

REPORT ON THE CORINNA GOLDFIELD.

Mines Office, Launceston, 9th April, 1894.

SIR,

I HAVE the honor to report to you upon the Corinna Goldfield, of which I have recently made a general examination. Leaving Launceston on the 12th March I reached Corinna on the evening of the 14th by way of the road from Waratah through the Heazlewood silverfield, and remained in the district till the 22nd. During my visit I examined pretty closely the areas of 1000 and 500 acres respectively at the heads of Middleton's Creek and the Lucy River which have been for the time being withdrawn from the operation of the leasing clauses of "The Mining Act, 1893," and are being prospected by syndicates with a view to working by the method of hydraulic sluicing.

The road from Heazlewood to Corinna keeps along the divide between the valleys of the Savage and the Whyte rivers, both of which, with their branches, have yielded a great deal of gold. It passes over the Long Plain and Brown's Plain, both of which are considerable stretches of somewhat flat country lying right on the divide between the two valleys, and have yielded a good deal of gold. On part of the Long Plain and over nearly the whole of Brown's Plain there is a superficial covering of water-worn gravel, of considerable depth in many parts of the latter. In places the gravel has been strongly cemented together so as to form a hard conglomerate, often closely resembling the conglomerates found in formations of very much greater geological age. Between Brown's Plain and Corinna the divide is usually covered with similar gravel, and occasionally conglomerate, though the bed-rock is visible in a few places. At Corinna, on both sides of the river, there are a succession of gravel terraces well seen while going along the track from Waratah to Trial Harbour, and on the spurs running into the Pieman, Whyte, and Savage River Valleys we find every here and there corresponding terraces, which have been without doubt deposited in succession as the streams cut their valleys down to lower and lower levels.

The bed-rock on which the gravels rest is most likely of Silurian age, though palæontological proof of this is as yet wanting or very scanty, and consists in different localities of various species of rocks,—conglomerates, schists, quartzites, slates, metamorphic sandstones, and crystalline limestones being all represented. The strata are very much contorted, sometimes being on edge or inclined at high angles, and again quite short distances away being seen almost horizontal. This is well seen in the section at "Hell's Gates" where the Pieman River cuts through the Donaldson Range: in a high cliff strata of slate, sandstone, and conglomerate are seen dipping 58° to the N.W. and striking about N.E. and S.W., while a short distance further down the river the layers are horizontally bedded, and again higher up the river at the Falls Creek they also lie nearly flat. In the Rocky and White River beds also the strata are seen to be greatly tilted and contorted. Veins of quartz are common in the bedrock, and larger ones, or reefs, are not unusual, but very little attention has yet been given to these, though there can be little doubt that auriferous lodes must be present among them. Some of the known reefs look well enough to deserve being prospected.

With the exception of a small patch of basalt, most likely of Tertiary age, which is seen on the road about six miles north of Corinna, the superficial gravels and the Silurian bedrock are the only formations met with in the district. At 22 miles from Corinna, however, we find a large mass of serpentine, which is there the principal country rock throughout the northern portion of the Heazlewood silver-field and extends to the Magnet Range. The goldfield on its eastern side lies against the granite of the Meredith Range: I am not aware that any gold has been found in this formation. The alluvial gravels often contain stones evidently derived from the granite range, especially a hard quartz and tourmaline rock, and the traces of tin ore through them are most likely also derived from it. The occurrence of stones, which have come in all likelihood from the Meredith Range on the west side of the valley of the Whyte River and further west still in the gravels of Middleton's Creek on the Savage fall, is of great interest, as tending to show that they were laid down prior to the excavation of the Whyte River Valley. Had the features of the country at the time of the laying down of the gravels been the same as at present, it is clearly impossible that stones from the Meredith Range on the east side of the Whyte could have crossed its deep gorge and been laid down on the divide between it and the Savage River. Of course it is possible that there may be a yet undiscovered outcrop of the granite on the west side of the Whyte River, but as the country has been well looked over by gold-diggers and prospectors without seeing anything of the kind, it is not likely that it exists. The most likely explanation of the distribution of the granitic stones is also the one that best explains

the occurrence of gravels on the top of the ridge between the Savage and Whyte rivers and on the tops of the Lucy spur, Frenchman's spur, Conroy's spur, and others. The highest of these that I noticed lay at an elevation of 1100 feet above sea level on the Long Plain; on Brown's Plain they are from 850 to 950 feet high; and on the Lucy and adjoining spurs from 650 to 750 feet. Except in the Pieman Valley and portions of those of the Whyte River and Middleton's Creek close to it, where the terraces of gravel descend from the divide down to sea level, the gravel usually disappears when we go down a short distance from the tops of the ridges into the adjacent valleys, and in these latter the solid bedrock is seen. Every here and there, however, there are terraces of gravel at varying elevations in these valleys also. The main deposits of gravel may therefore be said to lie at a considerable and fairly uniform elevation, varying a little above and below an average of about 800 feet. From the top of Mount Donaldson (1460 feet) a view is obtained of the country which goes far to explain the history of the deposition of the alluvial matter. It is seen that the whole country forms a plain rising gently from the coast towards the Meredith and West Coast ranges, the Donaldson and Norfolk ranges being isolated hills standing on this plain like islands rising from the sea. Exactly the same appearance is noticeable looking towards the sea from Mount Lyell. The gentle uniform slope seaward from the foot of the ranges points to the plain being one of marine erosion, and I have little doubt that this is really the case. During some past period there has been a depression of the western portion of our island, or more probably of the whole of it, during which the sea encroached further and further inland, levelling the inequalities of the surface as it proceeded, until it reached the flanks of the Meredith Range, Mount Dundas, and the West Coast Range; the Norfolk, Donaldson, and Heemskirk ranges then forming islands. During this period the gravels resulting from the disintegration of the shore rocks and those brought down from the ranges by streams were laid down in more or less regular strata on the bedrock. Doubtless a good deal of gold was distributed through these.

After a time the land began to rise again, and the shore-line to recede further and further westward. The marine deposits would then be attacked by streams running over them, and the gravels frequently sluiced over and re-arranged. As the elevation proceeded the streams would cut deeper and deeper into the bed-rock, ultimately forming the deep gorges and valleys in which we now find them running. From time to time terraces of gravel would be left behind at various elevations as we now find them. According to this theory the deposits on the tops of the ridges would be the oldest, and the terraces at lower elevations successively more recent going downwards. It is confirmatory of this view that the highest gravels show the thoroughly water-worn, highly rounded pebbles characteristic of marine gravels rather than the more flattened shapes prevalent in river gravels. The fact that the "wash" is often cemented to a hard conglomerate in the deposits at the highest elevations also goes to show that these are the oldest.

The evidence as to movements of elevation and subsidence of the land having been the main cause of the present distribution of the West Coast gravels is by itself fairly strong, but when we remember that in the North-Eastern District, from George's Bay to Lefroy, there is even better proof that there has been a prolonged and extensive subsidence of the country during the Paleogene portion of the Tertiary Period, followed by a gradual elevation during Neogene and Recent times, it seems clear that we must accept the explanation above given as the correct one. It may be here mentioned that the alluvial terrace deposits at North Dundas and the Ring River would be explained by the above theory as well as those of Brown's Plains and the Lucy spur.

The gravels near Corinna township, in Middleton's, Jansen's, and other creeks falling into the Whyte and Savage rivers, and at low levels along the Pieman River, have probably been largely derived from the older and higher deposits, which have been broken down and redistributed by the streams during the excavation of their valleys. The large accumulations in the neighbourhood of Corinna may very possibly be due to the slowness with which the Pieman River could only excavate its gorge through the Donaldson Range, it being very conceivable that the gravels brought down by the main stream and by the Whyte and Savage rivers would have a tendency to accumulate behind this bar faster than they could be carried away. The formation of this deep gorge through a high range is corroborative of the theory above explained, for it must have been cut from the top downwards, and therefore the outlet for the Pieman River waters must have been much higher than at present, as far as the Donaldson Range is concerned, though perhaps not with respect to sea level.

I have dwelt on the geological history of the gravels at some length in order that some conclusions may be deduced from it that may be of assistance in working them for gold:—

- (1.) The highest gravels on Brown's Plains, the Lucy and neighbouring spurs, and at the ridge at the head of Middleton's Creek, may frequently cover deep leads, or buried watercourses, which had nothing whatever to do with the existing surface configuration of the ground. In these a deep gutter is just as likely to be found under what is now a ridge on surface as under present low ground. Existing water-channels which have been worn through the gravel deposits may be expected to contain concentrated in them the gold originally distributed through the stuff that has been removed.

- (2.) The lower gravels on the slopes of the valleys may be expected, when opened up, to reveal their terrace character more plainly than at present, and the runs and leads of gold in them are likely to be more or less parallel to the main valleys. It will probably often happen that the bottom of a terrace will dip in towards the hill upon which it rests for a greater or less distance, forming terrace gutters which should sometimes be rich. The terraces originally parallel with the main gullies may be expected to be cut across by the later water-courses running down the slopes of the latter. These will contain a lot of gold concentrated from the older deposits cut through by them. Owing to the action of these small streams crossing them, the terrace shape of the older deposits will often be difficult to recognise.
- (3.) As many now bare slopes of bed-rock have been at one time covered with gravel which has since been removed, it is possible that heavy water-worn gold may often be found upon these, and occasional stripping of the surface soil from areas where no gravel is visible may therefore lead to rich finds. All little patches of gravel found on bed-rock slopes should be tried, as they may often prove to be remnants of much more extensive beds.

The gravels themselves vary a good deal in composition: the higher ones are mostly composed of well water-worn quartz and quartzite pebbles intermixed with coarse and fine quartz sand; but in the lower deposits there is often much clay and ferruginous cemented sand. In Fogarty's workings on Middleton's Creek there is much concretionary limonite (brown oxide of iron) in nodules, and the clayey wash is strongly cemented together with the same material. In some of the lower workings in Middleton's and Jansen's Creeks there is a great deal of chalcedony, often not much water-worn; this may be derived from the underlying bed-rock, which about the place where most of the chalcedony occurs is often an impure limestone. When washing the gravel for prospecting purposes a little black sand nearly always is found remaining behind to the last along with the gold; this is mostly chromic iron, doubtless derived from the serpentine country towards the Heazlewood. I have also been able to recognize in it tourmaline, rutile, and zircon; and probably other heavyish minerals exist in it also. A little tin ore is said to occur in it; and as tin is known to exist in the Rocky River and other streams coming from the Meredith Range, it is probable that it will be found widely distributed through the drifts; but in the few tests I have made of the black sand it is either absent or only in very small quantity. Gold is almost universally present in the gravels, though often only in very small "colours," and at times a little osmiridium is also found. In the Whyte and Savage Rivers, both of which pass through serpentine country, the usual matrix of this metal, there are said to be often found considerable quantities of it.

All over the goldfield, from the head of the Savage River southward to the Pieman, diggers have been at work for the last thirteen or fourteen years, and a great deal of gold has been obtained. For some years past there have not been many men at work, but every winter, nevertheless, sees some engaged in working the creeks and more easily accessible terraces. Most of the work done has been of a primitive description, often simply with cradle and tin dish, and hydraulicking has only been resorted to in a few instances, and then with poor supplies of water and inefficient apparatus. The highest ground, where water for sluicing has not been obtainable, has only been fossicked over by digging small holes in the watercourses and little gullies, and washing the material with pans and cradles. The work done has proved that the auriferous area is very extensive, but it may be said to be practically worked out so far as primitive means are concerned. For hydraulic sluicing, however, there is a very wide field, and great prospects of success.

I shall now describe in some detail the various localities visited.

Corinna Township.—On both sides of the river at the Corinna ferry there are extensive terraces of alluvial gravels likely to contain gold. On the south side they are passed over by the road to Trial Harbour for about $2\frac{1}{2}$ miles, where a heavy sand drift is met with at an elevation of about 640 feet above the river. A little further south the slate bedrock crops out at surface, and the gravels disappear. The slate bedrock is also seen at a small creek about one mile from the ferry, and is seen in the banks of the Pieman River at short distances above and below the ferry. It is therefore probable that the terrace gravels are of no very great depth anywhere, though sometimes they may be 50 or 60 feet deep; there is evidently a large quantity of gravel in several places. Next to no prospecting has been done on this side of the Pieman, and the higher gravels, though containing "colours" of gold, are so poor, according to a few tests made by me, that there does not seem much inducement to try them further; but when we consider that the best gold is sure to be in the bottom gravels, a few random dish prospects taken on surface ought not to be accepted as conclusive. In my opinion it would be quite worth while to spend a few hundred pounds on properly testing these terraces by shafts and drives. There appears, however, to be considerable difficulty in getting water for sluicing on this south side of the river, and anyone undertaking to work these gravels would do well to satisfy himself of the possibility of getting an adequate supply before going to much expense.

On the north side of the river at Corinna the road to Waratah rises over a succession of likely looking terraces for about 5 miles. The bedrock is seen in the banks of the Pieman River, a few

chains below the ferry, a high hill, part of the Elizabeth Range, of solid rock there terminating the gravels on the westward side. For over a mile from the ferry the terraces do not appear to have been worked at all, though a little gold is found in the surface gravel, and much of the wash is of a fairly promising nature. As the gravels of the Whyte River must have met those of the Pieman in this vicinity, when both rivers were at a higher level, it is likely that good runs of gold will yet be found, and persistent and thorough prospecting by shafts sunk to bedrock is to be recommended.

About two miles from the river, after passing over a high terrace, on which there is a great deal of very hard conglomerate, formed by the gravel becoming cemented strongly together by some very silicious cementing matter, the ground falls for about sixty feet towards a saddle on the divide between Middleton's Creek and the Whyte River, the elevation of the saddle being about 190 feet above the Pieman River. From this point onwards for over a mile to the north a great deal of work has been done in the creeks falling on each side of the divide towards the Whyte River on the east and the Savage River on the west.

Middleton's Creek.—On the western fall the main creek is that known as Middleton's, which runs a southerly course about parallel to the road (which here lies on the top of the ridge between this valley and that of the Whyte River) and to the Elizabeth Range for about a mile, then turns suddenly to the westward, cutting a gorge through the range, and runs into the Savage River, about a quarter of a mile above its junction with the Pieman. Several small branch creeks run into Middleton's, and most of these have been worked, and have yielded a lot of gold. The true bedrock is seen near the big bend in the creek, again in a small creek on the west side, known as Fogarty's, and along all the western side of the valley above this on the slope of the Elizabeth Range. It is here generally a soft arenaceous slate. Towards the head of the valley the creek has three branches, known as the Left (or western), Middle, and Right (or eastern) branches. These come together at the head of a stretch of flat ground, some 12 or 15 chains in length. A short distance up the western branch from the junction the true bedrock is seen, and a quartz reef crosses the creek. Between the western and middle branches there is a very peculiar gully, which has no outlet, falling towards a hole at the foot of a steep rocky face. As the rock is an impure limestone, it is certain that the water escapes by an underground channel. On the other side of the divide a stream of water issues from a cave in a similar limestone in the lower part of Sailor Jack's Creek; and two circular depressions, without visible outlets for the water that gathers in them, one near Jansen's Old Camp, about three miles from Corinna, and another larger one on the top of the divide, about two chains west of the road at two miles, also point to there being underground channels through the limestone. There is nothing unusual in this, as caverns and underground channels are common wherever limestone is found. The two "sinks" just mentioned are nearly on the top of the main ridge, and their sides are entirely composed of gravel, but there can be little doubt but that the bedrock lies close beneath them. This deduction is of importance, for the bedrock is not generally seen in the ridge, and to look at it one would be very apt to form the opinion that it was entirely formed of gravel for a great depth; but it seems likely that there is a corresponding ridge of hard rock close beneath. This opinion is strengthened when we examine the bottom exposed in the creek workings on each side of the ridge; it is almost always a black, somewhat cemented mixture of sand and earth, often containing rounded gravel, but frequently also angular and subangular quartz and chalcedony fragments. It is plainly not the true bedrock, but a "false bottom," but though it may here and there cover deposits of gravel containing gold, I think it will be generally found to lie upon the true bedrock. It seems to be, in fact, simply the old surface soil formed on the bedrock, when the latter was first laid bare by the streams, and at a later period it has been covered again with gravel. It often contains gold, and in working will probably be found worth removing down to the solid rock, and in some cases it is likely that rich gold will be found by so doing. In the middle branch of Middleton's Creek, five or six chains above its junction with the western branch, two shafts have been sunk, sixteen feet in the black false bottom, without reaching bedrock. A little gold was obtained all the way down, and much pyrites and lignite. The black bottom is evidently of alluvial origin, though older than the gravels resting upon it, and therefore requires prospecting. From the angular appearance of much of the stone contained in it, however, I do not think that it can be far from the bedrock. All the workings on both sides of the divide are on this false bottom, and it is seen to slope with the existing creeks and conform closely to the present configuration of the ground. A very similar black sandy layer lies between the gravels and the schist bedrock at some workings on Blackguard Hill at Brown's Plains and at the Lucy Spur workings.

The only party working in Middleton's Creek at the time of my visit was that of Fitzpatrick and partner, who have a claim in the main creek just below the flat above mentioned. Want of water—the season having been very dry—was preventing them from doing much sluicing, and the ground was getting very deep. The claim is a good one, however, and should give good returns to the owners when they have more water. The black false bottom is here soft, and contains a lot of gold, giving payable returns. The gold is flattened and water-worn, but fairly heavy. This claim is at the foot of a face worked some time ago by McLean and party by hydraulicking, and though they were unable to get down to the good ground that Fitzpatrick is now working they are said to have had payable returns.

Lower down the creek are several other old workings—Crotty's and Strong's, Middleton's, Conroy's, and others. Middleton's old face is on the western side of the creek; the wash is seen to be 14 or 15 feet deep, but is clayey, and gives poor prospects. It is said, however, to have yielded a good deal of heavy gold when worked on the large scale. Somewhat similar wash, but more cemented by oxide of iron, is seen at Fogarty's workings, in a small creek on the west slope of the valley. These are said to have yielded payable returns of coarse heavy gold, but rarely show gold in dish prospects. When ground contains coarse gold it is often impossible to get any fair idea of its value by dish prospecting, for the chances are greatly against any particular sample containing the gold. Ten cubic yards of dirt might contain an ounce of gold in three or four pieces, which might all be lying close together, and there would be little chance of getting one of these in a casual trial of the ground with a tin dish. A good deal of work has been done in Fogarty's Creek, and there are evidently large terraces of wash still left to be sluiced away. Much of the stuff, however, is so strongly cemented together that explosives would be required for shattering it before it could be sluiced. In one of the terraces some shafts have been sunk a depth of 20 or 30 feet without reaching bottom. The stuff thrown out from these often yields fair prospects. With a constant supply of water at high pressure it seems very likely that a good sluicing claim could be established at this place.

The flat above Fitzpatrick's workings is so deep and wet that it has not hitherto been possible to work it except by sinking holes in dry weather and cradling the stuff taken out; practically it is yet untouched, and from its position and surroundings it ought to be good; to work it by ground sluicing a deep tail-race would have to be brought in up the creek, and as the grade of this is rather flat the tail-race would need to be a long one; with an adequate supply of high-pressure water there would, however, be no difficulty in working it by means of hydraulic elevators. To work Middleton's Creek from top to bottom in a systematic manner the tail-race would be necessary, and any strong company securing the ground would find it to their interest to put it in at once. According to my aneroid levels Fitzpatrick's workings are about 145 feet above the Savage River, and Conroy's face about 60 feet, and the former are not more than 100 chains distant from it: the tail-race would therefore be much flatter than is desirable, as a fall of from 4 feet to 4 feet 6 inches to the chain is wanted for a good tail-race. With attention to flushing and the assistance of the winter rains, however, the race could be kept pretty clear. To work out the bottom of the flat, however, hydraulic elevators would almost certainly be required. An accurate survey should be made to determine the length of tail-race that would be required, and to ascertain definitely if it could be got with a workable grade.

On the west side of the creek at the head of the flat Mr. Fitzpatrick has sluiced out an excavation 30 feet long, 16 feet wide, and 12 feet deep, obtaining 6 ounces of gold in doing so, which was very payable. This return is at the rate of $13\frac{1}{2}$ grains to the cubic yard. This cut is made into the side of a terrace, and should be a fair sample of its average value. The gold was flattened and fairly coarse in size, and was richest on the black sandy bottom previously described. The present supply of water to this face is very scanty, work being only possible after wet weather, but if there was a constant supply the ground should pay well.

Up the various branches of Middleton's Creek large quantities of gravel are seen, and gold is nearly always obtainable in the dish when washing is resorted to. The creeks have given a living to men working with cradles and long-toms in wet weather, and therefore there is a strong presumption that hydraulic sluicing of the terraces themselves will be payable. As the gravel is concentrated in the gullies of the creeks by natural sluicing it is not fair to take tests from the stuff exposed in the sides of these as representing the average value of the terraces, and in order to prospect these properly shafts should be sunk in them, and all the stuff thrown out should be carefully washed: by this process some accurate data could be got for estimating what gold could be won by hydraulicking.

The highest workings in the middle branch of Middleton's Creek are at an elevation of about 380 feet above sea level; but there are still higher terraces, and in bringing in a water supply to command the ground it would be very desirable to have it at not less than 500 feet. With a constant and copious supply of such high-pressure water I have little doubt that the whole of the old workings in Middleton's Creek and its branches could be profitably re-sluiced, and very probably the terraces would also prove payable in many cases. There is a large extent of wash available, and except in the lower parts of the creek, where as above said it is doubtful that a satisfactory tail-race can be got, there are generally very good facilities for getting rid of tailings.

While examining Middleton's Creek a great many prospects were washed, and the gold from a proportion of them was saved and weighed. These tests cannot be taken as thoroughly representative of the average quality of the gravel, as some were from surface stuff, others from near the bottom, and nearly all from the banks of creeks, where, as above pointed out, there must have been a good deal of concentration of the stuff. On the other hand, they do not contain a fair proportion of the richest part of alluvial deposits—the bottom layer—which was not generally accessible, and very frequently in hydraulic sluicing even though the upper drift is not payable the richer bottom

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stuff makes up for all deficiencies. Taking this into account, the tests must be looked upon as, on the whole, very satisfactory. In the present condition of the ground it would be necessary to expend considerable time and labour before a thoroughly reliable estimate of the average value of the gravels could be made, for a large number of shafts would have to be sunk in the terraces. The actual sluicing that has been done at various points by Messrs. Middleton, Fogarty, M'Lean, Fitzpatrick, Conroy, and others, with poor supplies of water, low pressure, and many other disadvantages, has, however, done a great deal to prove that the ground will pay well when worked under more favourable conditions. The following were the results of some of my tests; the dishes used containing 400 cubic inches, equal to 26 lbs. of gravel—(estimating that 100 yards of sand and gravel in the solid swell when broken down to 107 yards, the proportion given by Molesworth, 1 cubic yard of undisturbed stuff would contain 125 dishes, or 1.45 tons):—

7 dishes from Middleton's old workings in the main creek, mostly light clayey stuff, gave 8 "colours" of gold, weighing .02 grains, equal to 0.25 grains per ton, or 0.36 grains per cubic yard. (It is interesting to note from this example that the average weight of the eight "colours" of gold was only 0.0025 grains apiece.)

3 dishes from Fogarty's terrace workings at point of spur, between two branches of small creek and shafts on S.W. side of creek, gave 0.2 grains of gold, equal to 5.73 grains to the ton, or $8\frac{1}{3}$ grains to the cubic yard.

4 dishes from Conroy's workings near the big bend in Middleton's Creek, two being the upper light drift and two the lower gravel, gave 0.245 grains of gold, equal to 5.27 grains per ton, or $7\frac{2}{3}$ grains per cubic yard.

12 dishes from the western and middle branches of Middleton's Creek at different points gave 1 grain of gold, equal to 7.2 grains per ton, or 10.4 grains per cubic yard.

Summing these up, we get that 26 dishes yielded 1.465 grains of gold, or at the rate of 0.05635 grains per dish, equal to 4.85 grains per ton, or 7 grains to the cubic yard. Even this low result, however, is quite payable for hydraulic sluicing, there being many instances where ground containing as little as 1 grain to the yard has been profitably dealt with by this method.

Brooks' and Lincoln's claim.—About $2\frac{1}{2}$ miles from the head of Middleton's Creek, on a small watercourse running into the Savage River, Messrs. Brooks and Lincoln have for some time past been working a large face of wash-dirt, part of a large terrace. This is one of the low-lying terraces above mentioned, which have been doubtless formed when the Savage River ran at a higher level and been left behind as it cut its way downwards. The track from Middleton's Creek to this claim passes over country in which the bare bedrock is visible for the most part, but some of the spurs are capped with gravel and there are some low terraces which have been worked a little. On the south side of Lincoln's Creek, opposite the face that is being worked, there seems to be a very large mass of gravel, but it has not apparently been cut into anywhere yet. The working face in Brooks' claim is of considerable size, about a chain long, and at the top a chain wide, and is from 45 to 50 feet deep. In the bottom limestone bedrock is seen, which is dipping underfoot towards the north-west a little. The lower wash is very clayey, but towards the top it gets whiter and more gravelly. The gold obtained is very coarse, and probably unevenly distributed, for it is very seldom that any gold can be found when prospecting with the dish. Very satisfactory results have, however, been obtained by sluicing, though owing to want of water the owners often cannot work more than two hours a day: if they had constant water they express themselves as highly confident that the ground would pay handsomely. This claim is splendidly situated for working, having a high face of wash-dirt and a big terrace to open into, while there is good fall for the sluices and tailings. About 4 chains below the face there is a waterfall over a limestone cliff quite 50 feet high into a deep valley that would hold an immense quantity of tailings. The fall in the creek below this cliff, however, seems great enough to cause the tailings to run right down to the Savage River without lodging to any great extent. The foot of the face is about 265 feet above sea level, so if a high level water-race were in existence along the divide between the Whyte and Savage Rivers splendid pressure would be obtainable from it. It is said that a good winter water-supply can be got by making a water-race some 4 miles in length to Tim's or Timb's creek, but this is a matter of which I know nothing personally. If the ground is nearly as good as it is said to be by the owners this terrace should pay well when water is brought on to it sufficient for constant working.

Whyte River Fall.—On the slope from the divide towards the Whyte River the principal workings are on Sailor Jack's Creek and its branches and on the White Creek, and a good deal of work has been done in past years by the Jansen Brothers, Mr. H. Middleton, and others. Want of water has, however, always been a great drawback, and only the gutters of the watercourses have been worked to any extent: these have mostly been sluiced out, but very little has yet been done to the terraces on each side of them. The ground closely resembles that on the other side of the divide on Middleton's Creek, and shows a succession of terraces lying on the slopes of the valley and cut through by numerous small watercourses. In the workings the black sandy false bottom is seen generally, but down towards the Whyte River the true bedrock makes its appearance. The workings on the White Creek are to the east of the Waratah-to-Corinna track at about two miles from the ferry: the head of the creek is crossed by the track. At this crossing there is a large hole

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worked out some years ago by Mr. P. Lynn, in which he obtained 18½ ounces of gold: the ground slipping in and becoming dangerous, he had to leave it. Dish prospects about this spot gave me very fair results, and the ground seems well worth working by sluicing. The terraces on each side of the creek here are extensive and contain likely looking gravel; the surface stuff shows a little gold on washing. A little lower down the creek we come to Lawson's workings, where there is a face of from 4 to 8 feet of white friable washdirt resting on the usual black sandy false bottom; fairly good prospects were got here, and the ground is said to pay for working in winter time when there is water. A great deal of concretionary chalcedony occurs in these workings. Lower down the creek we reach what is known as Middleton's Big Face, a large excavation two to three chains long and one and a half to two chains wide, which was worked some years ago and is said to have paid well. A small race was made five miles in length to bring water on to this ground, and Mr. Middleton is reported to have made £6 a week while the water lasted. The face of wash left standing is as much as 18 feet in depth, and the gravel is somewhat light and sandy. An excellent sluicing prospect was obtained by washing some of the stuff while I was examining this ground. The bottom of this face is some 100 feet above the Whyte River, and excellent fall for a tail-race is easily obtainable. With a good water supply there should be great hopes of successful working in this creek; the slopes of the hill on each side of it are deeply covered with gravel, and there is every appearance of there being constant work for many years to sluice it all away. In an old shaft of small depth some three or four chains to the north of the creek the wash-drift on the spurs was seen to be a fine light gravel, but carried a little gold; the hole had not reached the bottom, and probably when sunk deeper heavier and richer gravel would be got.

To the north of the White Creek lies Sailor Jack's Creek, which has several branches, most of which have been worked by sluicing out the gutters. On the spurs between the various branches of the creek there are what seems to be deep deposits of gravel which have been very little prospected; wherever they have been tried, however, they always contain some gold. About 180 feet above the Whyte River a big face was sluiced out by the Jansen Brothers; it has now become much covered up by slipped stuff, but was 40 feet high, all wash-drift, when they were working. A great deal of heavy conglomerate boulders and hard cement found through the stuff interfered very seriously with working, but the results obtained, if correctly reported, would show that with a better water supply and the aid of machinery in removing the heavy boulders the ground should be payable. There is plenty of fall for tailings. Lower down the creek some small faces have been opened, showing considerable deposits of gravel, which often prospect very well, and at an elevation of about 160 feet above the Whyte River the limestone bedrock makes its appearance. At about 100 feet a small creek is seen running out from a cave in the limestone: it is said to be about the same size all the year round, and on the day of my visit carried about 1½ sluice-heads of water. This would be very useful for flushing the tail-races. To the north of Jansen's Big Face, over a spur of gravel, we find Olsen's workings, where a little gold is being obtained when water is plentiful. I saw some nice payable prospects washed at this place. Above the Big Face the creek has been worked about 30 feet wide for a long distance, nearly up to its head. On each side there are still considerable depths of wash to be sluiced away. On the whole, the prospects washed from various points along this creek during my visit were satisfactory, and led me to form the opinion that hydraulic sluicing on a large scale would most likely result profitably. At the head of the workings in the gully a small race made by the Jansens comes in; along the course of this the ground is seen to be mostly gravel for a long distance. Not far from the highest workings a shaft was sunk by the Messrs. Jansen to a depth of 27 feet through fine gravel containing a little gold, but they did not reach the bedrock. There seems to be a very large terrace at this point.

Going along the Jansen's race for some 10 to 15 chains we come to another creek, which was worked by them also, with fairly good results. The wash is somewhat cemented, and some of it would require blasting before being sluiced. It is mostly a white gravel resting on cemented, hard black sandy false bottom. In places good prospects of gold can be washed from this false bottom, the gold being water-worn and often stained with iron and manganese oxides. Four dishes washed from it gave me 0.412 grains of gold, or at the rate of 8.86 grains per ton, or 12.9 grains per yard. Below the workings there is rather a flat part of the creek through which a deep tail-race would have to be cut in order to go on with sluicing satisfactorily; this flat is about 12 chains long and is very likely to contain a good deal of gold. The slate bedrock shows at the lower end of it. In order to get good fall for a tail-race it would be necessary to go some distance down the creek. According to a rough measurement made by myself with tape and aneroid at a point 32 chains down from the foot of the working face, the elevation above the Whyte River is about 195 feet, while at the face it is 265 feet. Below the point measured to the creek falls rapidly, so that there is no doubt that a tail-race with a good working grade is practicable.

To the north of these workings very little has been done, and though the gravel still continues on the top of the divide it seems to have been all removed from the slopes, and the bedrock crops out. Some 11 years ago a race was surveyed from a point a little higher than Jansen's race to Hunter's Creek, a distance altogether of some four or five miles. I went along the line of this to examine the country. The bush is not very dense, and the slopes of the hills as a rule not very steep, so there should be no great difficulty in making the race. At one point, in order to save a long detour, there is a tunnel projected; this would be about 350 feet in length. Near the intake

the ground becomes steeper and more rocky, and the water would probably have to be carried in fluming for some distance. The intake is at about 445 feet above sea level, just below the junction of two branches of Hunter's Creek, where there is a fairly good place for making a dam. At the time of my visit there did not appear to be much more than $1\frac{1}{2}$ sluice-heads of water in the creek, but this was just at the end of an unusually dry season. From the appearance of the creek it is clear that during heavy rains it must carry a large body of water, and ordinarily it probably carries not less than six or seven heads at the least. The Corinna Hydraulic Gold Mining Company, No Liability, have begun a survey of the race from this creek, keeping somewhat higher than the old one, in order to bring water on to Jansen's old workings; and no doubt during the progress of this it will be ascertained with some exactness what is the amount of water ordinarily available in the stream. From all appearances it seemed to me to promise a fair winter supply.

The country rock over which the race will pass is mostly schist and slate: it contains one or two reefs that may prove worth developing, and when cutting the race there is a possibility of finding others.

Some gold has been found in the upper branches of Hunter's Creek, possibly derived from the older gravels lying on the ridges, but which may also have come from reefs in the bedrock. One of these is seen crossing one of the branch creeks as a body of quartz impregnated with iron and copper pyrites: it is from 3 to 4 feet wide, runs a north and south course in schist country, and looks rather promising. Samples from it, however, when assayed yielded only traces of gold and silver.

Brown's Plains.—These are from 7 to 9 miles from Corinna, and were not at all closely examined by me on this visit. There are very extensive deposits of gravel on parts of these plains, especially on the ridge between the Whyte River and the flatter ground falling towards the Savage River, but in other parts the bedrock is occasionally seen cropping out. A good deal of gold has from time to time been got by cradling the water-courses, but as there is no permanent water supply all the higher ground has been left untouched by sluicing. About 400 yards east of the 8-mile peg on the road from Corinna there is a considerable hill known as Blackguard Hill, which seems to be all gravel. Some drives have been put in on the west side, so as to take out the stuff lying immediately upon the schist bedrock. This was pretty rich at times. In Harvey's tunnel the wash in the roof of the drive is cemented to a hard conglomerate, which would be troublesome in sluicing. If water could be brought on to these plains there seems great likelihood that a great many portions of them could be profitably worked, and the rich creeks running from them would no doubt then be thoroughly sluiced out.

Water Supply.—The future of the district all depends on getting a satisfactory water supply to enable work to be carried on continuously for at least nine months in the year. This can only be obtained by making a long and expensive water-race. Two water schemes have been proposed, one to bring water from the Heazlewood River, from a point some distance above where the road crosses it; the other to bring the water from the junction of the Heazlewood and Whyte Rivers. According to Mr. D. Jones, District Surveyor, the junction of the Whyte and Heazlewood Rivers is 425 feet above the Corinna Post Office (= 440 feet above sea level): the intake of the Heazlewood race according to Mr. J. Power, surveyor, whose chart of the proposed route has been kindly lent to me by Mr. E. Gaunt, is 992 feet above sea level. The lower race is estimated to be likely to be about 20 miles in length: allowing a fall of eight feet to the mile, this would allow of water being delivered on Sailor Jack's Creek at an elevation of about 280 feet above the Whyte River, which would command the greater part of Jansen's old workings and the whole of the White Creek workings, and could be brought over the saddle at the head of the White Creek so as to command all the lower gravels in Middleton's Creek. This would be a most useful race, and there would be plenty of work for all the water carried by it. A constant supply of not less than 50 sluice-heads of water could be pretty confidently relied upon all the year round. The great disadvantages of this scheme are that it would not avail to work the high gravels on the divide, leaving a very large quantity of washdrift untouched, and secondly it would have to come through rather rugged country. Being so low it would have to traverse the rough valley of the Whyte River, which is much broken by deep gullies. The Heazlewood scheme, on the other hand, would not give nearly so large a quantity of water, the supply falling probably to not more than twenty-five sluice-heads at most in very dry weather. For nine months of the year, however, it is probable that 50 heads could be obtained. Keeping as high as possible this race would head most of the rough gullies running into the Heazlewood and Whyte rivers, would skirt Long Plain, and come out on to easy country at Brown's Plain, after which it could be kept right along the top of the divide, commanding practically all the gravels. Much higher pressure would be procurable for working the not uncommon areas of cemented wash, and the high pressure would also be of very great value in working Pelton wheels for derricks used in removing large boulders of conglomerate and masses of hard cement. The race would probably be 26 to 28 miles in length, but from the easier country passed over it seems very probable that it would cost no more than the shorter lower one.

No proper engineering surveys have yet been made of either route, and until they have been carried out it is quite premature to say positively which scheme is the better one. There is no doubt

that the high-level scheme would be of the greatest benefit to the district generally, but it is quite possible that the lower one may be more to the advantage of the company which proposes to construct it. Both routes should be surveyed, and while doing so it would also be desirable to ascertain if the Savage River, or any of its large branches, could be made use of. Careful measurements of the streams should also be made at various times, so that accurate data could be obtained as to what supply could be got from them; at present everything is to a great extent guesswork.

The Corinna Hydraulic Gold Mining Company, No Liability, has been formed to acquire land in the neighbourhood of Jansen's and Middleton's old workings, on the 1000 acres now withheld from leasing, and to bring in a water supply. It is intended first of all to make the race from Hunter's Creek that is now being surveyed, and to test the ground practically with this while the preliminary surveys of the longer races are being made. The Hunter's Creek race can be got across the divide at a low saddle about three miles from Corinna, so as to test Middleton's Creek, as well as the slopes to the Whyte River. This seems to me a cautious and commendable policy. Should the ground turn out as well as is expected, I have little doubt that both the upper and lower level water-races will be required, and it may be pointed out that a good deal of water from the high-level race used in the vicinity of Brown's Plains could be picked up again by the lower race. The whole question of water supply requires very careful consideration, and much expense in surveying, but it is to be hoped that no trouble will be spared to get all data before coming to a decision. As the extent of auriferous ground commanded by the upper race is very much larger than can be held by the company making it, the sale of water to outside owners would be a constant source of revenue, and in the interests of the district it is to be hoped that the company will set aside a liberal proportion of the supply to be sold to applicants for it.

Townsend's Terrace, Pieman River.—Going up the Pieman River from Corinna it is seen that every here and there there are terraces of river gravel, and one of these on the south bank of the river, a little below the Paradise landing, is worth notice. Here a small terrace of gravel is found just above high-water mark, and Mr. Townsend, by digging out the bottom layer and cradling it, got 9 or 10 ounces of gold in a short time. This shows that all these little terraces are worth attention, and also makes it probable that there is a good deal of gold in the bed of the Pieman River itself, which may perhaps be got at by dredging.

Frenchman's Spur.—From the Nancy Creek landing a track leads to the Lucy Spur and to the Rocky River diggings. Going up this the slate bed-rock is visible up to a height of 630 feet, where waterworn wash is met with on the top of the spurs. The first gravel come upon does not appear to have been worked, but after crossing a deep little gully another deposit is met with at about the same height on what is known as the Frenchman's Spur. Here I saw an old shaft 31 feet deep sunk through fine quartz gravel, but not bottomed on the bedrock. About five chains from this shaft on the point of the spur a face almost 40 feet long and up to 12 feet deep has been sluiced away by C. McLean and his mate, who obtained 7 ounces of gold in three weeks. Mr. McLean considers the ground as payable with a good water supply, but this is difficult to get. The top of the spur is about 680 feet above sea level.

Conroy's Spur.—After crossing another gully we come upon another quite similar gravel terrace at a height of about 600 feet, known as Conroy's Spur. Gold has been got here, but very little work has been done. There are splendid large bodies of gravel on this and the Frenchman's spurs, and if on prospecting further they prove payable and water can be obtained, they will form good sluicing properties.

Lucy Spur.—From Conroy's Spur the track descends about 150 feet to cross a small branch of the Lucy Creek, which has been worked for gold. The bedrock here is mostly schist. We then rise to the Lucy spur, the top of which is about 730 feet above sea level. This is a long level spur, portion of a considerable stretch of approximately level country, which runs back to the foot of the Livingstone Range; it is probably 15 to 20 chains in length, and from one to eight or ten chains in width. The top of the spur is pretty level, and is all composed of more or less deep layers of gravel, much waterworn. The spur runs about E. S. E. from the camp at the northern end, where the track comes upon it and where the principal workings are situated. These consist of two large faces that have been worked out on the eastern side of the spur, and three small tunnels. The northern face is probably two chains in length, and the stuff has been worked out for perhaps 30 or 40 feet in width, the depth of the wash being from 6 to 20 feet. The gravel gets deeper towards the south, and the bottom dips to the westward, showing that the deposit will be deeper under the crown of the ridge than where now opened. The southern face is about 40 feet in diameter, and about 15 feet deep in the middle, but if cleaned down to the bottom it would probably be quite 20 feet deep. In both faces the top wash is much cemented, in parts becoming conglomerate. The heavy lumps of conglomerate have been troublesome in working. Over 20 ounces of gold have been taken from the northern, and 22 ounces from the southern face. Much of the gold is waterworn, but some of it is quite angular, and pieces with quartz still adhering to them are not infrequently found: these may be derived from a reef in the vicinity or from leaders in the schist bedrock. One auriferous leader has been laid bare in sluicing, but is very small. The schist bedrock is on its surface decomposed

(10)

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to a black sandy material not unlike the black false bottom in Middleton's Creek and the Jansens' workings above-mentioned, but here it is clearly only the old weathered surface of the bedrock upon which the gravels have been laid down: it often contains gold. There is some gold through all the drift, but the richest stuff lies right on the bottom, where nice coarse gold is frequently obtained. To test the ground and get at the bottom layer of gravel two small tunnels have been driven on the east side of the spur, below the faces worked. One of these is still in progress, and has gone 52 feet through soft schist bedrock, but has not yet reached the gravel: the other, some 30 or 40 feet further south, goes in for over 50 feet, then rises into the wash, and has been carried on along the bottom for 30 or 40 feet. The bottom dips to the westward, and at last water gathering stopped further progress. In this drive the wash-drift is similar to what is seen in the open faces, but coarser in character: the bottom layer prospects very well and should pay for working. On the western side of the spur there is another small tunnel driven towards those just spoken of, and in this the bottom dips to the eastward; that is, in the opposite direction to what is seen in the others; and we therefore must conclude that there is some sort of a gutter under the crown of the spur.

I saved the gold from several prospects washed from the working faces on the Lucy Spur, and have weighed it with the following results:—

Fifty-six pounds weight of stuff from the lowest foot and a half of wash from the tunnel on the east side, taken from several different spots, yielded 0.745 grains of gold, equal to 29.8 grains to the ton or 43.2 grains to the cubic yard.

One hundred and sixty pounds from the southern open face taken from top to bottom of the face gave 0.190 grains of gold, equal to 2.66 grains to the ton, or 3.86 grains to the cubic yard. Nearly all the gold, however, in this came from about 60 lbs. taken from the bottom foot and a half of gravel.

One hundred and thirty pounds of stuff from different parts of the northern face gave 2.550 grains of gold, equal to 43.94 grains to the ton, or 63.71 grains to the cubic yard. As in the last instance, nearly all the gold came from the bottom layer, there being very little in the dishes of stuff from above the bottom.

With the gold there was in every case a good deal of black sand, mostly rutile, chromic iron, and tourmaline.

About six chains or so south of the working faces a shaft has been sunk in the centre of the spur, 19 feet through light gravel, without reaching bottom. Further south still a good distance a small face has been opened on the western slope, and some gold was obtained.

On the east side of the spur, a few chains above the camp, there is a cave about 60 feet wide across the mouth and 50 feet deep, which seems to have been formed by a small stream of water which issues from it, removing gravel and soft bedrock from beneath an overhanging sheet of conglomerate (very hard cemented gravel). The same tendency of the gravel to dip in towards the Crown of the spur that was noticed in the tunnels is here again observable.

The gravel in this spur being on the top of a high ridge, without higher ground close to it, is not easily commanded by a water supply, and hitherto the only work that has been done has been gone on with during very wet weather, when a small supply was available for a few days at a time. With a good water supply there seems every reason to believe that this would be an excellent sluicing venture. The quantity of gravel is very great, the prospects are good, and the facilities for disposing of tailings are unexceptionally favourable. Two or three years ago an attempt was made to bring in a water-race, but the cost was under-estimated, and it was never completed. The syndicate who were instrumental in getting the ground round the Lucy Spur withdrawn from leasing are, I understand, trying to bring in water from the Paradise and Rocky rivers, a distance of probably 10 or 12 miles. Not having gone to these rivers where the race would strike them, I am not able to say what water could be obtained from them, but as both streams have large catchment basins, and are generally carriers of large flows of water, it is probable that they would give the supply required. The country over which the races would have to come seems pretty flat, though rising a little towards the ranges, and would be easy if it were not for the deep gullies that every here and there cut deeply into it. Surveys and estimates should be made to find what water could be got, and the cost of bringing it in. One thing seems pretty certain, there is no ground to carry a race at a level much higher than the Lucy Spur itself, and therefore considerable difficulty must be anticipated in getting a pressure exceeding, say, 50 feet. It is to be hoped that in laying out the race every endeavour will be made to keep it at as high a level as possible, in order that all the possible pressure may be available for the nozzles.

Lucy Spur to Whyte River.—Going from the Lucy Spur to the Whyte River suspension bridge, we pass first over a considerable stretch of flat country, often covered with gravel, which seems plainly part of the original plateau from which the Lucy, Conroy's, and the Frenchman's spurs have been severed by the action of running water. The track goes through Tinpot Gully, where some gold and tin have been obtained, and goes down to the junction of the Rocky River

(11)

with the Whyte. Less than a mile up from the junction the largest nuggets of gold ever found in the Colony were obtained by M'Ginty, Griffin, and party, in the bed of the Rocky River, and the greater portion of it has since been worked at one time and another. I noticed, however, several rather nice-looking terraces along the banks of the Rocky River that do not appear to have been tried. These might be worth looking into, and some of them at least might pay for sluicing.

The past summer is said to have been the driest for five years, there having been hardly any rain for the first three months of it, and in consequence diggers have been able to get into the bed of the Whyte River a few miles above its junction with the Rocky, and have made some good finds. It seems likely that river-mining on a larger scale than is possible for poor working diggers would be profitable in this river. A very good trial of it could be made at one spot more especially, close to the Whyte River suspension bridge. Here there is a loop-like bend in the river, the narrow part of the loop being a steep narrow ridge known as the Razorback. A tunnel about 350 feet in length through this would allow of the river being diverted through the spur, so as to lay bare about 64 chains of its bed. This venture seems well worth trying, having quite a good chance of being successful; any company undertaking it, however, would do well to have a working capital of not less than £6000, in order to be ready to meet contingencies that are likely to arise, river-mining being notoriously subject to disastrous interruptions by floods.

Conclusion.—In concluding this report, I desire to express the opinion that there is undoubtedly an excellent field for hydraulic sluicing in the terraces along the Savage, Whyte, and Pieman rivers, and on the plateau lying south of Mount Livingstone. It will be an expensive matter to bring in adequate supplies of water for working these deposits, and a difficult matter to arrange so that a monopoly of all the available water will not be conceded to one or two companies. I do not think that the fields will be very rich, nor that every company that undertakes to work them will be successful, but I am confident that when once the water difficulties are surmounted there will be a fair proportion of paying claims.

I have to thank Messrs. Ritchie, Fitzpatrick, Lynn, Devlin, Forster, M'Lean, and many others for much assistance when going through the district, and for a great deal of information as to workings in past years.

I have the honor to be,
Sir,

Your obedient Servant,

A. MONTGOMERY, M.A., *Geological Surveyor.*

The Secretary for Mines, Hobart.
