The following table gives the returns from the district up to the date of my visit:—

Number of Lease.	Name of Lease.	Date.	Quantity of Stone Crushed.	Yield of Gold.	
				Total Yield.	Rate per Ton.
			tons cwts. qrs.	ozs. dwts. grs.	ozs. dwts. grs.
10	Bullington	1898	8 0 0	5 3 0	0 12 21
		1899	26 0 0	6 10 0	0 5 0
	Total	...	34 0 0	11 13 0	0 7 0
pp. 2	Donnybrook	1899	26 5 0	76 10 0	2 18 6
1	Donnybrook No. 1 South ...	1899	26 10 0	39 10 0	1 9 19
7	Duke of Wellington	1899	1 0 0	0 12 6	0 12 6
3 & 11	Hunter's Venture	1898	10 0 0	9 10 0	0 19 0
		1899	101 0 0	56 1 0	0 12 2
	Total	...	111 0 0	65 11 0	0 12 19
5 & 13	Queen of the South	1899	104 19 0	299 2 0	2 17 0
C.L. 2	Perseverance	1899	4 0 0	2 12 0	0 15 0
pp. 14	Star of the West	1899	5 0 0	1 0 0	0 4 0
	Total	...	312 14 0	496 10 6	1 12 2
	Alluvial Gold	...	...	30 2 0	...
	Grand Total	...	...	526 12 6	...

The value of the gold varies from £3 3s. to £3 16s. per ounce.

THE GEOLOGY OF THE "NORTH LEAD," KANOWNA.

This report is intended to describe the geological features of what is known as the Kanowna North Lead, and is accompanied by an explanatory geological map, Plate VI., and four sections, Nos. 1, 2, 3, and 4, showing the structure of the deposits.

Resume of the History of the Kanowna Mining District.

The Kanowna Mining District lies in the North-East Coolgardie Goldfield, distant about 12 miles East from Kalgoorlie, and 397 miles East from Fremantle, being connected with both places by rail.

The field first came into prominence from the discovery of rich quartz reefs and leaders which were found outcropping on the higher grounds to the North of the present townsite. Subsequently surface alluvial deposits were profitably worked by "dry blowers" in the same neighbourhood. During the year 1893 a fresh discovery of auriferous beds was made in the lower grounds to the East. These beds were locally known as the Golden Cement Leases.* The discovery of this last-named deposit doubtless led the prospector to search for similar deposits in other parts of the field. In the early part of the year 1897 two prospectors, Messrs. Sim and Greson, whilst prospecting for alluvial gold on the Western watershed, discovered that auriferous deposits occurred underneath the surface stratum, which, up to this time, had been considered to be alone of sedimentary origin, the thin bed of hard travertine beneath having been mistaken for the true bottom, or rocky floor upon which the superficial deposits rest. This discovery led to the opening out of the Fitzroy Lead. After this it became simply a matter of following the Fitzroy Lead, the tracing of which enabled the miner to discover the North Lead and its tributaries, the Cemetery, and Wilson's Gully Leads. In the following year (1898) further developments took place to the North and North-East, where the Q.E.D. and Moonlight Leads were discovered, and there seems every reason to suspect that similar discoveries will yet be made in the Southern portion of the field.

General Geological Description of the Country in the Vicinity of the North Lead.

Covered as much of the field is with superficial deposits, most of the structural features are hidden from view, and as prospecting has not been carried on here over any great area, the underground workings do not give much scope for geological investigation. On the higher grounds lying to the South and West of the North Lead, however, the outcropping rocks show the country rock to consist of schists, which are intersected by acid eruptive dykes, the latter embracing the felsitic and quartz porphyry types.

* For a description of this particular deposit *vide* (*a*.) "The Alluvial Deposits of Western Australia," by T. W. Richards, State Geologist, Denver, Colorado. Transactions of the American Institute of Mining Engineers, Buffalo, October, 1898. (*b*.) "Auriferous Deposits of Western Australia," by H. Y. L. Brown, Government Geologist, Adelaide. By Authority, 1886.

Schists.

The schists, which are of the chloritic group, are the prevailing type of country rock. In hand specimens the unaltered rock is of a bluish-grey colour, with a hardness of from 1 to 2,* being easily scratched with the finger nail. The rock has a fine grained texture, a distinct schistose structure, with numerous crystals of calcite and other carbonates and iron pyrites. Under the microscope it is seen to consist essentially of chlorite crystals with occasional small grains of quartz interspersed throughout.

Like similar rocks found on the Kalgoorlie and Coolgardie fields, it is most probably a much altered eruptive rock, the exact nature of which it is difficult to arrive at with any degree of certainty until mining operations have been carried beyond the zone of decomposition. The decomposed products are usually of a much darker colour, owing to the oxidation of the ferrous to the ferric oxides, though in some cases where the ferric oxide has been leached out the rock becomes almost white. Numerous instances of pseudomorphs of ferric oxide after pyrites occur, the cubes being sometimes covered with paint gold, which points to the auriferous nature of the pyrites prior to decomposition.

Acid Eruptive Rocks.

These rocks occur as dykes, and are found intersecting the more basic rocks. Their general strike is to the East of North, with a prevailing dip to the East. In hand specimens these rocks are found to consist of a more or less fine-grained material, in which blebs of felspar and quartz are frequently seen sometimes in a most perfect state of crystallisation.

The weathered products are usually white, changed at times to an almost pure kaolin, in which are frequent irregular quartz crystals. In this state they offer a strong contrast to the more basic rocks. They are also characterised by the occurrence of numerous intersecting quartz leaders, which vary from mere threads to veins several inches in thickness. These quartz veins are sometimes auriferous, and have been prospected to some extent with success.

The North Lead.

The Kanowna North Lead lies in a natural depression, which extends from the Cemetery to G.M.L. 918x. The Fitzroy, Cemetery, and Wilson's Gully Leads form, as it were, tributaries of the main lead.

The total length of the lead is about two miles. For the first part of its course the depression is bounded on the North and South by high ground, but at its Western extremity the lead widens out into an extensive flat, and has been lost.

The incline of the present surface of the country for the distance between the head of the Fitzroy Lead to a spot adjacent W.R. 35† is about 43 feet, whilst that of the underlying gutter is about 80 feet. This fall is gradual in both cases, with few exceptions, though the incline is slightly greater at the Eastern than at the Western extremity. In following the gutter, however, there are cases where a sudden fall of several feet occurs in a distance of a few yards only. The width of the gutter varies from 2 to 80 feet, 15 feet being, perhaps, a fair average. On examining the form of the gutter (an easy matter at present, as tunnels extend for nearly its whole length), one is struck with the similarity of its shape to that of an ordinary river bed. Its bottom, the steep bank near a bend, and again the gradual widening out of the trough at the junction of its tributaries, and at the Western end where the incline is less, all point to the one origin, that of erosion by running water. Since this erosion took place, beds varying from a total thickness of a few inches to 90 feet have been laid down, the deposition taking place at intervals of time, the duration of which there is little or no evidence to show. There are, however, good grounds for stating that extensive erosion of the lower beds did take place before the upper beds were deposited; a fact which will be referred to at a later page.

With reference to the origin of these or similar beds, varying opinions have been expressed. In dealing with the "Cement" deposits at Kanowna and the Fitzroy Lead, Mr. T. A. Rickards considers that the origin of the deposits is clearly shown by studying the accompanying rocks. The greenish clay underlying the deposit he considers to be due to the decomposition *in situ* of the epidote in the diorite (schist), as the kaolin arose from the decomposed felspar of the granites at the "25-Mile" deposits. The ironstone overlying parts of the deposit he likewise considers to have originated from the decomposition of the diorite.

The cement lies in a shallow depression, at the upper rim of which the quartz reefs cross the country Furthermore, these reefs traverse a low divide, which in a rough way separates the deposit from another (the Fitzroy Cement) which slopes in the opposite direction.

In conclusion, he considers the deposits to be "the placers of a country destitute of running water," and in support of this statement notes that (1) the component parts have suffered little from attrition, and so have not likely been transported by water; (2) they are the decomposed products of the surrounding rocks; (3) they are comparatively unclassified, which is in keeping with the evidence afforded by the material of which they are composed; (4) the gold particles which have "rendered the 'cement' worth mining are found to be identical in fineness and physical appearance with the gold of the

* Moh's scale of hardness. † *Vide* accompanying plan, Plate VI.

neighbouring veins, and their scarcely rounded edges invite the conclusion that the gold also has not been borne far from the place of its origin"; (5) transportation of the material has been carried on by the united action of wind and flood waters.

Mr. H. Y. L. Brown, formerly Government Geologist of this Colony, and now occupying a similar post in South Australia, examined similar deposits at the 25-Mile (Coolgardie Goldfield) and the "Cement" deposits of Kanowna, and refers to them in the following terms:—

A limestone and ironstone cement is found to contain gold at Kalgoorlie and elsewhere. The auriferous cement at White Feather (Kanowna) and at the Kintore and Ormuz mines (25-Mile) is essentially an alluvial deposit, *i.e.*, it is the result of denudation, and the redeposition of gold from auriferous veins. The bed rock is coated in most places with travertine limestone and magnesian limestone, arising from the decomposition of the rocks. Considering the wide area covered over by the plains, it seems probable that deep leads may in the course of time be discovered beneath them, the alluvial gold-bearing cement mentioned above representing the shallow ground of such leads.*

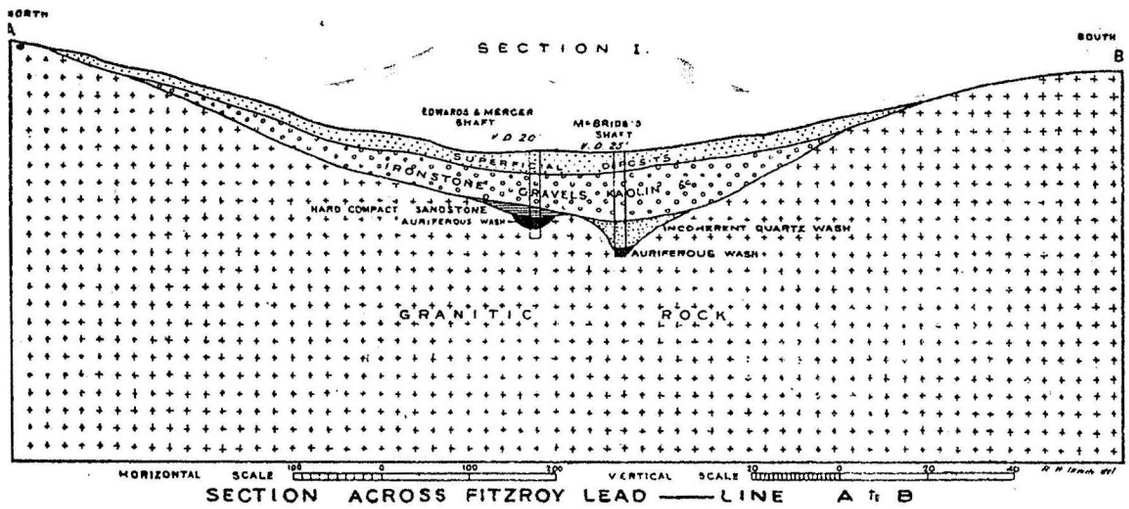
Mr. E. F. Pittman, Government Geologist of New South Wales, whilst on a visit to Western Australia towards the end of the year 1897, visited the workings of several well-known alluvial patches, and amongst others the Fitzroy Lead. His remarks on the subject are as follows†:—

It is only natural to expect that in the neighbourhood of such rich auriferous matrices as those which occur in the Kalgoorlie field, alluvial deposits, resulting from the denudation of the lodes and dykes, should also occur. For a long time, however, it appears to have been thought that there were no ancient drainage channels of any depth, and that consequently no deep auriferous leads could exist. Until quite recently, therefore, alluvial mining was confined to the shallow or surface deposits, and these were worked with considerable profit by dry blowing. These shallow deposits rest on a smooth floor of greyish white travertine, which, for a long time, was regarded by the miners as bed rock. In September, 1897, however, some more than enterprising prospectors of Kanowna broke through the travertine, which proved to be only a thin stratum, and which was found to be underlaid by made ground, consisting of angular fragments of stone with a few rolled pebbles. By following this down an extremely rich gutter was discovered resting upon a floor of decomposed quartz porphyry. This lead was worked into deeper ground, widening out as it was followed, and at the time of my visit had been proved payable at a depth of 50 feet. The gold is very angular as a rule, indicating that it has not travelled far in contact with hard rocks, but the fact of its occupying an ancient drainage channel is undoubted.

Mr. Pittman is of a decided opinion that the deposit may be classified as a "deep lead" in the usual acceptance of the term.

The nature of the strata forming the North Lead varies considerably in character for different localities of the lead. Starting at the head of the principal branch (the Fitzroy Lead), the deposits consist of ironstone gravels cemented together with oxides of iron and kaolin (more often a mixture of both), overlain with a thin layer of travertine, which is itself capped with a shallow deposit of surface soil. This surface deposit is the result of the disintegration and transportation of the weathered products of the surrounding rocks, more by the action of wind than that of water. The same conditions appertain most likely to the ironstone gravel deposited, the iron oxides having assumed their nodular form by the subsequent action of segregation.

At the head of the Fitzroy Lead the lower portion of the ironstone gravel deposit proved to be highly auriferous. A short distance lower down the Lead, however, the auriferous ironstone gravels ceased, and gave way by almost imperceptible changes to a coarse quartz gravel wash, the lower portion of which carried most of the gold. A section, No. 1, drawn through Messrs. Edwards & Mercer's claim shows the nature and thickness of the various strata at a short distance below where the above change in wash took place. The quartz wash is irregular in size, usually incoherent, and at times the fragments of quartz are much water-worn. The fragments of quartz in the upper portion of the deposit are often intermixed with kaolin.



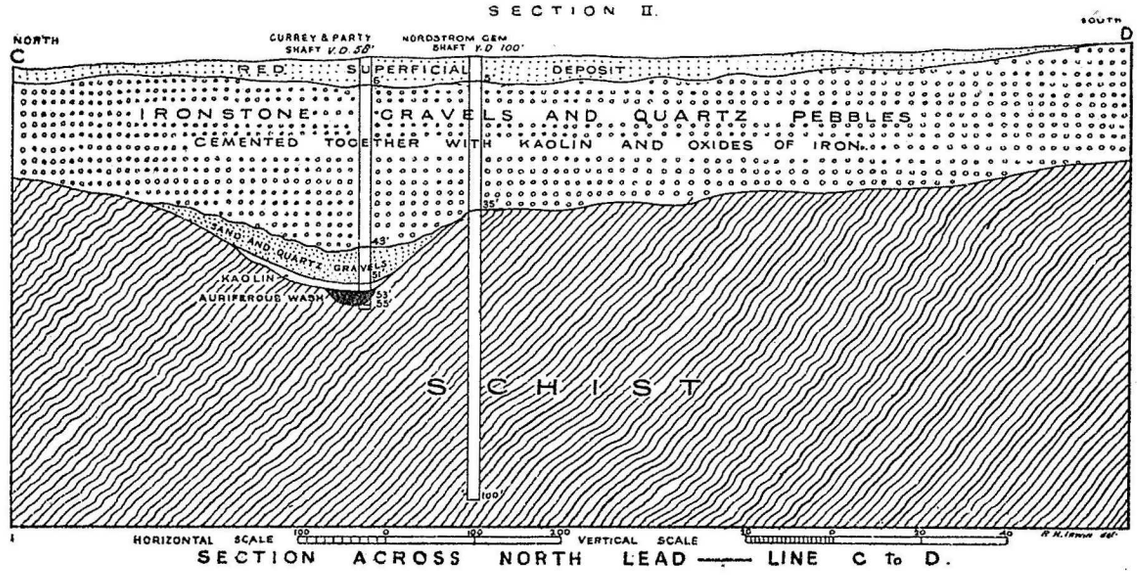
SECTION ACROSS FITZROY LEAD —— LINE A & B

Messrs. Edwards & Mercer are working a small tributary lead of a similar nature, with the exception that the upper portion of the quartz wash is cemented together into a hard compact brittle rock, similar in appearance to the quartzites found capping the hills in the Murchison and East Murchison goldfields, and already described by me in a previous report. The cementing material is silica. Overlying the wash are the prevailing ironstone gravels, and surface deposits.

* Auriferous Deposits of Western Australia. Adelaide: By Authority, 1896.
† Annual Report of the Department of Mines and Agriculture, New South Wales, for the Year 1897, p. 142.

Below the junction of the Fitzroy and Cemetery Leads, in the vicinity of Messrs. Currey and Party's claim, a band of kaolin, some two feet in thickness, separates the coarse quartz gravels from a finer auriferous wash which lies in the bottom of the gutter as can be seen in Section 2, C-D, herewith.

SECTION II.



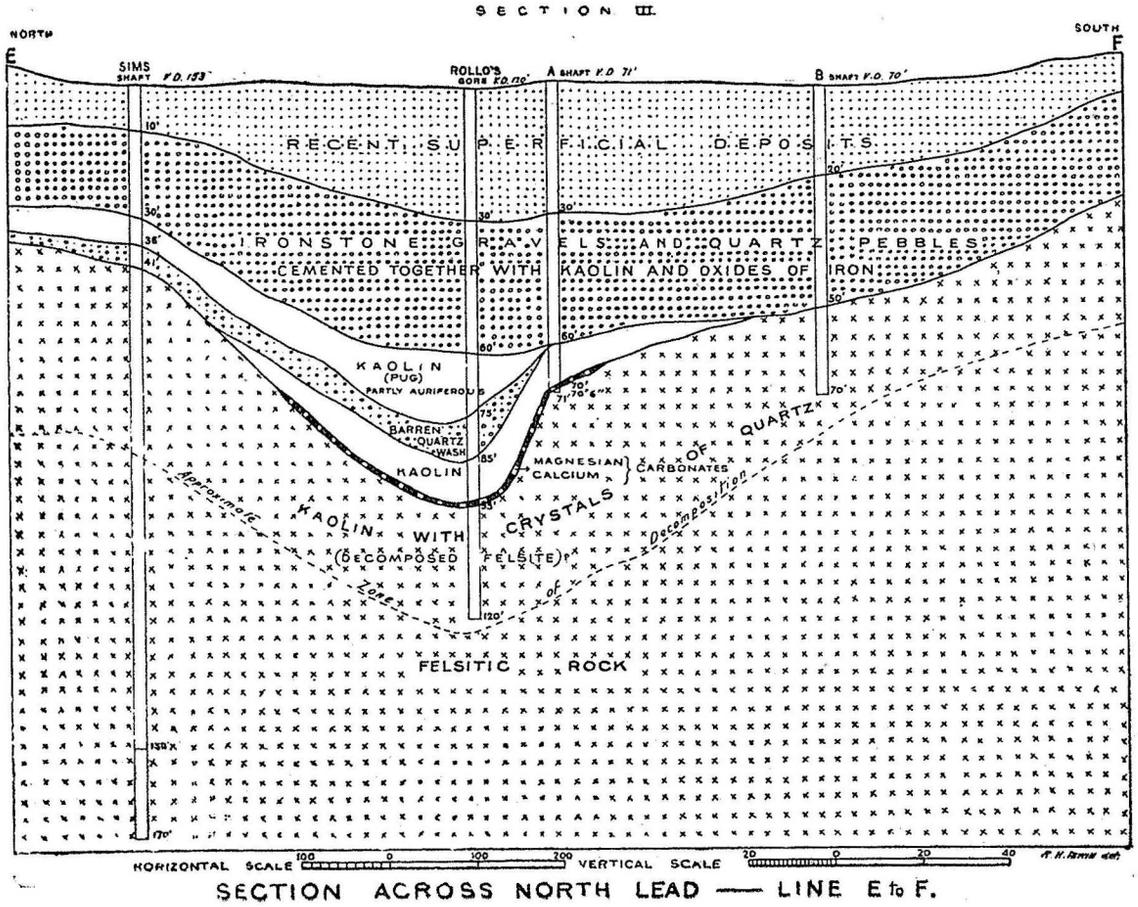
SECTION ACROSS NORTH LEAD —— LINE C to D.

The auriferous deposit varies in width from 20 to 40 feet, with an average thickness of about two feet. Both beds of quartz gravel were very much eroded before being covered up with the overlying beds. The dividing kaolin bed however does not exhibit this feature, but lies conformably to the overlying sand bed. The maximum thickness of the beds in this vicinity is about 55 feet.

From Messrs. Currey & Party's claim the same beds occur in a more or less eroded state till the lead commences to turn to the West, when the auriferous wash becomes very much broken and difficult to trace, patches only being found at irregular intervals in the gutter. The top or barren quartz wash however is continuous, though the kaolin bed is often missing. A new stratum of kaolin makes its appearance between the ironstone gravels and the top quartz gravels, near to where the lead turns to the West. In Soden's claim this kaolin bed is some two feet in thickness, but it gradually increases till it reaches a limit of about 20 feet.

The following Section 3 from E to F, as seen in Rollo's shaft, shows the relation of the various strata in this locality.

SECTION III.



SECTION ACROSS NORTH LEAD —— LINE E to F.

A thin bed of magnesite, usually about six inches in thickness, separates the lower bed of kaolin from the decomposed country rock. Owing to the sticky nature of the top kaolin bed, the name "pug" has been applied locally, more especially to that portion of the deposit which is auriferous. In the vicinity of Rollo's shaft, and to the Western end of the lead, the auriferous wash is extremely patchy, and though chiefly productive in places is too uncertain in habit to be sought for. Attention is therefore being given more to the auriferous portions of the kaolin which yield good returns. The exact extent of the auriferous wash is not determinable as much of the old workings are now refilled in lieu of timbering, and is consequently hidden from view. At the head of the Fitzroy Lead, the payable wash was two feet across the width, gradually increasing till at the junction of the Fitzroy and North Leads a dimension of 80 feet was reached. The deposit is as variable in thickness as in width, the variation ranging from a few inches to several feet.

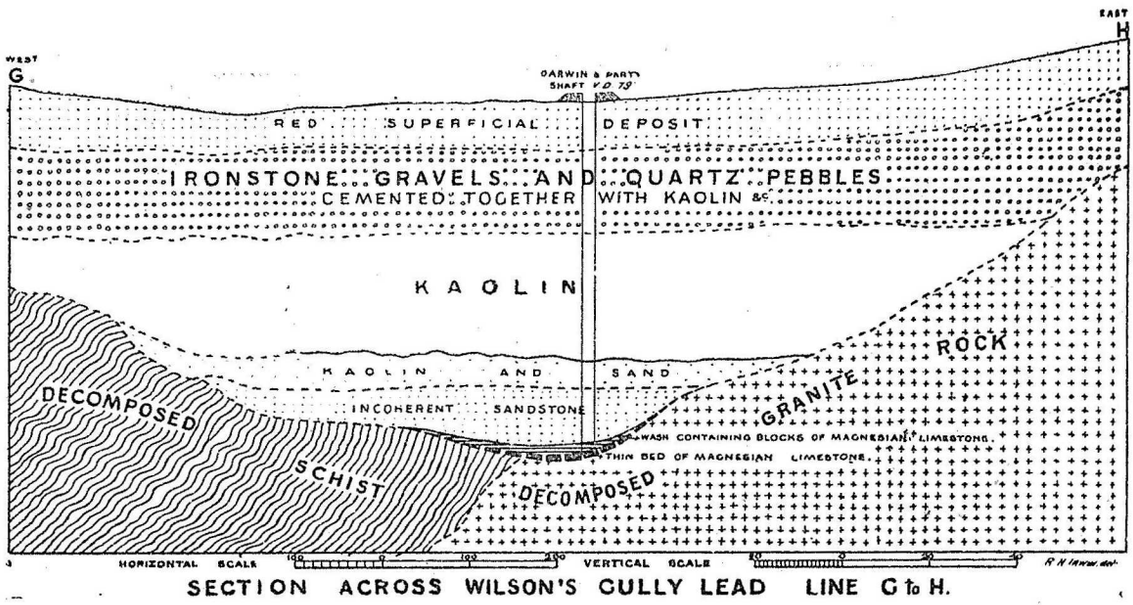
Lower down the North Lead the width of the wash ranges from 10 to 40 feet, with the same variable dimensions in thickness as in the Fitzroy Lead. It was from this auriferous wash that most of the alluvial gold has up to the present been won, some of the claims which include 150 feet of the gutter having produced as much as 4,000ozs. each.

Coming next to this deposit as a gold producer, the "pug" or kaolin bed* at the Western end of the North Lead is next in importance. Only portions of this deposit are payable as gold producers, the maximum width being about 40 feet with a thickness of upwards of six feet. As a rule the lower portion of the deposit is the richest, but there is no fixed rule, the gold being frequently found in more or less isolated patches. It is noteworthy, however, that the quantity of the gold in the deposit diminishes considerably at no great distance from the centre of the trough, and though the kaolin bed has been found extending for a considerable distance to the North, there is hardly sufficient gold contained to render it payable to work.

Gold is also being won in small quantities from what are locally known as "headings," a term applied to the strata immediately above the rich wash. This includes therefore some of the more or less barren wash, as well as the lower portion of the ironstone gravels. Much picking of the ore and careful prospecting are necessary, however, before these portions of the deposits are rendered payable, though with cheaper milling appliances there would doubtless be large quantities of gold won from this source.

One noteworthy exception to the usual sequence in the deposition of the beds occurs in Messrs. Vaughan, Davis, and Party's Claim, where, underlying the auriferous sandstone wash, a coarse much broken rock is found at a depth of 96 feet, carrying gold. That this may be the Eastern extremity of a second auriferous wash is possible. It seems, however, on close examination to be more probably the denuded fragments of some auriferous rock *in situ* as the component parts are not rounded to the slightest degree, in fact, perfect semi-detached crystals of orthoclase felspar and quartz are abundant in a most perfect state of preservation. The country rock at the bottom is undoubtedly granitic.

The deposits of the Wilson's Gully lead are identical in character with those of the North Lead. More erosion, however, has taken place in the lower strata, in consequence of which the auriferous wash is extremely patchy. A Section, 4, G to H, as seen in Messrs. Darwin and Party's shaft, is attached.



SECTION ACROSS WILSON'S GULLY LEAD LINE G to H.

Origin of the Deposits forming the North Lead.

As has already been mentioned in the previous pages of this report, the origin of the surface soil and ironstone gravels is probably due more to the denuding action of wind than that of water, subsequent segregation having taken place in the latter deposit, and formed the ironstone bands and nodules.

* Vide Section of North Lead E. to F. *supra*.

The beds of incoherent quartz gravels, etc., are, however, obviously due to the action of running water, as some of the fragments in these deposits are perfectly smoothed and rounded. The deposits, too, are well classified, and laid down horizontally over the much eroded surfaces of the beds immediately beneath them. In the Fitzroy Lead the gold in some instances was slightly water-worn, but further reference will be made to this question later on. The quartz wash is probably derived from the denudation of the quartz reefs and granitic rocks of the higher grounds to the East.

The beds of kaolin owe their origin to two sources—(1) the decomposition and alteration of the chlorite schist; (2) to the alteration of the felspars of the granitic rocks. Chlorite consists essentially of a hydrous silicate of magnesia, iron, and alumina in varying proportions. The beds known as "pug," on analysis in the Departmental laboratory, prove to consist of almost pure silicate of alumina; in other words, they are a kaolin or clay. This will account for the alumina of the chlorite, while the magnesia can partly if not wholly be accounted for by the beds of magnesium carbonate found in the lower portions of the lead. The kaolin bed of the upper portion of the lead is probably of granitic origin, the texture being unlike that of the "pug," the difference being partly due to the presence of grains of quartz, partly to a difference of fineness of material.

Nature and Origin of the Gold of the North Lead.

In studying the occurrence of the gold of the North Lead, the nature of the associated country rocks must first be considered. The two prevailing types of rocks are in the first place both auriferous; the granitic rocks containing gold in appreciable quantities *en masse* as well as in the intersecting quartz veins, whilst the chlorite schists contain auriferous pyrites disseminated throughout the rock, in addition to possible fissure lodes carrying gold.

That much of the gold in the auriferous quartz wash was derived from the former source is evidenced by the fact that it occurs in the quartz pebbles themselves, and though the gold, as a rule, in this deposit is not much rounded, the edges of many pieces are sufficiently smoothed to allow of no doubt as to their mechanical transportation and deposition.

Much controversy has arisen as to the origin of the gold in the "pug," the generally accepted theory being hydrothermal action. That the gold in this deposit has been chemically formed there seems little reasonable doubt, as evidenced by the following phenomenon in its occurrence. No evidence in favour of hydrothermal action could be discovered.

(1.) The gold is in a finely crystalline state, the edges of the crystals being in no way rounded by attrition.

(2.) The gold is often found following certain irregular cracks, and forming a connected drain of crystals, or covering cleavage planes so as to give the latter the appearance of pointed surfaces.

(3.) The gold is found in the vicinity of what was apparently the lowest portion of the trough in which the deposit rests, and therefore is where infiltrating waters would have been.

(4.) Manganese and cobalt oxides are often found in close association with the gold in scattered nodules, the three forming an auriferous wad.

That chemical action has taken place in the schists is seen by examining the numerous pseudomorphs of hematite after pyrites (locally known as Devil's Dice) which occur throughout that class of rocks. In many instances the gold may be seen coating the outside of the hematite crystals; though at one time it was undoubtedly included in the crystal of sulphide of iron.

Non-sedimentary Auriferous Rocks.

Perhaps the most interesting feature of the North Lead is the occurrence of gold-bearing rocks underneath the sedimentary beds. Such have been looked on as fissure lodes. Lodes, most of them certainly are, but only in the sense that any rock, not of sedimentary origin, which contains gold, may be considered a lode. With two exceptions, the lode material consists of much altered schist, impregnated in places with ironstone bands, patches of kaolin, steatite, etc., and abounding in places with pseudomorphs of hematite. In hand specimens the lode material is not distinguishable from the country rock found in the shafts sunk to the North and South of the North Lead. The acid dykes have a general trend of North-East and South-West, and underground the same strike is apparent, yet the lodes, or at least the payable portions of rock, will prove without much doubt to run North-West and South-East, for at present there is every tendency in that direction. Unfortunately, at no great depth below the sedimentary beds, there is a large influx of salt water, in consequence of which, sinking below the 100ft. level has in most cases not been undertaken, so much still remains to be seen. The gold presents the same crystalline form as that found in the "pug," with the exception that it is usually more coarsely crystalline, and at times presents a characteristic arborescent form. There seems no reasonable doubt that the origin of gold in both is identical, and that the presence of gold in the lodes, contrary to the accepted theory, is due to infiltration from above.

The extent of the gold occurring in the schists is not determinable, and will depend on the depth of the zone decomposition of the schists. At present the lode stuff is being taken out for a width of 40 feet, and in places up to 70 feet, but not to a greater depth than 20 feet, the influx of water being too great to cope with, except by the erection of more extensive pumping plants. An undoubted fissure lode occurs in Sim's claim, where a felsitic dyke is found to be auriferous. The gold-bearing rock in this instance resembles closely the felsitic dykes worked in the Wycheproof (G.M.L. 324w) and Wycheproof South (G.M.L. 1846E) mines in the Bardoc district.

Description of Lode Workings.

The following is a brief description of the workings in the lodes on the several claims in which they occur, the distinguishing symbols referring to the actual shafts on each claim, and shown on the accompanying map, Plate VI.

Miller's Claim.

Winze J.—This winze has been sunk to a vertical depth of 95 feet from the surface, and for a depth of 35 feet on the lode. A drive 30 feet to the East passes through decomposed auriferous rock, through which are numerous quartz leaders, having no prevailing strike or underlie. At the end of the drive a dyke of granitic rock is met with, and forms an apparent wall, which strikes a little to the East of North, and a slight dip to the East.

Winze H.—This winze has a vertical depth from the surface of 95 feet. A drive North-West and South-East extends from the bottom of the shaft for a distance of 22 feet in the lode. The lode, which is undoubtedly much altered schist rock, contains free gold and numerous quartz leaders intersecting at various angles.

Currey and Party's Claim (Winze V).

Similar lode stuff, as in the winzes in Miller's shafts, have been struck in this winze for a depth of about 40 feet from the bottom of the wash. The trend of the auriferous portion is about North-West and South-East. The workings have not been carried on to any extent up to the present.

Nordstrom Gem Claim (Shaft F).

This shaft has been sunk to a vertical depth of 90 feet. For a distance of 63 feet alluvial deposits have been pierced. After this much altered schistose rock was passed through to the 90ft. level, when a drive to the South was put in for a distance of 55 feet. This rock is of a similar nature to that found in Miller's claim, but is not auriferous.

Shaft E.—This shaft is down to a vertical depth of 100 feet. Drives have then been extended for distances of 160 feet to the North of West, and 135 feet to the East by South. In the Western drive a granitic dyke 10 feet in thickness was passed through at a distance of 70 feet from the shaft. This dyke has a strike of North 10 degrees East, and is practically vertical. A similar dyke was met with at a distance of 130 feet from the shaft, the country rock being much altered schist. The intrusive nature of the dykes is rendered visible by the banded and darkened form the schist takes in their vicinity.

Eastern Drive.—For the first 33 feet of the drive numerous pseudomorphs of hematite are seen in the rock, which is of the prevailing schist type. After this 15 feet of much altered granitic rock is passed through. This band has the prevailing strike of North by East. For the rest of the drive the schist rock is intersected till the face is reached, when a granitic rock again makes its appearance. This latter dyke of granitic rock is probably the same as is found in the drive from a winze in Miller's claim. Quartz leaders four inches in thickness are seen in the face of the drive in the granitic rock. Gold has not been obtained in any of these workings.

Moorhead's Claim (Shaft 77).

The vertical depth of this shaft is 139 feet. At this level a crosscut 40 feet in length extends to the West, from the end of which a drive 50 feet in length extends along the lode. At the 124ft. level a drive strikes about South-West and cuts a winze from the end of the drive of the 132ft. level. Which is lode, and which is country rock in this claim, is hard to say except by assay. What appears to be a wall occurs in the bottom of the shaft, the strike of this wall and a thin casing or "dig" is North seven degrees East, with a dip of one in four to the East. This, however, may be mistaken for a local cleavage in the rock. The gold bearing portion of the rock contains abundant pseudomorphs of hematite. The gold occurs in a purely crystalline state. A crushing of 11 tons taken from throughout the workings yielded a return of 3ozs. 17dwts. of gold, or at the rate of 7dwts. per ton.

Sutor and Party's Claim (Shaft O).

The vertical depth of the main shaft is 101 feet. A crosscut 60 feet in length extends to the East. From the end of this crosscut a drive has been put in for a distance of 140 feet to the North, 20 degrees West along the gold bearing portion of the rock, which has an average width of 30 feet. There are no defined walls, the auriferous portions only being discernable by fire assay or panning. The gold has the characteristic crystalline cubical form, though there are many instances in which it is found in a crystalline arborescent shape. The lode stuff and country rock are similar in appearance to the country rock in the vicinity of the lead. Gold has not been discovered in other parts of the claim except immediately below the lead. Some 200 tons of ore have been crushed from this claim for a return of 150ozs. 10dwts. of gold, or at the rate of 15½dwts. per ton.

Hack and Party's Claim (Shaft K).

A main vertical shaft has been sunk to a depth of 119 feet 6 inches. At the 117ft. level gold-bearing lode stuff was met with in the shaft, and followed in the shaft to the 11 feet 6 inch level, when a Western drive was made for a distance of 150 feet. Thirty-three feet from the shaft along this drive a crosscut was put in to the South for a distance of 15 feet, and to the North for a distance of 60 feet. In the South crosscut the same lode as in Sutor's claim was met with. The North crosscut passed through a lode striking East and West in the direction of the 150 feet drive. This gold-bearing rock has more the appearance of a fissure lode than any of the others discussed in the previous pages of this

report. The walls of the East and West lode are somewhat well defined, and though the workings are not up to the present sufficient to enable a decisive opinion being given, there is every appearance so far of a continuance of the lode at depth. The gold bearing portion has a distinct cleavage and contains much gold-bearing iron pyrites. Free crystalline gold is visible. The returns for 250 tons of ore crushed from the East and West lode are 75ozs. of gold, or at the rate of 6dwts. of gold per ton.

Eaton's Claim (Shaft C).

Lode stuff was struck in Eaton's claim at the 98ft. level, and followed in a drive for a distance of 110 feet. The course of the drive is to the West of North and East of South following approximately the course of the wash in the lead above. The lode, which consists of much altered schist rock, was first struck at the 78ft. level. There is no apparent change in the lode stuff at the two levels, except that water is soaking in slightly at the lower level. On the foot of the lower drive auriferous lode stuff is being taken out in the drive for a width of 50 feet. The gold is very crystalline, minute free cubes of gold being of common occurrence.

Soden's Claim (Shaft B).

The vertical depth of the shaft is about 96 feet, when the water level is reached. A drive extends from the bottom of the shaft for a distance of 80 feet to the North-East. Sedimentary strata extend in the shaft to the 82ft. level, when a dark decomposed rock is passed through for a distance of 14 feet. This rock is altered schist. It extends into the drive for a distance of six feet, when it is replaced by a much altered granite dyke 14 feet in thickness. This acid rock contains many quartz leaders. Its strike is about North-East, with an underlie to the East. For the next 60 feet lode stuff has been cut. The appearance of the lode stuff is identical to the country rock except that is does not carry gold. Altered non-auriferous schist rock is seen in the face of the drive. Both country rock and lode stuff are full of cubical cavities, apparently the old receptacles of iron pyrites.

Sims' Claim (Shaft G).

A vertical depth of 150 feet has been attained in this shaft. For a depth of 41 feet sedimentary deposits were pierced. After this the shaft passed through decomposed rock which gradually changed into a compact hard felsitic rock containing numerous quartz leaders. This rock contains gold in payable quantities. The occurrence of gold in this instance is similar to that of the Wycheproof (G.M.L. 325w), in the Bardoc Mining District, where a similar dyke rock is found to contain sufficient gold to render it payable to mine and treat. This is the one instance on the North lead of an undoubted fissure lode.

Return showing the Yield of Gold from Kanowna.

The following are the figures showing the gold yield of the Kanowna district as compiled from the "Gold Mining Statistics," published by the Department of Mines. Owing to circumstances beyond our control it has been found impossible to prepare a table giving the production of that portion of the district dealt with in the preceding pages.

LODES.

Date.	Quantity of Stone Crushed.	Yield of Gold.	
		Total Yield.	Rate per ton.
	tons cwts. qrs.	ozs. dwts. grs.	ozs. dwts. grs.
Previous to 1898 ...	27,365 11 0	28,243 15 11	1 0 5
1898	24,838 2 0	20,892 0 0	0 16 19
1899	20,735 10 0	19,680 0 14	0 18 23
Total	72,939 3 0	68,815 16 1	...

ALLUVIAL DEPOSITS.

(*a*) *Gravels.*

Previous to 1898 ...	Alluvial ...	10,611 18 10
1898	,, ...	63,548 0 10
1899	,, ...	17,492 15 2
Total	...	91,652 13 22

(*b*) *Cement.*

1898	45,983 4 2	68,183 10 22
1899	51,098 14 2	71,839 18 11
Total	97,081 19 0	140,023 5 9

KANOWNA GREAT BOULDER G.M.L. 885x.

The position of this lease is as marked on the accompanying plan, Plate VI. Much of the area to be embraced within the boundaries of the proposed lease (G.M.L. 885x), was originally taken up as alluvial ground, and prospected by means of the shafts as shown on Plate VI. Such claims, however, as were taken up within the boundaries of G.M.L. 885x, were soon abandoned, and on the 1st November, 1898, Messrs. Holroyd and party made an application for two gold mining leases, including an area of 30 acres, which comprised most of the area taken up in the proposed G.M.L. 885x.