59 16	8 4	397 7	57 6½	85	8	24	3	177 6½	.....
Do do	1877		76 6	86 0	6 16	33 4	12 4	214 8	32 19	34	2	13	4	85 19	.....

barrels have no grinding power; they can, therefore, only gather free gold, and become a farce or deceit as far as the treatment of blankets and the extracting of gold therefrom is concerned:—

A report on the Great Victoria Mine, by Mr. C. S. Wilkinson, late Government Geologist, was published in the same volume in 1877, and is quoted on page 54, whilst a report on the Perseverance Gold-mining Company, by the Mining Registrar at Adelong in 1881, is published in that year, and repeated on pages 45–47.

A private report, by Mr. A. Llewellyn, Mining Engineer to the present Gibraltar Company, was made in 1914, and extracts are given on page 39.

PHYSIOGRAPHY AND GENERAL GEOLOGY.

The Adelong district is drained by the Adelong Creek, which heads in the Tumbarumba range at an altitude of between 3,000 and 4,000 feet above sea-level, and flows north to the Murrumbidgee River. The creek throughout the greater part of its course flows between hills of granite formation rising steeply to an altitude of from 500 to 1,000 feet above the valley. These might be said to form the western foothills of the Kosciusko plateau, and at the same time are spurs from the Tumbarumba Mountains, which lie further to the south.

Adelong is 1,000 feet above sea-level as determined by aneroid levels, and after crossing the range on the west side of the creek the country falls away rapidly to the Riverina plains, between 500 and 600 feet above sea-level.

The climate is as a rule very bracing, and whilst the days are hot during the summer months, the nights generally cool off rapidly, owing to the proximity of the Kosciusko and Tumbarumba plateaux. During the autumn and winter months, extreme cold is very rarely experienced, although sharp frosts are common, with an occasional light fall of snow at very rare intervals.

The average annual rainfall at Adelong is 30 inches, and as the main watercourse is largely fed from country with a rainfall of 60 inches, the water supply is to all intents and purposes permanent.

The hills on the easterly side of Adelong Creek are very rocky, and largely destitute of soil except in the small saucer-shaped depressions; moreover, the granite formation is largely of an acid type unfavourable for soil production.

The western hills are more fertile, however, whilst the soil derived from the decomposition of the gabbro in the neighbourhood of the village is very rich, and adapted for almost any form of cultivation. The flats along Adelong Creek, though restricted in area are, as a rule, rich, and the presence of practically permanent water renders them admirably suited for intense cultivation of either fruit or vegetables.

GENERAL GEOLOGY.

The principal geological formations within the area under review consists of granite, which in places becomes gneissic or schistose. The granite is portion of a very large intrusive mass occupying many hundred square miles of this part of New South Wales, and the Adelong field occurs near the western periphery of the mass.

The adjoining rocks within touch of the granite in this neighbourhood are of Silurian age, and consist of slate and metamorphic rocks. The closest sedimentary rocks occur in the neighbourhood of Bangadang, 4 miles to the north-west of the Gibralter mine, but apparently these have no association with the auriferous occurrences found on the Adelong gold-field.

The writer inclines to the opinion that the granite, which intrudes the Silurian sediments, is referable to the numerous areas of a similar type of rock to which a Carboniferous age has been assigned. The grounds for this opinion are that the Adelong granite can be traced continuously for about 25 miles in a south-easterly direction, when it is found intruding fossiliferous strata of Devonian age, and 35 miles to the north west rocks of that age are also intruded by the granite.

Three main types of granite rock were identified, namely:—1. Quartz-felspar granite; 2, biotite granite; and 3, quartz-felspar porphyry.

No. 1 includes the various rock gradations due to dynamic stress, ranging from a practically normal granitic structure to a mica schist. There is no sharp line of demarcation, but the types gradually merge into one another, nor does there appear to be any sequence or connection between the belts of intensely crushed rock. They are irregular in shape and strike, and vary in size from a few yards to many chains in length or width.

Occasional bars or irregular shaped segregations of a dark, fine grained rock, with a strong macroscopic resemblance to the mica lamprophyre, are found in the granite, but, according to Mr. Card, "although the sample of this rock presents some perplexing features, on the whole it must be regarded as crushed granite."

These occurrences are liable to be misleading in carrying out prospecting work, for if they strike off the main channel at an acute angle in a zone filled with primary dyke material, there is a risk of the level following the crushed granite instead of the channel.

2. *Biotite Granite.*—The sample of biotite granite was obtained in the 270 feet level workings from Perkins' shaft, and according to Mr. Card, differs from all the others in composition and structure. No surface indications were noticed of this granite which might indicate a distinctive intrusion into the quartz felspar granite, nor is it typical throughout the workings from that shaft.

The evidence with regard to this occurrence is confined to the mine workings, and it appears to indicate a magmatic differentiation rather than a distinct intrusion, but opportunities for studying the occurrence are so limited that it is impossible to express a definite opinion on the question.

3. *Quart felspar Porphyry.*—This rock is found on the Old Hill Line, and occurs as segregations in the granite. An interesting feature of the porphyry are the blebs of bluish-tinted quartz; the colour, according to Mr. Card, being due to dynamic stress.

I am indebted to Mr. G. W. Card, A.R.S.M., Curator and Mineralogist to the Geological Survey, for the following petrographical descriptions.

ROCKS FROM THE GIBRALTAR MINE, ADELONG.

With the exception of 9116, the granite specimens collected from the Gibraltar Mine by Mr. Harper, are of medium and equal grain-size, consist essentially of quartz and felspar, and are more or less aplitic in texture. The felspar is in part oligoclase, and microperthite and micrographic structures are often present.

A gradation can be traced from rocks (9115 *e.g.*) showing only an initial stage of dynamic stress to others (like 9159) which have been mashed, chemically and mineralogically altered, and rolled out until they have practically become mica-schists.

The labels supplied by Mr. Harper distinguish between granite favorable to the occurrence of metallic values and that unfavorable, but I am quite unable to detect any essential difference between the granites themselves.

9116 is a biotite-granite, and differs from all the other specimens in composition and structure. Like them, however, it has participated slightly in the strain produced by dynamic agencies.

9125, a quartz-felspar porphyry, may be mentioned here. Like the biotite-granite, it has been slightly affected by strain.

The town of Adelong is partly built on an intrusive mass of gabbro, occupying an area of between 300 and 400 acres. This rock distinctly intrudes the granite, for round its edges, wherever the bedrock is exposed, tongues of gabbro, varying in width from a few feet up to many yards, are to be seen extending into the granite. Apart from the fact that the gabbro post dates the granite, there is no evidence as to its age, nor can it be associated with the intrusive dykes of mica-lamprophyre.

According to Mr. Card, "this gabbro differs considerably from the mica-lamprophyre in chemical composition, and there is no reason apparent for suggesting a genetic association between them."

Dykes are wall-like bodies of igneous rock intruding the country, and occurrences of this nature are very numerous in the Adelong Gold Field, as evidenced by mine workings, although very few, were identified on the surface. This is probably due to the dykes weathering much more rapidly than the granite with the result that their outcrops are generally obscured by accumulations of soils.

At least three periods of intrusion are evidenced, and whilst, according to Mr. G. W. Card, all consist of one type of rock, and belong to the Kersantite division of the mica-lamprophyres, one set exhibits distinctive structural characters which renders its identification possible in every case. These are referred to here as primary dykes because they have been intersected by the two remaining groups identified (see page 21), and are undoubtedly much older, for they have participated in the dynamic stress which has effected portions of the granite, whilst the other groups are not crushed at all.

It is not usual for a magma basin to retain the same chemical characteristics extending over a lengthy geological period which would result in the outbursts of an identical petrographic and chemical type of rock at widely separated intervals, but in the present instance, there is distinct evidence that whilst all the igneous dykes are of identical type, sufficient time must have elapsed between the earlier and later intrusions to permit of intense crushing.

TECTONICS.

The dynamic stresses to which this belt of country has been subjected are complex, and the available evidence does not permit of a detailed diagnosis or the determination of chronological sequence. That such stresses were intense is obvious from the occurrences and rock specimens examined, and they would appear to have operated in a most erratic manner.

The main zones of stress mostly to bear about 5° W. of N., as evidenced by the belts of gneiss and schist found outcropping in the neighbourhood; but in the workings of the Gibralter Mine, belts of schist striking from 35 to 45° north of east have been cut.

These latter belts would more or less coincide with the strike of the ore bodies and primary igneous dykes of mica-lamprophyre. At a later period dynamic forces were again active, and the primary dykes were intensely crushed and sheared, with the probability that additional belts of country also participated.

The formation of the ore bodies, as dealt with elsewhere in this report, ensued, and was followed by at least two periods of igneous intrusion of a mica-lamprophyre petrographically identical with the earlier dyke rock.

Apparently the final phase of the tectonic forces which operated in this belt of country is represented by the faulting, a detailed description of which is given on pages 23–27.

The writer can offer no adequate explanation for the remarkable local structural changes, nor of the dynamic agencies which produced them, but chemical and mineralogical alterations were no doubt brought about during the formation of the ore bodies for the same minerals are found in both the granite and lodes, the only difference being the degree of concentration.

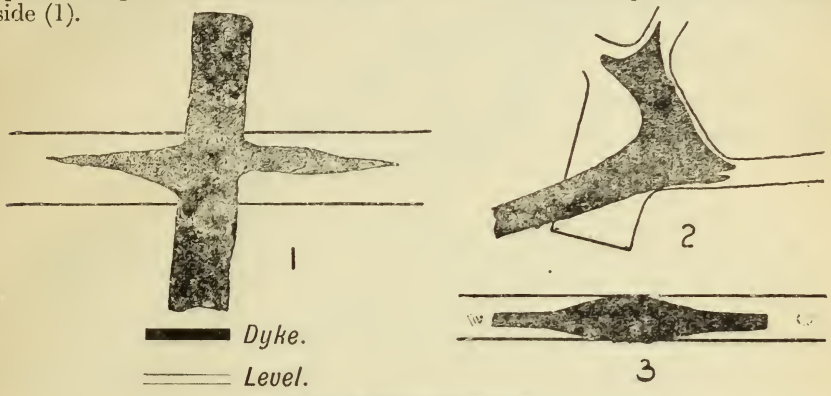
Detailed Descriptions of:—

A. Dykes.
B. Faults.
C. Auriferous lodes and ore bodies.

A. Dykes.

As already stated, three periods of igneous intrusions in the form of dykes were identified. The material forming the primary dykes is very much crushed, and exhibits a foliated shaly structure, with veins and blebs of calcite, and quartz whilst iron pyrites and zinc blends are also found in the crushed rock. The shaly structure is so pronounced that the miners refer to the intrusions as "slate bars," but in places, in the central portion of the dyke, the true nature of the material can be detected.

The series of dykes all have a more or less vertical dip (75 to 85 degrees), and whilst the majority of them appear to occupy and have a common strike with the main reef channel, others enter the channel almost at right angles, spread along it on either side of their line of strike, and pass out the other side (1).



Types of Dyke Occurrences.

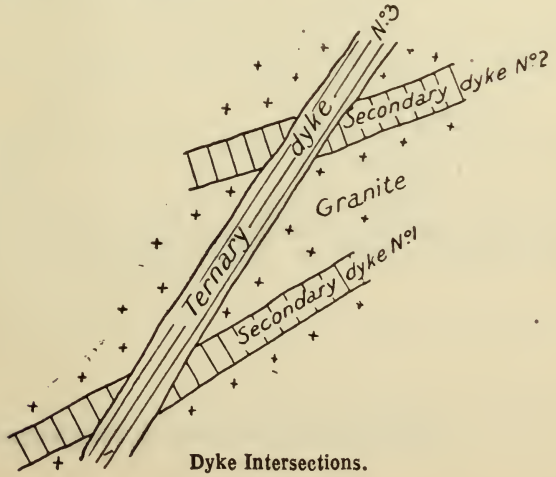
Another mode of occurrence is for spurs to be found striking off the main channel (2), or for big bulges of diorite to be found in the channel (3).

The secondary dykes are composed of a much more compact rock showing little sign of alteration except at the sides of the dyke in places, or when they coincide more or less with a fault plane, as happens at times. These dykes have a dip of from 20 to 60 degrees either way from the strike of the main channel, which they cross, and vary in width from 3 inches to 6 feet.

It seems probable that most of these dykes intruded the country prior to the major ore bodies being formed even though they intersect makes of ore and equal values are found for considerable distances on either side of the dyke, which is devoid of sulphides. Exceptions occur, however, in which both iron pyrites and zinc blends are found on joint faces in the secondary dykes, a point referred to in the genesis of the ore bodies.

That the secondary dykes are intersected by yet a later group is evidenced in the underhand stopes north of a winze sunk from the 1,000-feet level north.

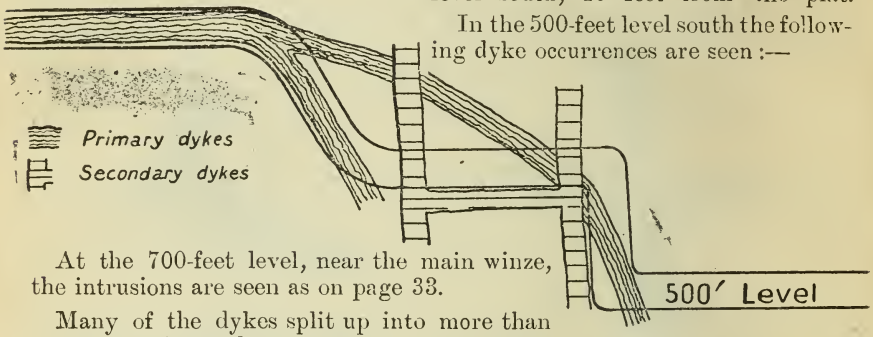
The following section was obtained in this area :—



Dyke Intersections.

1 and 2 undoubtedly belong to the secondary dyke period, and they are clearly intersected by 3. A similar occurrence is to be seen in the 900-feet level south, 40 feet from the plat.

In the 500-feet level south the following dyke occurrences are seen :—

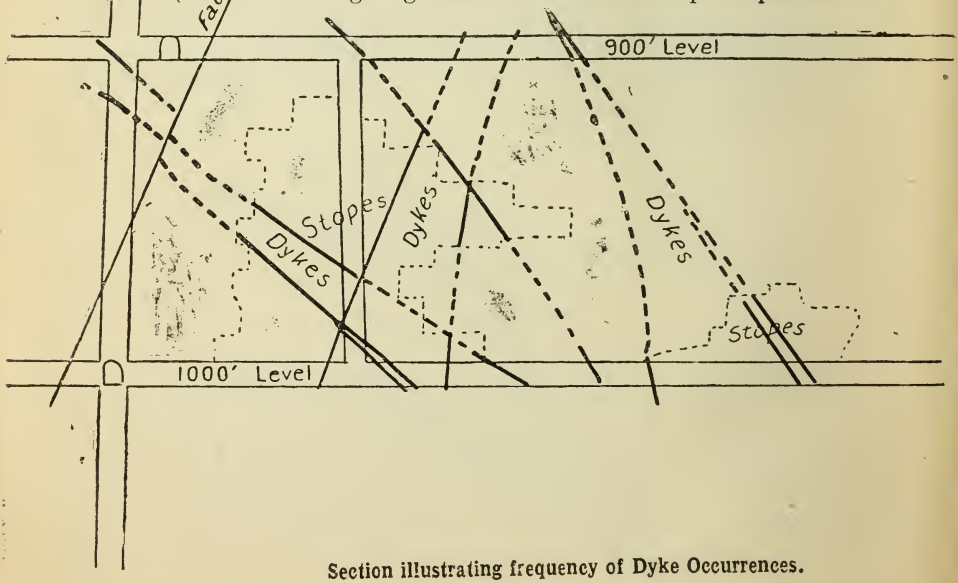


At the 700-feet level, near the main winze, the intrusions are seen as on page 33.

Many of the dykes split up into more than one, whilst the underlay, strike, and width also vary to a great extent; so that it is difficult to identify the individual dykes at the various levels.

The intrusions play a most important part in the economic working of the mine, and whilst they have been all important in relation to the gold and mineral contents of the channels (as pointed out in that portion of the report dealing with the genesis of the ore deposits), their presence is a great source of worry and expense.

In places the main channel is entirely filled with primary dyke rock to the exclusion of ore over considerable lengths. The stoping contents of the channel is also much reduced, and increased costs entailed by the presence of the secondary and tenary "bars." The former factor is strongly evidenced in the 600 feet level, where up to the date of writing this report, the main channel has been driven upon for 200 feet, and was completely filled with primary dyke material. The latter factor is strongly evidenced between the 900 and 1,000-feet levels, from which the following longitudinal section of the stopes is produced :—



Section illustrating frequency of Dyke Occurrences.

In the case of faults E, P, and X, the fault plane in some of the levels coincides with the wall of a dyke, so that whilst the dykes occasionally indicate a fault by reason of its displacement, they more often obscure it.

There is no doubt that the intrusions are increasing in number and size as the mine workings are extended down, and the possibility presents itself of a large magma basin of mica-lamprophyre lying at no greath depth beneath the land surface in this neighbourhood.

If such is the case, one would expect a gradual increase in the intrusions, and having regard to their significance upon economic mining, the outlook in the writer's opinion is not encouraging.

Faulting.

A fault is a dislocation and displacement of the channel and country rock, and eight occurences of this nature have been identified in the Gibraltar Mine workings (O'Brien shaft) up to the present, but it is probable that they are even more numerous, and further development work will, no doubt, bring others to light.

All are reversed faults, with a right hand throw, and they may be divided into three groups as follows—the letters denoting their identity on the mine plan :—

A and E—The two main semi-veritical faults.

P and X—Two semi-horizontal or cross faults, extending from faults A to E in each case.

F.G.H. and J Minor faults, more or less vertical and resulting in very slight displacement.

Fault A dips S. 43 W. at an angle of from 65° to 68° and has a horizontal displacement of from 30 to 40 feet. The amount of vertical movement could not be definitely determined, but it is probably in the neighbourhood of 40 feet.

Fault E. dips S 67° W. at an angle of about 54 degrees, and gives a horizontal displacement of from 60 to 80 feet, with a veritical movement of apparently from 50 to 100 feet.

Fault P dips N.E. at an angle of 40 degrees and has a horizontal displacement of about 30 feet, the vertical movement probably being about 30 feet also.

Fault X dips N. 56° E. at an angle of 60° and has a displacement of about 40 feet vertical, and from 80 to 90 feet horizontal.

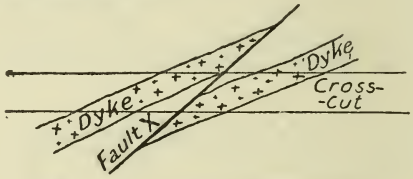
Faults F and G were one in the upper levels with a dip of 54 degrees to the south west, but a split takes place between the 700 and 800-feet levels, and both branches straighten up, the south west branch to 67°, whilst the north-east branch becomes nearly vertical.

The amount of displacement is slight, probably not more than a foot or two.

H and J are also very minor faults, but sufficient work has not been done in their neighbourhood to ascertain particulars regarding them.

Faults, E, P, and X, where located, are in contact with the igneous intrusions, so that their identity and the movement caused is very much obscured.

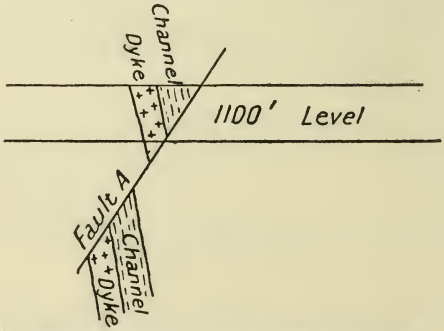
At the 1,000 feet level, in the cross-cut recently driven from a point about 30 feet south from the foot of the main winze, the occurrences met with are rather complicated, but very interesting. The cross-cut was driven to intercept the main channel, which if normal conditions pertained as regards underlay and strike, should occur between 50 and 60 feet south east of the level. The channel was reached within the limits expected but is here filled with a primary intrusion, whilst the cross-cut also passed through dyke X of the secondary period of intrusion, and proved fault X. The fault plane and igneous intrusion have a more or less common strike, but the fault dips at a steeper angle, and consequently faults the dyke which is thrown down as shown in the following diagram :—



Faulting as seen at the 1,000-feet Level.

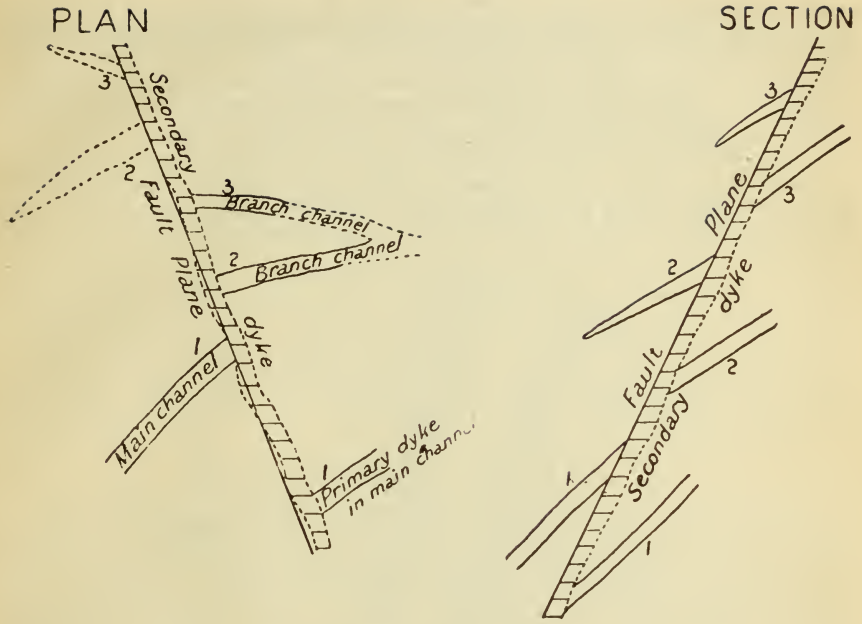
The 1,100-feet level has not tapped the main channel if the assumption be correct that it behaves more or less consistently as regards strike and dip. Fault A was cut about 55 feet south in this level, and practically coinciding with the fault, a channel of primary diorite occurs and strikes away from the fault into the footwall. This channel would agree with the calculated strike and position of the main channel after allowing for faulting. The fact of the channel having been cut just where it leaves fault A greatly obscures the occurrence and renders its identification difficult.

A sketch section of this occurrence is as follows :—



Faulting as seen at the 1,100 feet Level.

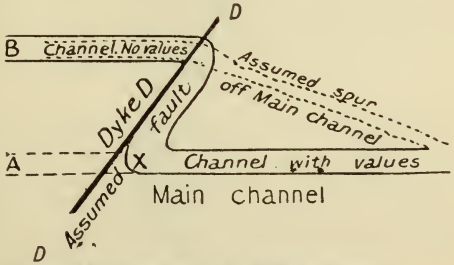
Fault P at the 700-feet level is another instance of the difficulties presented by fault planes when they coincide with dykes. This fault is found coinciding in part with the secondary dyke (P), passing through a primary or channel dyke almost at right angles, and the whole further complicated by at least three ore channels. The occurrence is illustrated in the accompanying sketch plan and section.



Faulting as seen at the 700-feet Level.

Dyke D is a case allied to the foregoing, but representing reversed conditions. *i.e.*, every appearance of a fault plane with a definite throw, yet apparently representing a volcanic intrusion only.*

From the 400-feet down to the 700-feet levels, D was met with, and considered a fault, because where it was first struck (at the 400-feet level) the ore body being worked had pinched. Prospecting was carried out more or less along the course of the dyke or fault as it was then thought to be. About 20 feet to the right of the ore channel originally worked another well-defined body of ore was reached, and the natural assumption was that D had been proved a fault. The occurrence is illustrated in the following diagram of the 600-feet level.



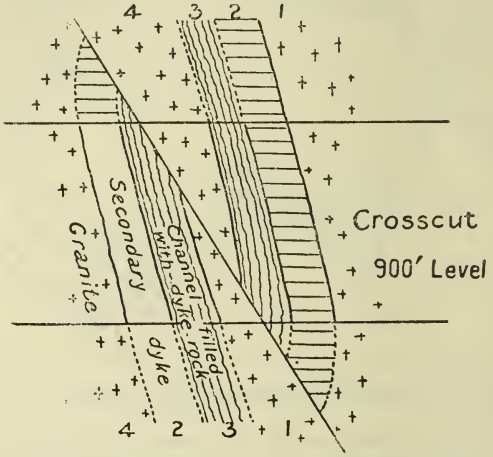
Pseudo Fault on Dyke D, 600-feet Level.

The explanation for this occurrence would appear to be that channel B is a branch of channel A, and once the idea was established that DD was a fault, subsequent work in the lower levels was planned accordingly.

* It must be admitted that the evidence with regard to D is still far from complete.

The continuation of the channel from X as proved by subsequent prospecting, strikes in the correct direction, and is well defined between two pronounced walls, with a normal underlay in keeping with that of the main channel, but up to the time of writing, the work done has proved the infilling material to consist almost entirely of primary dyke material to the exclusion of ore. A similar proving has been made at the 700-feet level.

At the 900-feet level north, about 30 feet from the plat, fault A presents further complications. The channel is filled with primary dyke material, which is intersected by a secondary dyke, the whole being faulted by A. The following section is exposed in the cross-cut and level.



Apparent Discrepancy in Faulting, 900-feet Level.

From the above section it is apparent that a discrepancy occurs in the order of sequence of the formations on opposite sides of the fault plane. This is explained in the following diagram of the mode of occurrence in section prior to faulting.

Explanation of above.

If the upper portion (A) of the section was moved down and to the right opposite B by the faulting, then we would get a section as it appears in the mine workings. The apparent confusion arising through the secondary dyke cutting across the channel, a feature not uncommon with the secondary dykes, in which both strike and underlay frequently vary.

In the case of most of the faults, although evidence as to their existence has now been found by prospecting, the data available is still very meagre. The fact that the country rock is granite, and that ore channels or the intrusions of igneous dykes are the only means of determining a fault renders it almost impossible to calculate the exact amount of displacement. Moreover, these channels and dykes are numerous, and it is not always possible to definitely correlate such after displacement.

That there has been vertical as well as horizontal movement is evident, but the former is more difficult to arrive at even than the latter. In the case of some of the faults at all events, it seems probable that the amount of displacement gradually increases until the maximum is reached. The result is that, as the mine workings occur at different points along the horizontal and vertical extensions of the fault, the amount of displacement is not necessarily constant in the different levels. Another factor influencing the amount of movement at different positions in the mine, is the probability that cross-faults P and X each varies in the amount of throw at either extremity; in other words, there may have been a differential movement.

Origin of Faulting.

The faulting is probably the final phase of the various tectonic forces, which have operated within the belt of country under review. The cause would appear to have been an effort on the part of nature to adjust matters after the final intrusions of mica-lamprophyre. Shrinkage would follow cooling, and possibly, slight subsidence occurred after the original magma basin collapsed.

These factors apparently led to areas of local compression in which reversed faulting took place, such as is found in this field.

Unfortunately, owing to the Great Victoria and Old Hill lines of reef having been closed down for many years prior to the present geological examination, and in the absence of mine plans, it was impossible to carry out an investigation into these lines of reefs. From information received from old miners who worked in the mines, there is no doubt that many faults occur, and that they are similar to those proved in the Gibraltar Mine.

Bearing this in mind, and in view of the abrupt cessation of work in many of the old mines, it seems reasonable to assume that further bodies of ore could be found if the evidence afforded by a systematic examination and a careful diagnosis of events were acted upon.

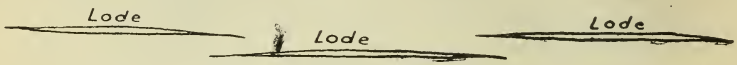
Unfortunately, the faults present only one of the many factors to be considered if economic mining is to result, but they alone should not now present any insurmountable difficulties.

C.—The Auriferous Lodes and Ore Deposits.

As already pointed out, the only active mining being carried out at the present time on the area dealt with is confined to the Gibraltar Consolidated Gold Mines; but so characteristic are the nature of the occurrences as evidenced by the associated rocks, and information supplied by old miners on this field, that all are probably referable to one of two types.

The true fissure lodes, as represented in the O'Brien shaft workings, the Victoria, and Old Hill lines (the two latter are distant about 2 miles south-east of the former), are probably the most important, whilst the other type is represented by irregular makes of mineral-bearing quartz and partially replaced granite, such as occur in Perkins and Radcliff shaft workings (Gibraltar Consolidated Gold Mines).

The fissure lodes consist as a rule of a main channel, with branches or spurs and bays, and the available evidence points to the channels being more or less restricted in their longer dimensions. The Victoria line and the Old Hill line have each been considered a continuous line of lode, but, judging from the apparent dimensions of the O'Brien shaft "reef," the writer inclines to the belief that they represent a series of flat lenses, with a common strike, which overlap one another, more or less, a few feet apart, and gradually thin out towards the extremities, thus in plan or section :—



Assumed Nature of Ore Channels.

The lode on the Gibraltar Consolidated Gold-mining Company's leases strikes from 30 to 40 degrees east of north, with a tendency to swing round more to the south in its southerly extension, and underlays in a south-easterly direction at an angle of from 70 to 80 degrees from the horizontal. The Victoria and Old Hill lines strike about N. 15° W., and as far as could be ascertained from old shafts ; underlay steeply to the north of east.

In the writer's experience, individual auriferous lodes in a granite formation maintain a more or less general average strike and underlay, and whilst subsidiary channels may vary in this respect, it is a wise principle, after establishing the average strike and underlay of a main channel, to develop a mine with these factors in view.

On the Wyalong Gold Field, about 100 miles north-west from Adelong, and where the auriferous lodes occur in a granitic rock, the above was firmly established subsequent to a detailed investigation by the present Writer.*

After a study of the mine plans, the Adelong lodes were investigated on these lines, and the hypothesis has again been vindicated, for not only do branch channels in the form of spurs and bays occur on this field, but the trend and underlay of the main fissures are more or less consistent.

If the plan and transverse sections of the Gibraltar Mine working be studied, a marked discrepancy in both strike and underlay is noticeable in places. After allowance has been made for faulting, it will be seen that an appreciable consistency is found both horizontally and vertically in the northerly workings (O'Brien's shaft) from the 400 down to the 900-feet level. Below the latter level there is a marked change of underlay evidenced by the workings, whilst the greater portion of the southerly levels display a big discrepancy both as regards strike and underlay.

To test the theory advanced, a cross-cut was extended from the 1,000-feet level south with the expectation of intercepting a channel within the calculated distance. The work was successful in proving a well defined channel, but unfortunately within the area so far prospected, the channel has suffered from falting and igneous intrusions, thus nullifying the hoped for results.

In the 600, 700, and 900 feet levels similar provings were made, but so far, unfortunately for the shareholders, the main channel is almost entirely filled with primary dyke material, although its strike and dip agree with that of the lode where good values were obtained. When it is realised that similar occurences have been encountered in other portions of the mine, adjacent

* Annual Reports, Department of Mines, Sydney, 1909, pp. 184-190 ; and 1912, pp. 186-190.

to high values, conditions disclosed by prospecting operations to date are not altogether discouraging for further makes of ore, although costs are enormously increased. The subject is again referred to on pages 41–42, in which future prospects are considered.

With regard to the irregular makes of mineral-bearing quartz and partially replaced granite, it may be pointed out that evidence of their existence or extent is very meagre, and no rule can be laid down in regard to prospecting. They were probably formed contemporaneously with the lodes, for the same mineral contents is observed, and the proved occurrences are found in the vicinity of the lodes, more particularly at their longitudinal extremities, as in Radcliff's and Perkins' shaft workings. Small bunches of this class of ore are found in or adjacent to the walls of the main channels, but these are as a rule too restricted in size to pay.

ORE BODIES.

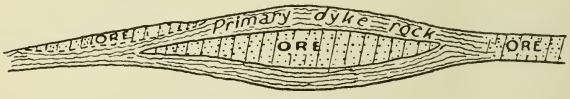
The ore bodies consist mainly of lode quartz impregnated with sulphides of iron, zinc, and a little copper, iron pyrites predominating. Very little free gold is seen in the quartz, but it is not uncommonly associated with the sulphides.

In places a network of quartz veins occur associated with a granite rock in which the basic minerals are almost entirely replaced by secondary silica. Granular sulphides are associated with the quartz, and crystallised sulphides with the replaced rock, and if the former predominate, good values are obtained, but if cubical pyrites are most in evidence, as in the primary kersantite and altered granite, in places, values are low. Occasional small but rich isolated patches of sulphides are found in the country rock, but as a rule they are too dessimated to pay.

Veins of quartz up to 3 inches wide occasionally traverse the altered granite, and whilst comparatively free from sulphides, they are often associated with parallel makes of dense iron pyrites rich in gold contents. This may be due to the secondary enrichment or a differentiation in deposition of the channel filling.

The walls of the channels are as a rule well pronounced, but instances occur in which the values gradually die out both laterally and longitudinally into altered and finally normal granite country. This mode of occurrence is to be seen in the 900 and 1,000 feet levels north, where it has paid to stope out large chambers of ore over 20 feet wide. In these particular instances the primary dyke rock appears to have formed a bay round large masses of granite which has been sufficiently impregnated with gold-bearing sulphides to pay.

The following sketch illustrates this mode of occurrence :—



Mode of Occurrence of Ore Body.

The width of the ore bodies varies from an inch or two up to over 20 feet, but under normal conditions the average width of the stopes has been about 3 feet.

It is not uncommon to find masses of quartz representing replacement of the primary mica-lamprophyre dykes, fragments of which still remain included in the quartz. In such cases, unless sulphides are present, values are low.

The presence of zinc blende in the ore always presages good values, and if the walls consist of grey mottled to white granite values are expected, whereas if red mottled granite forms the walls the reverse is the case.

Perkins' shaft occurrence.

The auriferous deposit worked from this shaft, distant 400 feet west of O'Brien's shaft, is quite distinct and of a different type to the latter.

The makes of pay ore are most erratic in their mode of occurrence, and there appears to be no sequence from one level to the other. No defined walls occur, and the auriferous stone consists of makes of mineral-bearing quartz and

granitic rock, the latter being almost entirely replaced by secondary silica and sulphides of iron and zinc. In places a network of quartz veins occur associated with partly replaced granitic rock impregnated with sulphides, the whole being more or less auriferous. Heads and floors are numerous, but have no significance with regard to values.

Owing to the impossibility of examining the underground workings on the Victoria and Old Hill or Old Reef lines, where all the mines have long been abandoned, details as to modes of occurrence cannot be given, but it is thought that the general principles laid down with regard to the Gibraltar Mine workings are applicable throughout the area dealt with.

BRANCH AND SUBSIDIARY CHANNELS.

The following specific instances of branch or subsidiary channels may be described, but all are alike in character, and apparently attributable to the same tectonic forces.

In the 300-feet level north, about 50 feet from the main shaft, a spur enters the main channel, at an angle of about 135 degrees, and was worked up to fault E. Values were high in the main channel before striking the spur, and gradually got better towards the junction. The spur, as stated, was worked up to fault E, but the main channel decreased in both width and values towards that fault. A plan of this portion of the workings is as follows :—

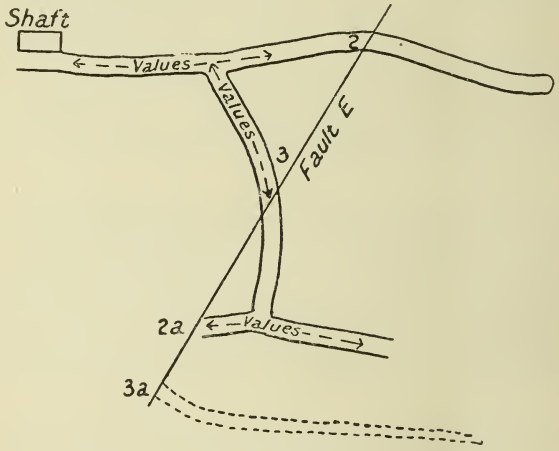


Illustration of Branch Channel and Faulting.

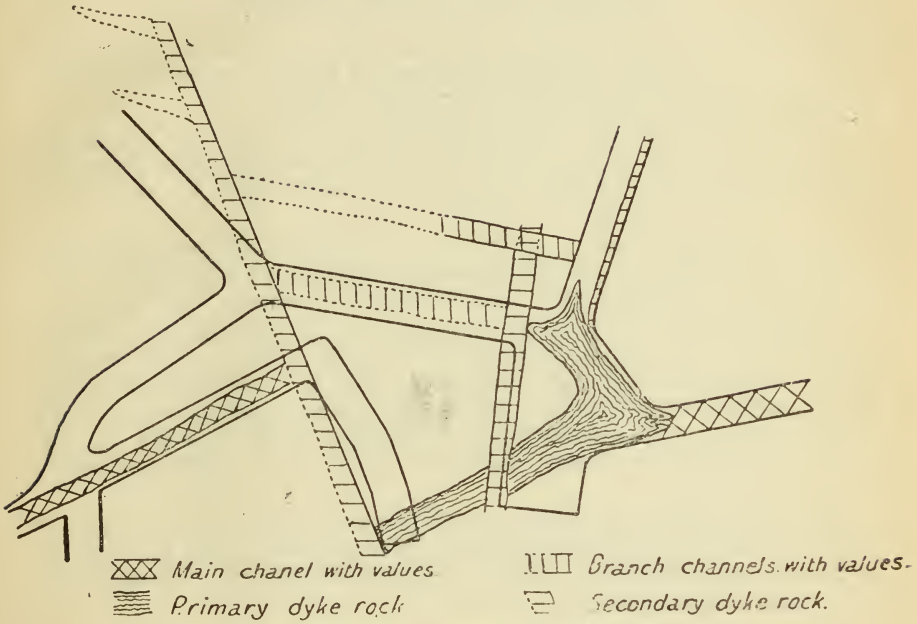
1, 2, 2a and 1a represent the normal strike of the main channel. 3 and 3a represent the spur after faulting.

Fault E has caused a horizontal displacement of from 60 to 80 feet as far as is determinable in other parts of the mine workings (400 feet level), but evidence on this point is rather meagre. It was thought that 2a—1a represented the displaced portion of the reef from 3, because values were obtained in each, and not at 2, but a vertical as well as horizontal displacement would account for the discrepancy in material at 2 and 2a. If such was the case, the channel from 2 should have been penetrated in the crosscut, but it was not, and hence the assumption is that the foregoing diagram represents the conditions pertaining. It seems probable that the displaced portion of 3 would be found at 3a, but this channel is a spur and may be expected to die out rapidly, although pay ore may be found at 3a near the fault plane, within the scope of the vertical displacement.

At the 400 feet level a spur corresponding to the one described above takes off from the opposite side of the main channel.

At the 700 feet level, from the main crosscut south, two spurs were worked for a short length and yielded good results. The phenomena met with here are both numerous and complicated, and are referred to in that portion of the report dealing with dykes and faults, but mention is necessary here to enable the reader to grasp the situation.

The following plan illustrates the conditions pertaining :—



Plan illustrating Occurrences at 700-feet Level.

No. 2 was thought to be the main channel, faulted by D, but D has been diagnosed as a dyke only, whilst P represents both a dyke and a fault plane, dipping in the opposite direction to D. Channels 2 and 3 merge into the main channel and were stoped up to P with good results, whilst the main channel was stoped out north from Y, and south from 1a on the opposite side of fault P. From Y to 1 the channel is filled with primary dyke material, having been proved by a drive or crosscut from 1a to 1, but a rise is now being cut at 1 in the hope of striking the make of stone found at 1a. The success of this work would appear to depend largely upon the direction of vertical displacement on P, and as the zone of untried channel should extend up in the form of a V from the 700-feet to above the 400-feet levels, there is plenty of scope for prospecting.

The 800 and 900-feet levels south opened up an extensive make of ore which is undoubtedly distinct from the main channel as defined in the northerly workings.

These levels would appear to have got off the main channel north of the main winze in the vicinity of fault A, and were driven more and more away from the channel underlay and strike. About 50 or 60 feet away from the winze the 800-feet level opened out on a very wide body of ore of high value, which persisted south for about 40 feet, and then gave out. A winze was sunk to the 900-feet level, and good ore carried all the way, but it appears to have pinched out below that level.

This make of stone is apparently entirely isolated, and lies some 80 feet west from the calculated position of the main channel should it persist and maintain its general strike. It is probable that the occurrence represents an isolated fissure or impregnation.

GENESIS OF THE ORE BODIES.

The genesis of ore deposits is still a subject of heated discussion amongst the world's most prominent mining geologists, but it is not within the scope of this paper to discuss the question in its various aspects.

Mr. T. A. Rickard, editor of the *Engineering and Mining Journal*, has advanced the axiom with regard to the genesis of ore deposits, that "Positiveness of statement is impossible. A reasonable probability is the utmost goal of our unwearied seeking." *

Such a statement is very applicable to the genesis of the Adelong ore bodies, and the writer must admit that the result of his investigations still leaves much to be desired in the way of data for definite deductions.

Distinct evidence of the presence of two types of ore bodies was obtained, namely, those occupying space caused by rending, and others caused by replacement. Both appear to have derived their metalliferous contents from portions of the country rock containing metallic mineral contents, a concentration being brought about by circulating waters. In other words, that the ore was derived from the rock magma, and not brought up into open fissures by ascending solutions.

Favourable evidence in support of this is thought to be the occurrence of isolated patches of auriferous rock in the granite country, and the presence of threads and leaders of quartz and mineral extending into the ore bodies from leached zones of rock.

The lodes show evidence of at least two periods of infilling, for veins and threads of silica of more recent origin are to be seen intersecting the earlier quartz filling, a difference in colour rendering their presence well marked. The same may be said of the metal sulphides, which are represented by two types, namely, fine granular, and somewhat coarsely crystalline. These occur frequently in distinct bands or accretions, and the line of demarcation is well defined.

The above is further supported by the fact that at least three periods of igneous intrusion are evidence, each no doubt followed or accompanied by the deposition of lode material from circulating waters.

That the lode material accumulated subsequent to the dynamic stress which resulted in the crushing of the primary dyke material is evidenced by the presence of perfect crystals of iron and zinc sulphides in the intensely crushed and sheared dyke rock. If such had been present prior to the crushing, it is hardly conceivable that they would not exhibit evidence of having participated in the stress.

Thus it must be assumed that the fissures formed first, and were invaded by dykes of mica lamprophyre which partially filled them. Dynamic stress followed, resulting in the crushing of the dykes, and closing up of most, if not all, the open spaces.

It is evident that the branch channels (bays and spurs) were formed contemporaneously with the main fissure, for they also are filled in places with the crushed dyke material, although not to the same extent. After the crushing, further intrusions of mica lamprophyre occurred, as described on pp. 21–22, and portion of the channels were probably once more opened for the reception of ore bodies.

* Ore Deposits, A discussion (republished from the *Engineering and Mining Journal*, 1903).

That the later intrusions took place prior to the formation of the ore bodies appears evident, for their edges, where they intrude primary dykes, are marked by the presence of a thin coating of dig, such as would accumulate in a shrinkage crack ; but the ore bodies are frozen tight on to the walls of the dyke, and are never invaded by stringers of the dyke rock.

It is a well-known fact that igneous intrusions are accompanied by vapors and dissociated gases, and that vulcanism gives increased activity to thermal waters which would dissolve mineral contents from the country rock. The minerals, after having been set free, were redeposited in a concentrated form in the lodes or replaced zones, thus forming the ore bodies.

The secondary enrichment of lodes by the agency of descending waters, as laid down by Professor Van Hise (1), Mr. Emmons (2), and Mr. Weed (3), has probably played an important part in the Adelong ore deposits, as evidenced by leached zones of lode material, and local makes of exceptionally rich ore, particularly within the zone of circulating vadose waters. The faulting took place after the formation of the ore bodies, and it is probable that the fault planes would render certain portions of the lode more susceptible to the action of vadose waters. Although they contain no ore themselves, rich makes of pay ore have been found adjacent to them in many of the levels of the Gibraltar Mine.

(1) "Some Principles Controlling Deposition of Ores," by C. R. Van Hise. Trans. A.I.M.E. Vol. XXX, pp. 27-117.

(2) "The Second Enrichment of Ore Deposits," by S. F. Emmons. *Ibid.*, pp. 171-247.

(3) "The Enrichment of Gold and Silver Veins," by Walter H. Weed. *Ibid.*, pp. 424-448.

REEF GOLD.

No official returns of the quantity of reef gold won prior to 1884 are available, but judging by the amount of prospecting done, and the known richness of some of the yields, it is thought that 50,000 oz. is a conservative estimate. Although the amount of stone treated was somewhat limited owing to crude mining methods and inadequate plant, some very rich returns were obtained from small parcels of stone. Evidence of this is found in the earlier reports of the Department, and in 1877, one ton of stone from the Carrajong Mine yielded 17 oz. of gold.

Moreover, the number of miners working during that period was far in excess of the men employed in more recent times.

From 1884 to 1914, returns show that 182,261 oz. of gold were obtained from reefing claims. Even these returns are probably far from complete, and it is more likely to be 200,000 oz.

In round numbers it is estimated that 254,000 oz. of reef gold, valued at £1,000,000, have been won from within an area of about three square miles.

TRANSVERSE SECTION ON LINE EF

TRANSVERSE SECTION ON LINE EF

O'Brien shaft workings

Gibraltar Consolidated Gold Mine

Adelong

Scale 0 40 80 Feet

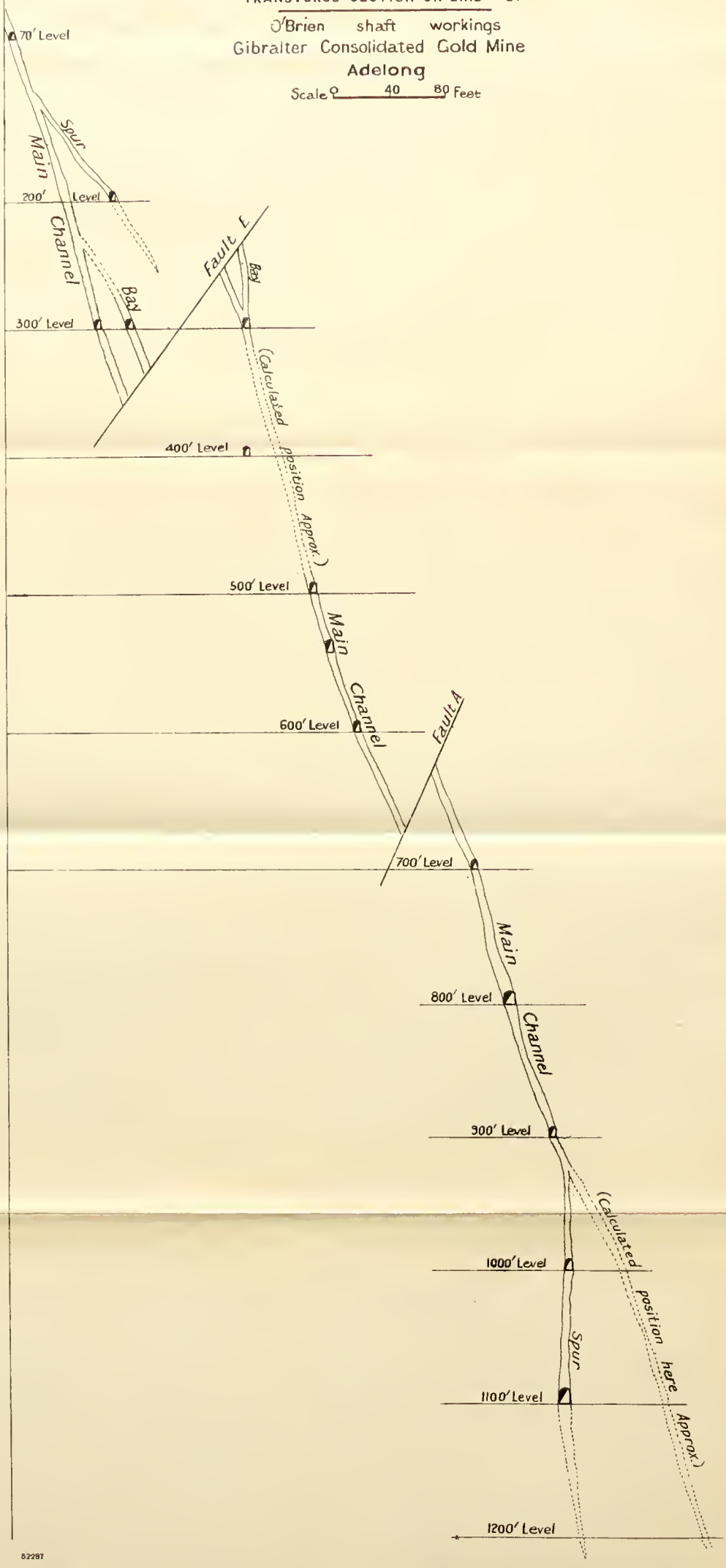


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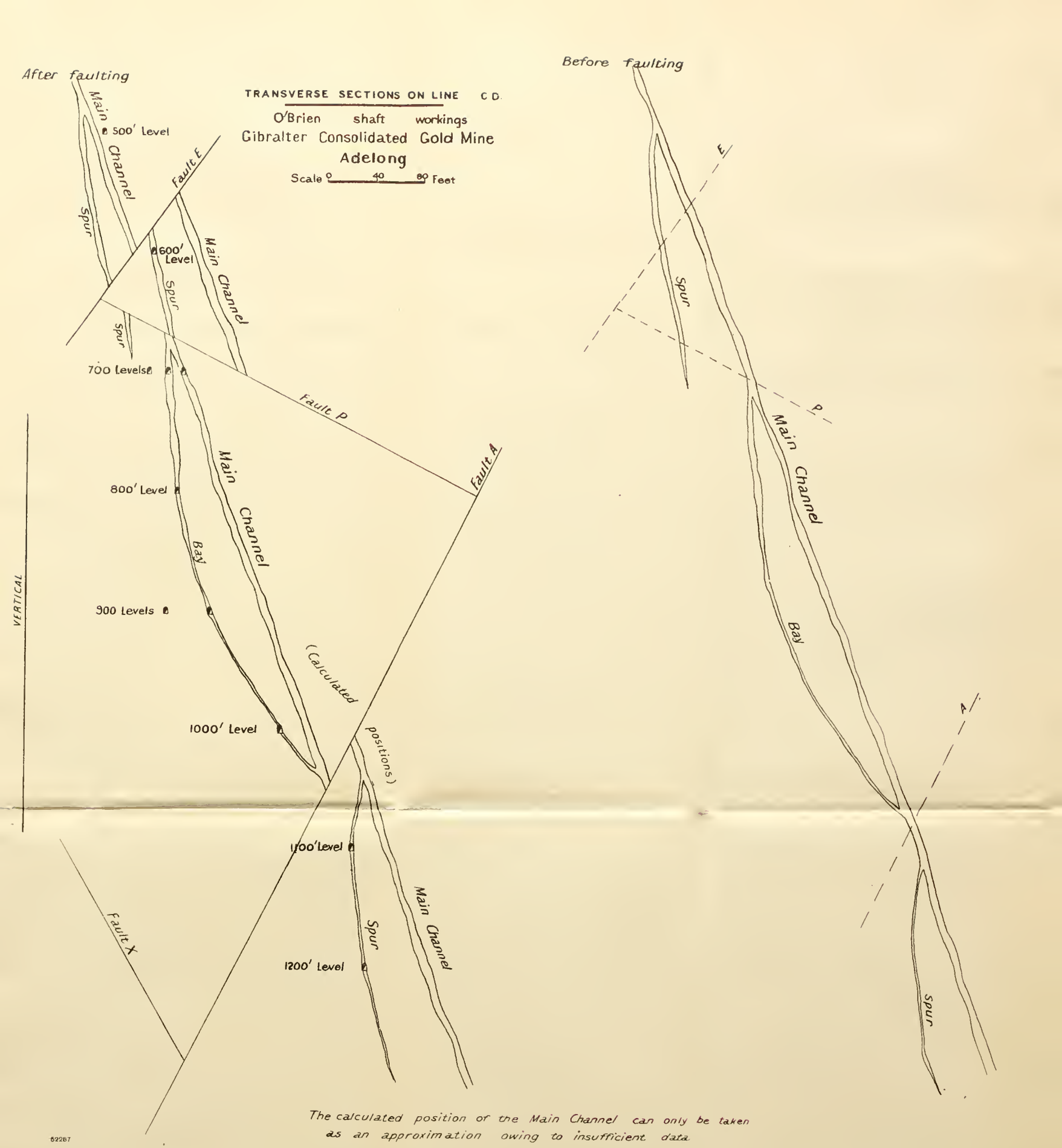
PHOTO-LITHOGRAPHED BY W. S. GULLICK, GOVT. PRINTER, N.S.W.

After faul
Spur



The calculated position of the Main Channel can only be taken as an approximation owing to insufficient data

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PHOTO-LITHOGRAPHED BY W.A. GULLICK, GOVT. PRINTER, N.S.W.

TRANSVERSE SECTION ON LINE AB

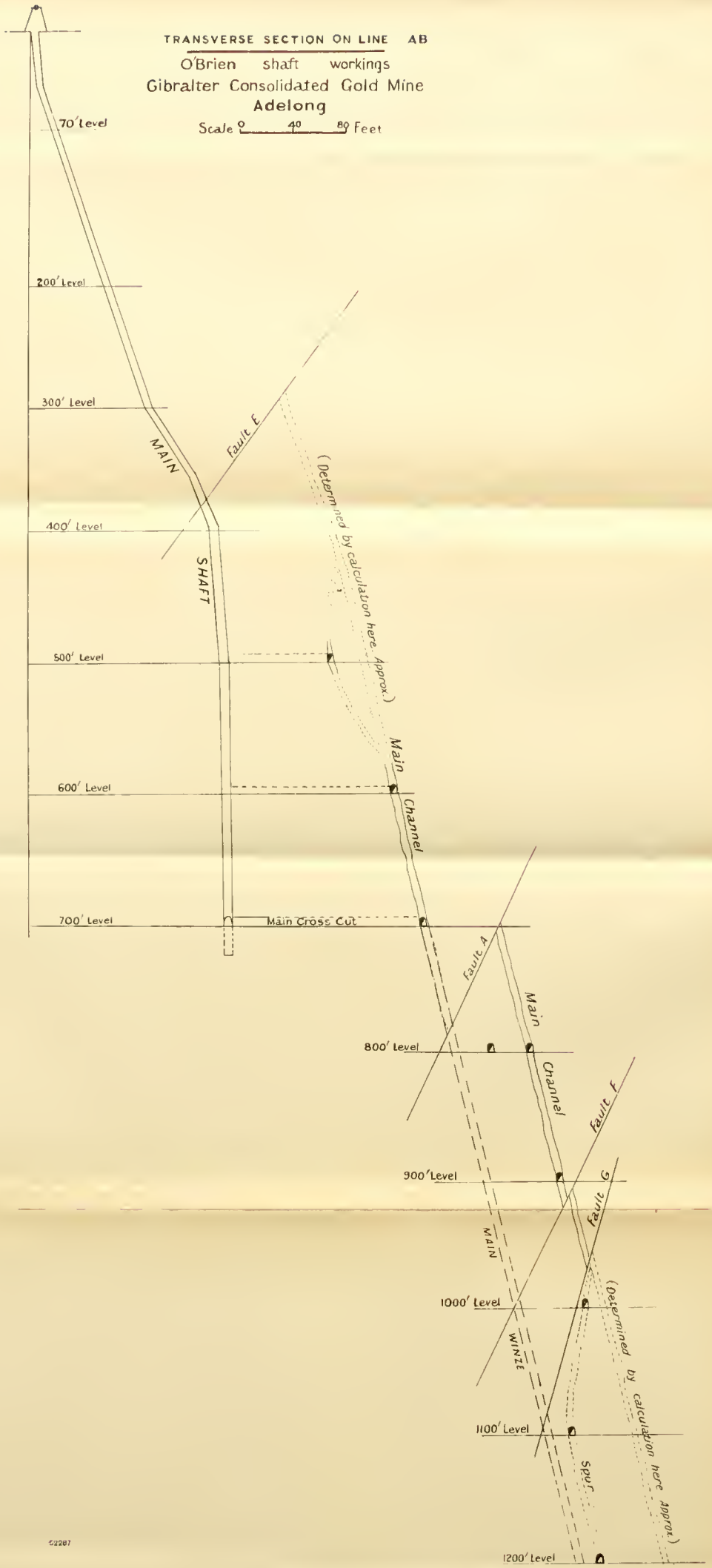


PHOTO-LITHOGRAPHED BY W.A. GULLICK, GOVT. PRINTER, N.S.W.

GIBRALTAR CONSOLIDATED MINES
ADELONG
PLAN OF WORKINGS FROM PERKINS O'BRIEN AND RADCLIFFS SHAFTS

Scale 0 30 60 90 120 Feet

Perkins shaft
270' Level
170' Level
370' Level
410' Level
Rise
Air Shaft
270' Level
410' Level

O'Brien Shaft
A
E
70' Level
c200'
200' Level
300' Level
200' Level
c300'
300' Level
400' Level
c200'
500' Level
500' Level
300' Level
400' Level
c300'
c400'
c500'
c600'
c700'
c800'
c900'
c1000'
(Proved Here)
C
600' Level
c500'
700' Level
SECTION LINE
900' Level
1000' Level
1100' Level
1200' Level
c1000'
c1100'
c1200'
B
D
F
Radcliffs Shaft

Dykes — Narrow — Wide
Faults (Minor faults not shown)
Calculated position of main channel — c200'sc
(Approximate only, owing to incomplete data)

PHOTO-LITHOGRAPHED BY A.A. MULLICK, GOVT PRINTER, N.S.W.

THE GIBRALTAR GOLD-MINE.

The first official mention of the Gibraltar Hill appears in the Annual Report of the Department of Mines for 1885. A return is published of 32 tons of stone treated for a yield of 72 oz. of gold, but it is not until 1891 that the official publication refers specifically to the Gibraltar Hill Gold-mining Company. In that year a yield of 112 oz. of gold is recorded from 50 tons of quartz raised and crushed. The shaft was 45 feet in depth, and the deepest level at 20 feet, on a vein from 12 to 18 inches in width, with an underlay to the west, and a meridional strike.

Apparently this was not the same lode now being worked by the Gibraltar Consolidated Gold-mining Company, and may have been one of the bays or branch channels.

The following year (1892), 182 tons, yielding 805 oz. of free gold, and 9 tons of concentrates, valued at 10 oz. per ton, was returned.

From then on until 1894 the yields gradually increased, as evidenced by the following official returns :—

Year.	Ore treated.	Gold returns.
1893	656 tons.	2,090 oz.
1894	706 ,,	3090 ,,

In 1895 the property was disposed of to an English company, with a nominal capital of £300,000, and a vigorous policy of development and equipment was entered upon, with the result that the 1896 returns show 3,000 tons of stone at grass, estimated to yield 9,000 oz. of gold.

In 1897 the newly erected plant was working, the following description of which is taken from the Annual Report of the Department of Mines, 1897 :—

> The extensive operations of the Gibraltar Consolidated Gold Mine (Limited) are responsible for this very gratifying increase. The following facts and figures will give some idea of the magnitude of the mining operations of this company. There is nothing in the past history of this division approaching them, and the company may be congratulated on the very complete and modern plant they have erected to treat the body of ore at their disposal, a description of which may prove interesting—the estimated value of which is £60,000 :—30-head stamp battery, 12 frue vanners, clorination works for treating 100 tons of concentrates per month, cyanide works to treat 1,400 tons of tailings per month, air compressors capable of operating twenty rock drills, four shafts equipped with hoisting machinery driven by steam, two 140 horse-power Lefell turbines for water to operate air compressors and battery, also auxiliary steam power plant for same, shafts connected with the battery by two self-acting incline tramways, water race for water power 3 miles in length. The development work is as follows :—Radcliff shaft, down 467 feet, has reef opened for a length of 700 feet on levels connected with crosscut 200 feet in length, with Calico reef running parallel with same ; O'Brien's shafts, 360 feet, opened on 350 feet level for 100 feet in length ; Perkins' shafts, 270 feet, opened for a length of 300 feet on the 170 feet level, connected by means of crosscut 140 feet in length, with Chinaman reef running parallel with same ; crosscut on the 270 feet level has now struck Chinaman's reef, therefore the workings are on five distinct reefs. Deepest level, Radcliff's, 455 feet ; width of lode or vein, average 18 inches ; dip or underlay, average 12 degrees ; bearing

or strike, north 35 degrees east. The number of men employed averages about 350. The number of tons crushed was 10,271, which yielded 18,416 ounces of gold. This does not include the yield from concentrates and tailings.

The following returns are available since the property was taken over by the first English company :—

Year.	Ore treated.	Gold returns.	Remarks.
	tons.	oz.	
1897	10,271	18,416	Exclusive of concentrates and tailings.
1898	12,886	13,459	
1899	23,700	11,362	
	46,857	43,237	

In the Annual Report of the Department of Mines for 1899, the following information is published, together with plates from photographs by Mr. John Nute, managing superintendent of the company :—

"The Gibraltar Consolidated Company, Limited, whose mine is the principal one in this division, has done good work, and during the year has treated 23,700 tons of stone for a return of 11,362 ounces of gold, valued at £40,800. There is every probability of an improvement taking place in this property at a depth, and of the lode becoming more regular and defined, and not as now—a continuous series of breaks. The exceptional formation met with in this mine, attributed to the peculiar rending of the rocks in past ages, requires special geological investigation There are three main shafts, viz., Radcliff's shaft, 400 feet above the creek ; O'Brien's shaft, 250 feet above the creek ; and Perkins' shaft, 150 feet above the creek. The former is being sunk, and at the end of November had reached a depth of 600 feet from the surface. The drives from this shaft are the 40, 160, 233, 355, 455, and 555 foot levels ; and the total lengths amount to over 1 mile, the 230 and 455 foot levels communicating with O'Brien's shaft ; there is good ventilation throughout the mine. O'Brien's shaft is being sunk, and at the time above stated, a depth of 360 feet had been reached. A fair amount of development work is being prosecuted in the 200, 300, and 350 foot levels of this shaft.

There are several reefs in the property—the Main or Central reef, Calico reef, Chinaman's reef, &c., their general bearing being from 40 degrees to 60 degrees north-east and south-west, and underlying slightly to the east. They are composed chiefly of quartz containing a small percentage of iron pyrites. The country rock is a very hard granite ; but a series of diorite bars and buck-reefs run through the country at right angles to the reefs, causing a great disturbance, and consequent difficulty in systematically opening up the mine, owing to the faulting of the reefs, sometimes to the extent of over 100 feet. These heaves, however, are almost invariably to the right hand.

The reefs vary in width from 1 to 3 feet, and the milling ore assays from 13 to 15 dwt. of gold per ton. Ore chutes are blocked out by winzes from level to level, and the stone is extracted by back or overhand stopes. Strong stulls are put in, in the back of the levels, and mullocking is carried on as the ground is being taken out. About 240 men are employed underground at present, and there are twenty machine rock drills constantly at work.

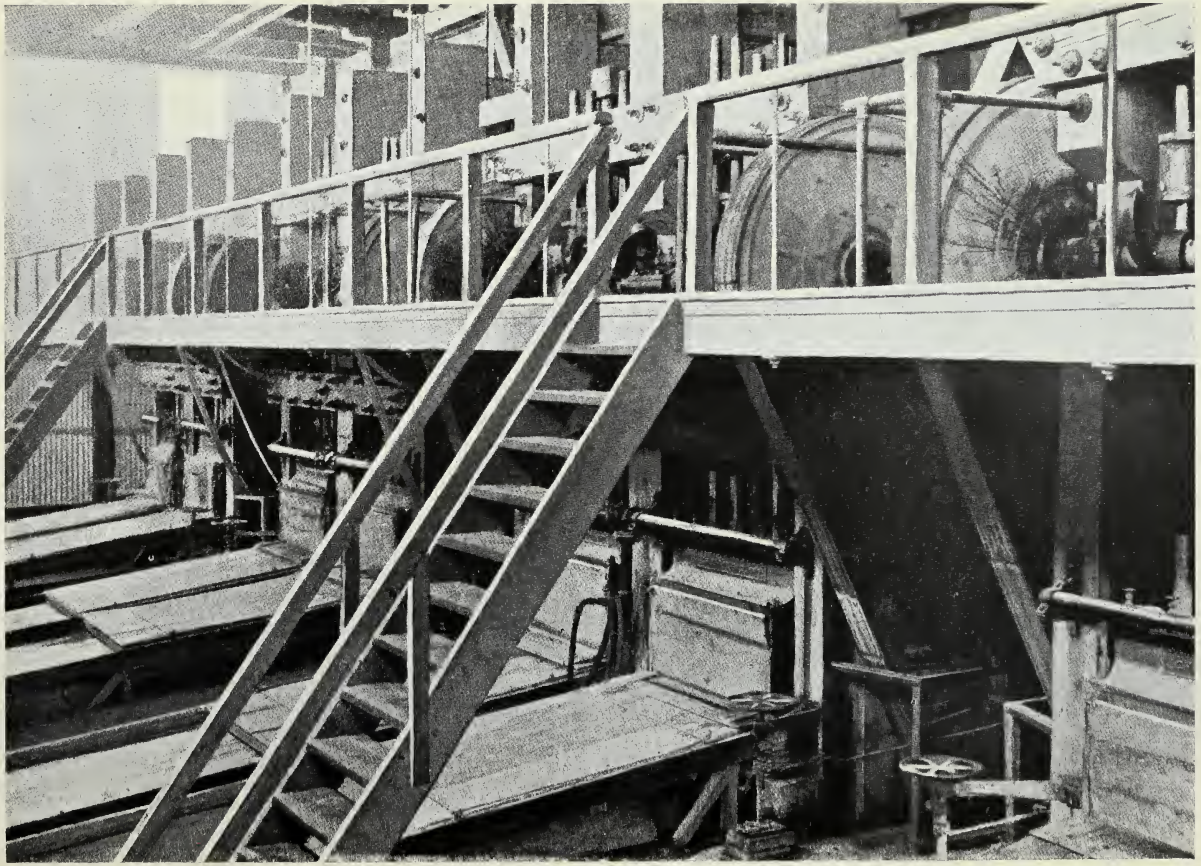
Radcliff's Shaft.

O'Brien Shaft.

Perkins Shaft.

The Gibraltar Consolidated Gold Mine, Adelong.

† 52287



View of Battery, Gibraltar Consolidated Gold Mines.

The plant and machinery on the property is valued at £40,000. There are steam hoisting-engines at each shaft, and double cages to carry trucks of 6 cwt. capacity. The battery comprises two Dodge Giant rock-breakers, eight Challenge ore-feeders, forty heads of stamps (weight 850 lb.) ninety drops of 7½ inches per minute), fourteen frue vanners, and all necessary steam-driving gear. There are also compressor plants, a number of rock-drills, and very complete chlorination and cyanide works capable of treating respectively 10 tons per week and 2,000 tons per month. The Department is indebted to the courtesy of Mr. John Nute, managing superintendent of the company, for the illustrations given of this mine, as, also, for some of the above particulars."

From the foregoing it is evident that the outlook for this mine at the close of the year 1899, was considered most favourable. This optimistic view no doubt appeared justified from the development work carried out during the preceding twelve months, but in the light of present day information, the difficulty of forming a true estimate of prospects in almost all mining ventures is again emphasised.

Subsequent work completely altered the aspects, and although ups and downs have since been experienced, it must be admitted that the latter have predominated. In the year 1900 the company reconstructed, and a further capital of £150,000 became available. The Caledonian, Caledonian Extended, and Challenger mines were purchased, situated on the Old Hill line to the north of the village of Adelong, and considerable prospecting and development work was carried out.

The following particulars are taken from a Report to the Company by A. Llewellyn, Mining Engineer, April, 1914 :—

"In two years (1900 and 1901) the company crushed 31,012 tons for a yield of 16,264 oz, or an average of 10½ dwt. per ton.

"During the latter part of 1901, the various mines were let on tribute, and from O'Brien shaft workings 12,750 tons of ore were crushed, which yielded 20,675 oz. or 1 oz. 10 dwt. 10 grs. per ton. This was selected ore, and came chiefly from and about the 500 feet level north.

"All the tributes expired in 1907, after about £85,000 worth of gold had been won, and the company commenced to develop the Gibraltar Mine below the 500 feet level, but nothing more appears to have been done on the Old Hill line.

"In six years, from 1908 to 1913, 22,648 tons were crushed for a yield of 27,558 oz., averaging 1 oz. 4 dwt. of gold per ton."

As far as can be ascertained the total production of this mine up to the end of 1914 may be taken at 120,000 oz., valued at £450,000.

No doubt the earlier individual miners and tributers did fairly well, for the tributers appear to have won £85,000 worth of gold. Only one dividend of 1s. per share was paid by the old company, but the present company has never paid a dividend.

Thus it will be seen that whilst this mine has produced gold to the value of £450,000, and swallowed up large sums in capital outlay, practically no return has ever been made to investors.

These conditions were brought about not necessarily through extravagant management, but more by reason of the high costs entailed in the opening up of ore bodies, the enormous amount of underground prospecting necessary to locate makes of pay ore, and the limited annual output compared with working costs. The latter has been largely dependent on the second factor, for it must always be difficult to lay out a mine on an economic basis when

confronted with geological phenomena in the form of faults and dykes such as occur in the Gibraltar Mine. The pity of it is that only the drill and pick could afford absolute evidence of these troubles, even though the mining geologist might suspect them from evidence obtained in the upper levels or even on the surface.

Despite discouragement and difficulties, however, the company has pursued a vigorous prospecting policy during the past few years, and during the first six months of 1915, £6,500 were spent in prospecting, whilst even greater efforts to locate makes of pay ore are being made at the present time.

The superintendent kindly supplied the following particulars with regard to the mine:—

Working Costs.

	£	s.	d.	
Stoping, with all expenses...	1	16	7·3	For first seven months of 1915.
Driving and winzing ...	4	3	2·5	
Sinking	8	0	0	

Men employed, 110; area of leases, 250 acres, of which 156 acres consist of alluvial ground sub-let for gold dredging purposes, but now abandoned.

Fuel consumption per month, 200 cords, at a cost of 19s. per cord. The works are supplied with water and also power by a head-race delivering 150 cubic feet per minute, the length of the race being about 7 miles.

Mr. Onus, the battery manager, supplied the following:—

Plant.

2 Blake rock-breakers.
40 head of stamps, weighing 850 lb., fully shod.
4 Wilfley tables (one to each 10-head of stamps).
6 cyanide vats.
2 zinc boxes.
2 U.F. Multitubular boilers at battery, I.H.P.
2 U.F. Multitubular boilers at O'Brien's shaft.
1 vertical boiler, Perkins' shaft, I.H.P.

Concentrates amount to 2 per cent. of the ore milled, and have an average gold contents of 8½ oz. per ton as treated at the Cockle Creek Smelting Works.

The tailings contain 3 dwt. of gold per ton, and the extraction is about 80 per cent.

Twenty-five per cent. of slimes result, with a gold contents of 2¾ dwt., and they are treated three times by decantation process, which returns 80 per cent. of the gold.

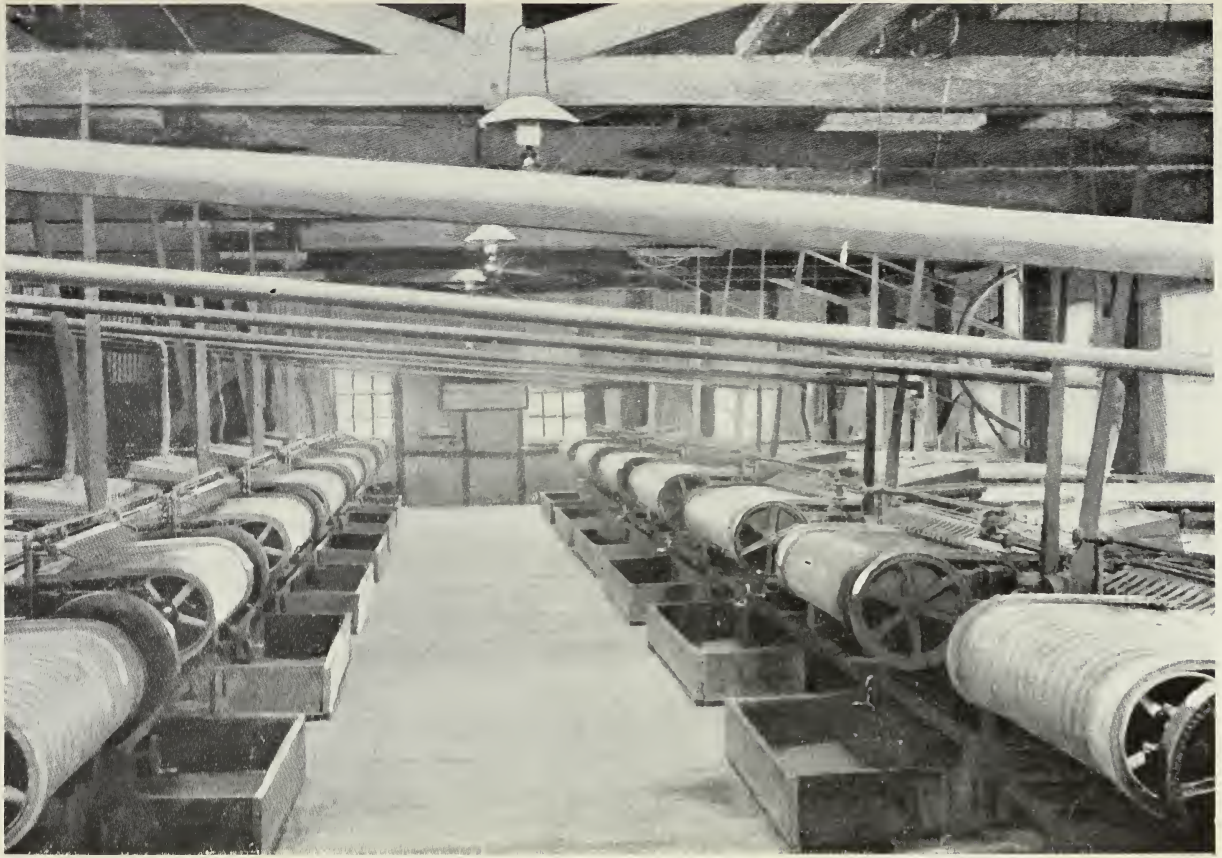
The cyanide consumption is 1¼ lb. per ton, being somewhat high owing to the presence of small quantities of copper in the ore.

The necessary power used in emptying the various vats is derived from a water-wheel, developing about 3 horse-power.

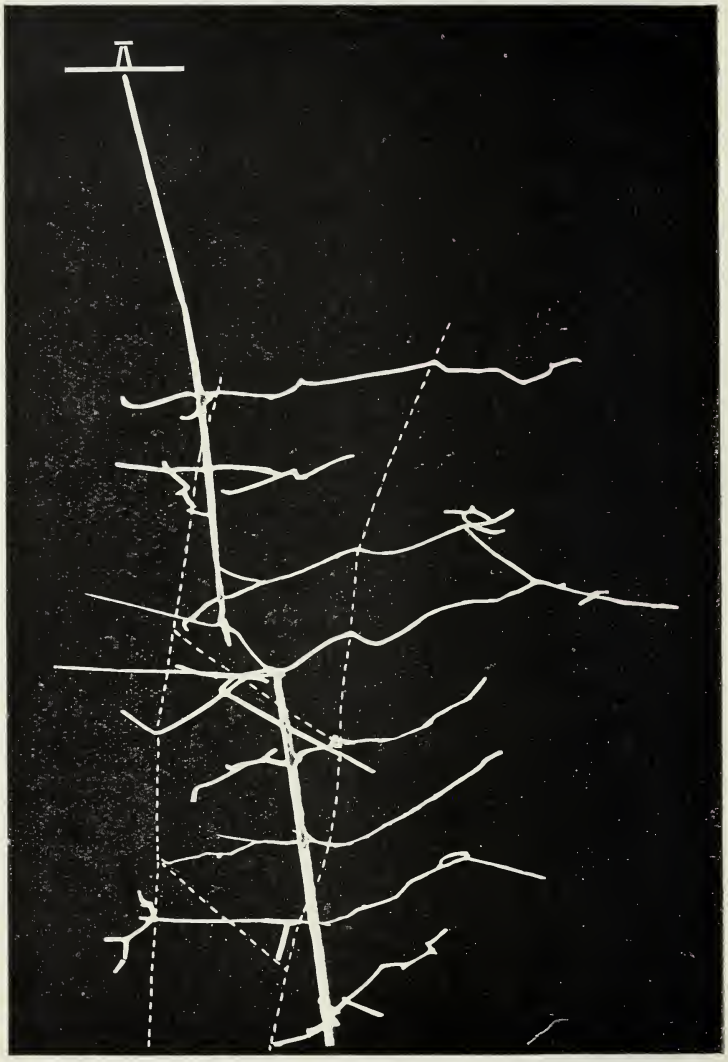
Battery gold is worth £3 11s. per oz., and gold from cyanide extraction £2 17s. 6d. The main shaft, known as O'Brien's shaft, is down a depth of 700 feet on the underlay and is connected to the main winze by a cross-cut 160 feet long, the winze being 500 feet deep, also on the underlay.

CORRIGENDUM

Page 40—*For* driving and winzing, £4 3s. 2·5d, *read* £3 16s. 8·02d.



Frue Vanners, Gibraltar Consolidated Gold Mines.



O'Brien Shaft Workings.

(Reproduced from photograph of model prepared by the Author.)

The dotted lines represent fault Planes.

There are two other shafts on the property, known as Radcliff's and Perkins'. The former is about 700 feet deep, and not now in use, whilst the latter is down to a depth of 470 feet. There are twelve levels in the O'Brien shaft workings, totalling nearly 10,000 feet in length, numerous long cross-cuts, and many winzes, whilst the amount of stoping is roughly indicated on the accompanying longitudinal projection..

Particulars with regard to occurrences, &c., are given elsewhere in this Report.

Prospects.

Before expressing an opinion upon the future prospects of gold mining within the leases held by the Gibraltar Consolidated Gold-mining Company, it may be as well to epitomise the principal factors which, in the writer's opinion, govern the situation.

1. The carrying out of prospecting work in the direction of the calculated position of the main channel.
2. Mica lamprophyre intrusions.
3. Limited dimensions of ore channels.

Unfortunately No. 1 does not necessarily imply continuous makes of pay ore, but it should concentrate operations, and minimise dead work, whilst likely "spurs" could be investigated later.

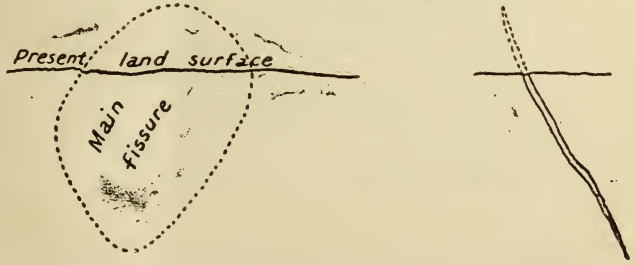
No. 2. The evidence available points to the presence of igneous intrusions being an all-important factor. To a large extent in the upper levels, primary dykes have been found occupying the main ore channels, whilst in the deeper levels intrusions of at least three ages have been found to be increasing, both in number and extent, with the result that even if the lode continues, ore bodies are likely to be restricted and more or less isolated.

The evidence may indicate that the reservoir of the intrusive igneous rock lies at no great depth beneath the present surface, and that offshoots from the same are likely to increase.

No. 3. There are grounds for assuming that the main ore channel is as restricted in depth as it no doubt is in length. In other words, the main fissure may die out along a vertical axis with a length corresponding to the longitudinal axis.

Pay-ore has been proved over a maximum horizontal length of 600 feet, and the vertical axis may be equally as short.

The following diagram will serve to explain the possible conditions:—

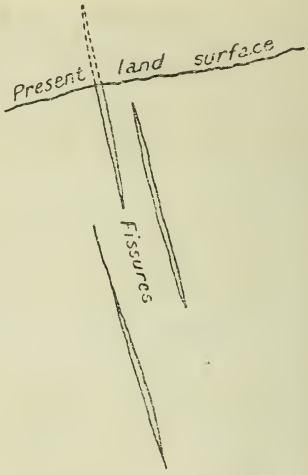


This implies relatively insignificant dimensions to the fissure both horizontally and vertically.

Viewing the Nos. 2 and 3 possibilities, one must be prepared for the worst, and although present evidence is far from complete, it would appear to favour these theories.

Of course there is always the possibility of striking parallel makes of ore within a zone comparatively free from intrusions, but there is no evidence to guide one in prospecting for such.

If they do occur, the following section illustrates a likely mode of occurrence :—



The possibility of the channel and makes of pay-ore in the 1,000 and 1,100-feet levels north being attributable to this mode of occurrence presents itself, thus accounting for the departure from the projected underlay of the channels worked in the upper levels.

Since the theories herein advanced were put before the superintendent, and after mutual consultation, most vigorous prospecting has been carried on with a view to testing their tenability. The following particulars of this work have been supplied by the superintendent :—

Position in Mine.	Work done.
1,100 feet level north No. 2 crosscut east	8 ft. 0 in.
1,100 ,, ,, south ,, ,,	30 ,, 0 ,,
1,000 ,, ,, ,, from crosscut west	205 ,, 0 ,,
*1,090 ,, ,, ,, from No. 2 crosscut east	25 ,, 0 ,,
*900 ,, ,, ,, channel driven for	76 ,, 0 ,,
700 ,, ,, ,, crosscut east through fault P	37 ,, 0 ,,
700 ,, ,, ,, incline drive	10 ,, 0 ,,
600 ,, ,, ,, (on main channel)	212 ,, 6 ,,
*600 ,, ,, ,, crosscut west to south of fault E.	25 ,, 0 ,,
*400 ,, ,, ,, (on main channel)	100 ,, 0 ,,
*400 ,, ,, north crosscut east	12 ,, 0 ,,
*800 ,, ,, ,, crosscut commenced	.....
	740 ft. 6 in.

It must be admitted that results have been most disappointing, for whilst the general principles have been proved correct, no further ore bodies have yet been located. This is due to the two following factors :—

1. Extensive volcanic intrusions, to the entire exclusion of ore bodies.
2. The thinning out of what is apparently the main fissure.

* Progressing.

Underground Shift at O'Brien Shaft, Gibraltar Consolidated Gold Mines, Adelong.

No. 1 factor is most evidenced in the 400, 600, and 700 feet levels, where although wide well-defined channels have been driven on, they are practically filled with primary dyke rock.

No. 2 has been proved in the 1,000 and 1,100 feet levels, where a true fissure vein has been exposed in the calculated positions, but its width is only from 1 to 6 inches, and no values are present. It may be that the reef has been cut in each case in pinched zones, which occur in many places even in the rich upper levels, but the possibility of a general thinning must be recognised. Certainly a make of mineralised stone from 2 to 3 feet wide has now been reached in the 1,000-feet level north, but its gold value or extent have yet to be determined.

OTHER MINES.

The fact that all other mines within the area examined have long since been abandoned precludes any detailed description, and the only information available with regard to them is contained in the Annual Reports of the Department of Mines. The positions of the mines referred to are shown either on the map facing page 2, or on the plan reproduced from the report by Mr. W. H. J. Slee, late Chief Inspector of Mines.

Reef mining appears to have commenced on the hills immediately to the north of the village of Adelong, several distinct lines of reef being worked.

The most easterly, known as the Old Hill line, received considerable attention, over a dozen claims having been pegged out. The first definite information is contained in the Annual Report of the Department of Mines for 1881. It is there stated that the Perseverance Gold-mining Company was actively engaged on what is known as the Old Hill line, and the following particulars are given:—

The Prowse and Woodward's, or No. 1 shaft, is now at a depth of 874 feet; the shaft is well timbered, and is skidded from top to bottom; drives have been put in north and south at the following depths from the surface:—275 feet, 375 feet, 475 feet, 535 feet, and 640 feet, and to the south only at 740 feet. Numerous winzes and passes have been made between the drives, and iron tramways laid up to the faces for conveying the quartz and refuse away in the trucks, which are sent direct to the surface, thus giving the men as little trouble in handling the stuff as possible. This was one of the first gold mines in New South Wales in which rock-boring machinery was used. There are five Burleigh rock-drills with a powerful air-compressor and 14 horse-power boiler and engine to work the same. Besides working the drills, the compressor supplies fresh air to the mines, which becomes a necessity when a great depth is obtained.

The Our Own, or No. 2 shaft, has only been sunk a depth of 375 feet, and is not worked now, as it is intended to work this ground from the Nos. 1 and 3 shafts. The Adelong, No. 3 shaft, is 460 feet deep; it is skidded for double cages from top to bottom, and drives have been put in at the different levels north and south, as in No. 1 shaft. Large quantities of gold have been taken out of these mines near the surface, being nearly 6 oz. to the ton, and it is the opinion of many that still richer finds will be made at a depth. On the Little Victoria there are two shafts, each down a depth of 200 feet only. This ground proved very rich in former years, hundreds of tons, yielding 10 oz. per ton, being obtained. All the mines are in splendid order, every convenience being provided; and it is evidently the desire of the proprietor—ably carried out by the manager, Mr. John McLennan—that the mines should be worked in as safe and economical a manner as possible. Near the Little Victoria main shaft, and on the bank of Adelong Creek, is situated the recently-erected battery, and which is said by many to equal any in the colonies for gold saving appliances. There are four boxes of five stamps each, and the crushing stuff, after discharging from the boxes through fine gratings (144 to 255 to the square inch), passes over two sets of copper plates, each 24 inches wide, then through ripples charged with mercury into Chilian mills, of which there is one to each box; from the mills it passes into Denny's pulverisers, of which also there is one to each box. After leaving the pulverisers it flows over the usual blanket tables into a patent buddle for saving the mundic, and after, over a shaking table. The whole of this, and machinery, is driven by a powerful engine of 45

horse-power, the steam for which, as also for a winding-engine and steam-pump, is supplied by three large boilers. Since erecting the third boiler the company have been able to work the whole twenty head of stamps together, and are thus enabled to crush for the public when not occupied on their own stone.

The whole of the mines are connected with the battery by a tramway, worked by a small but powerful locomotive, a splendid piece of machinery, supplied by Mort's Dock Engineering Company, Sydney. A photograph is shown. The management of the battery, like that of the mines, shows great care and forethought. A large amount of capital has been spent on the property; and now that everything is in good working order it is to be hoped that Mr. Molineaux will be well rewarded for his pluck, energy, and perseverance, which are so unusually shown in connection with gold mining in New South Wales.

The yields from this line appear to have been very patchy, and whilst excellent results were obtained at times, numerous blanks were proved. We find here to-day evidence on the dumps that similar rock types exist as are found in the Gibraltar Mine, and judging from the proportion of dyke rocks the same difficulties were encountered.

Prowse and Woodward's shaft reached a depth of 1,100 feet as far as could be ascertained, and this is situated at the top of the hill, about 500 feet above the Adelong Mine shaft, which is 400 feet deep, and distant about 1 mile from the former.

The evidence is not sufficient to enable one to say that this is a continuous line of reef, although shallow workings occur throughout the length stated. From the nature of other occurrences on the field, it would appear probable that the "line" represents a series of flat lenses filled with ore or dyke rock, each one more or less isolated. This might account for abandonment after apparent adequate prospecting, but it is reasonable to assume that if the surface length of ore bodies extend over a mile other similar occurrences may be expected to go down to a proportionate depth. A possible explanation for the closing down of the various workings on this line is that the individual lenses upon which work was done petered out at a depth. If the assumption as to mode of occurrence be correct, other lenses should occur at a greater depth, and might be located by cross-cuts or drives, once the general conditions as to underlay and mode of occurrence are realised. On the other hand, the dyke intrusions met with appear to have been numerous, and such would prove a grave obstacle to economic mining.

The next most important line is known as the Victoria, and is distant about 20 chains to the westward of the foregoing, and on the opposite fall of the hill. This line embraced the various claims shown on Mr. Slee's map, and in the Annual Report for 1877 the following report by the late Mr. C. S. Wilkinson was published :—*

"In conjunction with Mr. W. H. J. Slee, Inspector of Mines, I examined the Great Victoria Gold-mining Company's quartz reef at Adelong, for the purpose of reporting upon the merits of that company's claim for the Government reward of £1,000 for having been the first to discover and make known to the Minister for Mines the existence of payable gold-bearing quartz at a depth of 800 feet perpendicular from the cap of the reef.

* Report on Great Victoria Gold-mining Co., by W. H. J. Slee and C. S. Wilkinson. Annual Report, Dept. of Mines, Sydney, 1877, pp. 198-9.

"Under our supervision 3 tons of quartz were raised from a depth of from 810 to 820 feet; the result of the crushing, which was carefully conducted at the Royal Mint, gave at the rate of 1 oz. 12 dwt. 12 grs. of standard gold, and 1 dwt. 18 grs. of standard silver (value together £6 7s. 0½d.) per ton of quartz. Two samples of the tailings from this crushing were assayed at the Mint and found to contain only 4 dwt. 10 grs. of gold and 1 oz. 13 dwt. 1 gr. of silver per ton of tailings. The quartz contained much iron pyrites.

"The company's property consists of two adjoining leases, situated on the Victoria reef, about half-a-mile north from the town of Adelong. The leases together embrace 334 feet along the line of the reef; the bearing of the reef is N. 10 degrees W., its general dip is easterly, but it varies thus—for the first 110 feet it is easterly, then to the 400 feet level the dip changes slightly to the west, again it turns to the east for 130 feet deeper, and then westerly, but almost vertical to the 820-feet level.

"The reef occurs in a dark greenish schist, which varies in width from about 2 to 10 feet, and is bounded on both sides by well defined walls of hard quartzose granite containing black mica. The quartz reef is sometimes over 12 inches thick, at others it makes into several veins accompanied by numerous thin thread-like veins of gold-bearing quartz interlaminated with the schist, so that in places nearly the whole width of the schist or "channel" of the reef is taken out for crushing. Such is the general character of the veinstuff from the surface down to the lowest level. Both the schist and the quartz are highly impregnated with pyrites. Occasionally "horses" of granite make into the schist; they may be well seen in section in the face of a drive near the 730 feet level.

"Characteristic samples of the reef and of the rocks associated with it were obtained by the Inspector of Mines and myself for the Museum of Mines. At the 820-feet level the reef is 11 inches thick, and widening as it goes down it shows gold freely. The schist here is full of thin veins of quartz (called "seconds") containing pyrites and gold; sometimes veins of calcite are met with. The mine is remarkably dry; the only water entering it is that which drains in from the upper levels near the surface.

"The mining manager informed me that the offering of the £1,000 reward by the Government induced him to push forward the sinking of the main shaft, with the hope of enabling the company to merit the reward. Other mining companies were also, I believe, sinking with the same object in view. It is thus gratifying to know that the intention of the Government in offering this reward has been so quickly realised; and the good effect thereof, while directly benefiting an individual company, will be to establish confidence in the permanency of quartz-mining in the Adelong gold-field, and probably in other gold-fields throughout the colony.

"I availed myself of the opportunity to ascertain the temperature at various depths in this deep mine. Both in descending and ascending the mine, the thermometer read as follows:—

Depth—	200	feet,	60	deg.
,,	400	,,	60	,,
,,	450	,,	60	,,
,,	510	,,	60	,,
,,	620	,,	65	,,
,,	730	,,	68	,,
,,	815	,,	70	,,

Above the 510 feet level the temperature was affected by the currents of air circulating through the mine. Below that level we find an average rate of increase in temperature of about 1 degree for every 30 feet, but this rate apparently diminishes with the depth. The weather at the time these observations were taken was rather warm ; at the surface the temperature in the shade was 75 degrees."

Two of the claims on the Victoria line, known as Annettes and the Research, are stated to have produced some £50,000 worth of gold during the twelve years they were worked prior to 1895. In that year they were taken over by the Gibraltar Hill Syndicate, and a company known as the Great Victoria United Gold-mining Company was formed. A vigorous prospecting policy was carried out, the main shaft being worked to a depth of 1,075 feet, the deepest shaft in New South Wales at that time, whilst three other shafts were sunk on the property to depths of 770 feet, 700 feet, and 400 feet respectively, in addition to numerous drives and cross-cuts. Results do not appear to have been satisfactory, and work was practically abandoned in 1897.

The Flagstaff claim on the same line had yielded excellent results prior to 1881, as much as 715 oz. of gold having been won from 65 tons of stone. It was purchased for £16,000 by Amos Bros., but subsequent work failed to justify the expenditure. Other claims on this line appear to have had the same ultimate fate, despite big gold yields from the upper workings.

Here again the tips bear evidence of similar rock occurrences to those found elsewhere on the field, and it seems probable that failure to realise the nature of the geological phenomena resulted in somewhat unsystematic prospecting, and an expenditure of money altogether out of keeping with the results obtained, despite the large amount of prospecting work carried out.

Other lines of reef attracted considerable attention in the past but no information could be obtained concerning them, apart from that given in the report, republished herewith, by the Inspector of Mines upon the mines at Adelong.

PROSPECTS OF THE FIELD.

When one realises the enormous quantity of gold won from within the limited area of the Adelong field proper, it is hard to believe that the comparatively limited amount of reef-mining carried out has exhausted Nature's store.

It must be admitted that mining is now at a very low ebb on this field, and future prospects, on the evidence available, present numerous problems.

The principal of these may be summarised as follows :—

1. The probable dimensions of the original fractures, both as regards length and depth.
2. The extent of the intrusions of mica lamprophyre, particularly in respect to the primary or channel dykes.
3. To what extent will the possible mode of occurrence (*i.e.*, short overlapping lenses), faulting, and igneous intrusions affect the cost of mining and ore available.

With regard to No. 1, it must be admitted that the available evidence is very meagre, but in the writer's opinion it favours somewhat restricted proportions for each individual reef or channel.

Factor No. 2 is all important in the auriferous deposits of the field and the preponderance or otherwise of these intrusions is vital in the future development of the field. There is now no doubt that they will prove very numerous, and greatly reduce the tonnage of milling ore, even should a succession of lenses with makes of ore be demonstrated. Moreover, they are likely to increase in depth.

On the Rand mines in South Africa, dykes and faults are very numerous, and

> * "A mining engineer in estimating the ore reserves of a Rand mine generally considers it necessary to make a reduction of 10 to 15 per cent. on the calculated quantities, in order to allow for losses on this account."

In the case of those mines, dykes conforming with the ore channels are practically unknown, but they are very prevalent on the Adelong field, and the writer is inclined to allow a reduction of 50 per cent. in ore estimates, by reason of these occurrences.

The third reason is more or less dependent on the two foregoing, but there is now little doubt that these factors will be of great significance in economic mining.

On the whole, the writer is inclined to be pessimistic with regard to the chances of the gold-miner, whilst admitting that there must be numerous makes of pay-ore yet to be exploited. The very fact of the dumps containing a large proportion of dyke rock would indicate that the channels prospected were largely invaded by the intrusive material. Consequently, even if faulting did lead to mistakes in following ore channels, the makes of pay-ore are likely to be more or less isolated and restricted in size.

Viewing all the evidence, successful mining within uncertain limits is quite within the bounds of possibility, but by reason of the numerous opposing factors, it is essential that mining be carried out on intelligent and economic lines.

ALLUVIAL GOLD.

The discovery of gold in the Adelong district appears to have been made in the alluvium and *in situ* practically at the same time. No absolutely fixed date could be ascertained, but Mr. John Perkins, of the Post Office Hotel, Adelong, who was amongst the first miners to arrive on the field, states that it was about the middle of the year 1857.

The bed and banks of Adelong Creek and tributaries have been the source from which the alluvial gold was won, and fossicking has been carried out from its head almost to its junction with the Murrumbidgee River. The bulk of the gold has been won from about a mile below the village of Adelong for a distance of approximately four miles down stream. This stretch is opposite, or just below, the various lodes on the Gibraltar Hill, hence probably the source of much of the gold. Most of the gold derived from the Victoria and Currajong lines would also be deposited here, for owing to the rock-bound nature of the creek in their neighbourhood, there was not much opportunity for gold to accumulate.

* "The Gold Mines of the Rand," Hatch and Chambers, p. 58. London, 1895.

Golden Gully, in which a large amount of gold was obtained, drains the watershed of the Old Hill lines, and junctions with Adelong Creek at the village.

The first official records of the Mines Department did not commence until 1875, so there are no means of obtaining even an approximate estimate of the quantity of alluvial gold won prior to that date, nor were the returns furnished for the year 1875.

Old residents of the district have expressed the opinion that the returns of gold from the alluvial deposits during the first twenty years subsequent to the discovery far exceeds subsequent yields for a similar period, but the writer cannot verify this statement.

The official returns of alluvial gold won from 1876 to 1914 are very incomplete during the first ten years, and the following table can only be taken as an approximation :—

Year.	Gold Yield in oz.	Remarks.
1876	5,000	Estimate.
1877	4,000	,,
1878	3,000	,, (yield fell short of 1877 owing to drought).
1879	4,000	,,
1880	5,000	,,
1881	2,000	,, (alluvial mining slack).
1882	3,000	,,
1883	2,000	,,
1884	5,000	,,
1885	5,253	,,
1886	4,085	... ..
1887	833	.....
1888	350	.....
1889	1,771	.....
1890	3,390	.....
1891	2,991	... ..
1892	1,000	Estimate.
1893	1,739	.....
1894	1,624	.....
1895	500	Estimate }
1896	300	,, } Scarcity of water owing to drought.
1897	300	,, }
1898	635	.. ...
1899	500	.....
1900	644	.....
1901	806	Gold dredging started.
1902	3,600	.....
1903	3,276	.....
1904	3,250	Estimate.
1905	5,000	Approximate.
1906	6,000	,,
1907	12,000	,,
1908	13,000	,,
1909	10,535	.....
1910	9,339	.....
1911	5,000	Approximate.
1912	2,000	,,
1913	4,858	Bucket dredges at work.
1914	6,851	.....
Total ...	144,430	

In the Annual Report of the Department of Mines for 1879, it is stated that "the Chinese still send away, and sell locally, some 1,000 oz. per year. As a rule these "fossickers" follow after the alluvial miners have "picked the eyes out of" the auriferous deposits, and this alone would indicate that much of the alluvial ground had been more or less worked prior to that date.

In the absence of any data it is impossible to form an estimate of the alluvial gold won between 1857 and 1876, but probably it is well within the mark to estimate the total quantity won to date at 250,000 oz.

In 1882, at Sheppard's claim, in the creek opposite Gibraltar Hill, a large amount of work was done, and in the Annual Report for that year it is stated that "from the bottom of a shaft, 8 feet by 4 feet, 14 oz. of gold were obtained," and that 100 men were employed on this claim.

About the same time Mr. Travers Jones was working an area of alluvium just below Mr. Shephard's, and an idea of the magnitude of his operations is gained from the Annual Report for 1883. Sixty men were employed, there was about 8,000 feet of main drives, besides cross-drives, on a lead 300 feet wide, and 230 trucks of wash dirt were landed from a depth of 48 feet each eight-hour shift.

These alluvial claims were worked vigorously until about 1895, when a period of more or less stagnation set in with regard to alluvial mining.

In 1899, large areas of land were taken up along the Adelong Creek, with a view to dredging for gold, but it was 1901 before operations were in full swing. Messrs. Davies and Kershaw had secured the dredging rights, and a vigorous policy was adopted, with the result that during the next few years the gold yield went up in leaps and bounds. Two suction dredges were installed, and in 1908 the returns show that 1,393,000 cubic yards of material were treated, with the results shown in the table.

It must be remembered that most of the ground treated had already been worked by sluicing companies, and thousands of tons of old mine timbers were removed during the process of dredging.

In 1908 further areas lower down the creek were secured by another company with a view to bucket dredging, and in 1911 two large bucket dredges were at work. Although the ground is not so rich as it was higher up the creek, there appears to be good future prospects for this enterprise.

In 1913, Messrs. Davies and Kershaw had practically worked out their area, and the writer was informed by Mr. Davies that, as a result of the undertaking, nearly 3 tons of gold had been recovered from that portion of Adelong Creek.

Five other dredges are still working some distance below Grahamstown, and, judging by the gold returns (6,851 oz.) for 1914, the sum total of the gold won from the bed of Adelong Creek will be still further augmented.

Sydney: William Applegate Gullick, Government Printer.—1916.

Similar view to frontispiece, taken 13 years later. Note the effect of the gold dredging in the bed of Adelong Creek.

MINERAL R

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