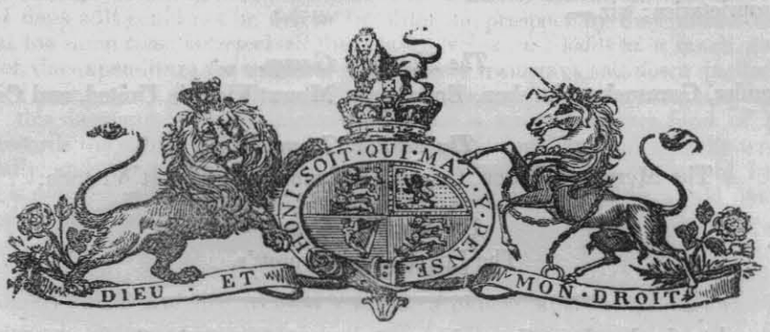

REPORT on the Mount Victoria, Dan Rivulet, Black Boy, and Mangana Gold Fields; also remarks after examination of the Tullochgorum Prospecting Area.

Launceston, December, 1884.

THE Mount Victoria Gold Field proper, it will be remembered, has been reported on previously, viz., in March and November, 1883, so that it is unnecessary to go over as much of the same ground again on this occasion, but now to draw attention principally to matters which appear to have not only retarded the development, but also to have caused the cessation of active mining operations in many of the leaseholds. A sketch plan is furnished herewith showing the leases, the locations of the auriferous reefs, tunnels, and shafts on the more prominent mining properties.

1.—GEOLOGICAL FEATURES.

Since my last visit a considerable amount of work has been carried out on several sections; crushing machinery has likewise been erected on three claims, races cut for supplying the water-motors employed, shafts sunk, adits driven, and a considerable quantity of stone has been raised and crushed from the levels in the various mines, thus enabling me to report more fully, from the additional information now available, at the present time.

The principal mines are situate on the east side of the Dorset River, with the exception of Loane's reef, which crops out on the west bank, due to the windings in the course of that river. The auriferous belt of country at the northern end of the field is about half a mile in width, and the nearest granitoid rocks occur about five miles from the schists in the west and about three miles in the east. This appears to be about the same distance in the south between Mounts Victoria and Saddleback, though, at the former, the carbonaceous formation overlies the Silurian slates and sandstones enclosing the gold-bearing matrices. This line of country may be, with a few interruptions, traced from the Waterhouse Gold Field through Mount Horror, Branxholm, Mount Victoria, Dan's Rivulet, Black Boy, and Mangana; and the Silurian rocks, interspersed with quartz veins, were observed in the Esk valley, at some distance from the Tullochgorum Company's scene of prospecting operations for gold in the alluvial. It will be admitted that these auriferous deposits are, at present, the most extensive we have in Tasmania, and that therefore all impediments to their general development should be removed by every means that can be used for the purpose.

The topography of the whole district is rough and broken, some of the valleys and gorges being over 1000 feet deep, as gouged out of the sides of the mountainous ranges.

At Mount Victoria, *i.e.*, from Everett's leases in the south east, near the sources of the Dorset, to the Crown Prince Company's mine in the north west, below Alberton, the gold-bearing quartz, mined at several places, is of a very *dense* and hard description; it is also mineralised to a considerable degree by those sulphides so generally found in auriferous quartz, and by the hydrates formed after the decomposition of these sulphides. The former comprise the following:—Sphalerite (zinc blende), galenite (lead sulphide), iron and arsenical pyrites, also pyrrhotine, and, of the latter class, arsenates of iron or "pharmacosiderite." These auriferous sulphurets form, therefore, important ingredients of the matrices, besides which the gold itself, as disseminated throughout the veinstones (more or less) is of mostly a very fine description, approaching a moderately coarse grain only.

The quartz reefs that have been worked for gold may be, for the purposes of this report, divided into three groups, and with nearly the whole of them it has been observed that the "makes" or "pipes" of gold-bearing quartz on the various lodes *dip* north in the strike of the latter, the Loane's, probably, forming the exception, as it is dipping south. Then we have the Northern, Middle, and Southern Groups, each of which is represented by the following more prominent proprietaries; viz.—

The Northern Group.

The Premier, Gumsucker, Strahan, Endeavour, Mount Victoria United, and Crown Prince.

The Middle Group.

The Mercury, Wilson, Caxton, Montana, and Mount Victoria.

The Southern Group.

The Loane's and Everett's.

With regard to the Northern Group it may be stated that all the Companies enumerated have discovered gold-bearing lodes, and that they have opened same more or less. Crushings have been had from most of the veins, yielding from a few pennyweights to over an ounce of retorted gold per ton. The Premier Company have been operating on a mass of brecciated quartz occurring in hard, regularly stratified country; and in their two adits the Gumsucker, Nos. 2, 3, 4, and the easterly veins, have been intersected. Had the tunnel been continued the Strahan lode would also have been found. It appears that all these auriferous veinstones have been opened up more or less, and stone above the adit has been taken out for crushing to the surface. Owing to the, comparatively speaking, short distances driven along the course of the quartz, the ground cannot be said to have been thoroughly tested for its value. The original surface block, for instance, which was 2 feet wide, and showed gold freely, was found to dip north; and it is rather an important matter, favouring future amalgamation of these claims, that the main tunnel has passed *beneath* this block of stone, and that that adit has not yet been connected with the surface workings, as it should have been.

The Strahan Company's shaft is 70 feet deep, and at 40 feet from the surface the stone crushed first gave nearly an ounce of gold per ton; a second parcel yielded over an ounce; the only drawback being the expenses attached to transporting the quartz to the Premier battery This reef is from 6 to 18 inches in thickness.

The Endeavour Company's reef, 10 inches wide, has been traced to a depth of only 35 feet, and a crushing averaged 18 dwts. per ton. Close by, on one of the Victoria United Company's sections, a very promising lode, 2 feet wide, crops to the surface. It is of a laminated character, and strongly impregnated with auriferous pyrites. A short tunnel and a shallow shaft, not yet connected with each other, is all the work done here.

The Crown Prince Company's mine, located farther to the east, has been opened at the surface across the old Black Boy track. Of the quartz sent down for crushing, 108 tons gave close upon 18 dwts. of retorted gold per ton, from a reef averaging two feet six inches in width. At a depth of 79 feet water came in, and a "splice" of poor quartz for a time displaced the richer shoot of stone, inducing the Company to start a main deep adit lower down the range, by means of which they can command about 175 feet of backs. At a distance of 401 feet 6 inches the lode was again intersected in the deep adit, where it is well defined and over six feet wide, the quartz being of the usual laminated description, carrying besides a little gold, a good per-centage of valuable sulphurets. A great drawback to the reefs at Mount Victoria turning out more remunerative than what they have done, consists in the hard country rocks which enclose the former, which renders mining rather expensive. The Crown Prince reef at the adit level occurs as accompanied by a soft selvage or "dig," by means of which the working of this reef will be much facilitated, at a considerable reduction of the expenses. Besides this so very similar feature in comparison with the deep Sandhurst (Victoria) quartz reef, another and equally satisfactory circumstance was observed (so far as I know, the first instance of the kind in Tasmania), namely, the occurrence of a "dyke" of volcanic rock intersecting the schists. This dyke was found 300 feet "*in*" from the mouth of the adit, bearing S. 52° W. for a width of over 2 feet, and was accompanied by strings of quartz embedded in soft black slate. It runs nearly parallel to the course of the reef itself, 101 feet 6 inches farther along in the tunnel. Although not possessed of any direct influence or bearing upon the occurrence and value of quartz reefs, these dykes of "*anamesite lava*" are yet regarded with very considerable favour by the practical miners of Sandhurst, as in their experience they afford excellent indications for the periodical "recurrence" of their rich quartz lodes at ever increasing depths (to 1920 feet); and this discovery of a dyke of a variety of "*Gabbro*," or better known as "*Aphanite*," in conjunction with the Mount Victoria reefs, is likely to be fraught with considerable importance as affecting their future permanency to great depths, especially so if other similar dykes are found to exist.

Glancing at the sketch plan it will be found that this northern group (like the two other groups) forms quite a cluster of proved auriferous veinstones, the outcrops of which are located at various and considerable altitudes above the Premier Company's batteries. As nothing appears to be known of the metalliferous character, if any, of the country situated between the most westerly (Malunna) reef and that crushing plant, it would seem a matter for future consideration whether or not a central deep adit could not be driven in order to prospect by that means the unproved country, and, at the same time, intersect *all* the known veins and lodes at a much greater depth, whereby most of the expenditure for trucking upon costly tramways and down inclines would be avoided. If, for instance, all those companies were to amalgamate upon a certain equitable basis from "below" this deep adit level, and meanwhile create a kind of reserve fund of proportional contributions towards the driving of that adit, all these reefs could undoubtedly be wrought much more economically, and, for a very considerable time to come, the batteries would be more fully employed than is now the case, whilst the expenses for driving that main adit would not be felt very much by the contributing proprietaries.

The Middle Group

Comprises the Mercury, Wilson, Caxton, Montana, and Mount Victoria.

The first-named, owing to the discovery of two parallel lodes of good width, early attracted attention, and, as the stone very frequently exhibited rich gold pretty regularly disseminated through it, it was hoped that that company would give a good account of itself when in full operation. Two tunnels were driven, and each lode intersected; and as shafts had been sunk following their underlay from the surface connecting with those adits, regular stoping above the adit levels should have followed as a matter of course. During my careful examination of the whole of the workings it was found, however, that the working of the mines had been carried on very unsystematically and without any regard as to the future. Nature itself having favoured this metalliferous region in the way of facilities for deep tunnelling instead of deep main shafts, and, if properly conserved, of sufficient water power for driving the crushing plants, the working expenses of most of these mines should have been much less than where steam power would be required for hoisting, pumping, and crushing; but, generally speaking, no such reduction has taken place, and the working expenses of the mines, and of the manipulation of the ores raised, are still above what practical men anticipated. In the Mercury Company's mine the adit on No. 2 reef commands 125 feet of "backs," and on No. 1 reef, 92 feet. These stopes of ground, with the average width of the veinstone, should have kept the batteries going for a considerable time had the levels been kept *ahead* of such stopes. This, however, had not been done, and, in order to obtain supplies for the batteries, underhand stoping and other means were resorted to, which not only added to the expenses, but eventually brought the mine to a standstill; besides which, the quartz having been taken indiscriminately and mixed up with much non-auriferous rock, with a view only of keeping the batteries going, the yield per ton* was much reduced, and, therefore, became unprofitable to work. A change in the management has, however, taken place, and the mine has been put into a pretty good state, although many feet had to be driven on both lodes before stoping could again be resumed with regularity; and it is hoped that by blending the richer with the poorer quartz, and by exclusion of all valueless wall-rock, the yield will become higher than what it has been lately. The two lodes, 229 feet apart, run nearly parallel to each other, and they are nearly vertical, viz., one foot in 14 feet for underlay, and, as the ground is hard, require not much timber except in the levels, which should always be kept well ahead of the stopes.

The Wilson Company, Pollentine's shaft, has been sunk on the underlay of that lode which Mr. Wilson originally discovered. At the side of Wilson's Creek, below the outcrop, there appear two veins of quartz which *diverge* in their underlay to the east and west, but they, at the same time, in their northern dip, in the general strike of the lode, *converge*, thus forming a "saddle" reef, so well known at Bendigo (Victoria.) The two separate bodies of stone forming the east and west "legs," as descending from their "saddle," are of a seamy character, the western being the larger of the two, and it contains more gold than that in the east. As the latter could only be worked from the creek level, the other, or western, lower down that creek, would command some 20 or 30 feet of more backs, which in itself would be a consideration, as the stone of the west leg could be followed farther than the eastern leg, owing to the rather rapid dip to the north, and because the cap of the lode, or the junction of the two legs, had proved, so far, of little or no value.

In this connection it may likewise be stated that the No. 2 lode in the adjoining Caxton Company's ground—a very fine solid gold-bearing body—occurs precisely in the centre between those two legs, thus exhibiting, owing to its northerly dip, a much lower body of auriferous quartz than that met with in the Pollentine's shaft, which it underlies in the form of, probably, a second and deeper "saddle." As from all appearances this will be found to be the case, it establishes, in my opinion, a very valuable feature on this goldfield which cannot but have an important bearing on the future permanency of the whole of this auriferous region. As will be seen from the sketch plan, the reefs at Mount Victoria observe the reverse of regularity in their mode of occurrence and

*1689 tons of quartz were crushed for 1453·15 ozs. of gold, or, on the average, 17 dwts. 5 grs. per ton of retorted gold.

of their bearings towards the horizon ; in fact, the whole of these veins are disjointed, strike almost at any angle, and are therefore rather difficult to follow. The country, as well as the Wilson and No. 2 Caxton* reefs, are much more regular, and of a "kindlier," so to speak, character. It thus appears that when the Mercury, and eventually the Premier group, approaches at considerable depths these underlying formations, those lodes at deeper levels will also become more regular and continuous than what they are at present.

The No. 1 Caxton lode has been followed from its outcrop at the surface, rather high up the range, by means of a tunnel, for a distance of about 200 feet. A very regular wall accompanies the stone, which latter occurs in bunches or shoots, the average width being from 18 inches to 2 feet, giving an average of 10 dwts. 9 grs. per ton.† An air shaft was sunk 180 feet from the mouth of the adit, which requires about 50 feet more before it will connect with the adit. It appears that before many feet had been driven on this lode, and previous to any positive knowledge of the value of the lode had been arrived at, a sinuous tramway was constructed for a length of over 75 chains, at a cost of £375, which connects the mine by means of a shoot with the Mercury crushing plant of ten heads, the other five heads belonging to the Caxton Company. From present appearances it will be some time before sufficient "backs" can be made available for crushing regularly, and meanwhile the tramway requires alteration and repair. It will also be judicious to drive on the lode at the tramway level, as the shoot is not in a very good working condition.

The Montana Company have started to drive on what appears the continuation of the No. 1 Caxton lode, inside the Mount Victoria Company's ground, or 167 feet from the Montana Company's southern boundary, the tunnel having been continued in their own ground 50 feet farther and still driving. At 90 feet "in" a "fault" occurred, displacing the lode which had been found in the mouth of this adit ; and in that distance the width varies from 6 inches to 3 feet in the stopes. As from the rise of the range every foot driven adds to the height of "backs," the tunnel should be continued for that reason alone, if not for the probability of larger and richer bodies of stone being discovered along the strike of this lode. At the end of the adit there were about 3 feet of vein-matter taken for crushing ; the remaining 12 feet, although sometimes interspersed with gold-bearing quartz veins and threads, was found too poor to remunerate for all expenses incurred. A surface air-shaft was anticipated to be soon connected with this adit ; and it should be observed that in all this Middle Group the auriferous shoots of stone dip to the north.

The Mount Victoria G. M. Co. have wrought the reef Mr. Balstrup discovered by means of a large boulder of auriferous quartz which had become detached from the reef and washed down a gully, both by shafts and an adit connecting the same. This upper tunnel is 157 feet in length, and a cross-cut to the west of 31 feet intersected the lode, on which 139 feet have been driven. At the south-western end a "slide" or fault has temporarily displaced the lode, and a great deal of stoping has been done right to the surface. The lode averages 18 inches in width, and underlies 18 inches in 3 feet. So far, 1940 tons of quartz have been crushed for a total yield of 1748 ozs. of retorted gold, making an average of 17 dwts. 12⅞ grs. per ton. In this mine, as in most of those of this Middle Group, good gold-bearing quartz has been found at the greatest depths attained, and the prospects for remunerative and profitable work at these greater depths are very good. This Company, in order to avoid the present heavy expenditure for carting the quartz from the shoots to their battery, have driven a deep main adit, No. 2, which would give them, if continued, over 95 feet of backs beneath their No. 1 or first adit. This main adit is a creditable piece of work, very straight, and, like all the other mines, well secured with sound timber.

The Southern Group.

The Loane's Gold Mining Company's reef is situated on the west side of the Dorset, and it crops to the surface 26 feet above the river, underlying to the west, with the shoot of stone dipping south. A vertical shaft was sunk to a depth of 47 feet, and at 45 feet the lode was driven on for 20 feet, showing a mixture of gold-bearing matrix and pure quartz also. The surrounding strata is, like the reef itself, very dense and hard ; the quartz has that peculiar bluish hue due to the pyrites occurring, principally in the laminations. Gold was seen in the latter as well as in the solid quartz, which appears to be of about the average character on this goldfield. They were much incommoded by the water, which is not surprising, as the southern continuation of the lode must cross the Dorset a little higher up, thereby increasing, by percolation, the influx of water. An adit started at high-water mark from that point along the course of the reef would have been an easier and less expensive method for both proving this reef and for raising stone for a trial crushing.

The Everett's Gold Mining Company have disclosed, by means of open cuttings and shafts two very massive formations of quartz reefs. Both are highly mineralised, and the sulphide of zinc is here more prevalent than elsewhere on the field. The eastern body averages about three feet in width, and the western occurs in bunches from five to nine feet in thickness, besides which the adjacent wall-rocks are interlaced by veins, spurs, and strings of quartz. Gold has been found in both reefs, but, so far, trial crushings have not, the same as on the Loane's reef, yet been made.

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* Marked A on the Plan. † 292½ tons yielded 157·27 ozs. of retorted gold.

From the above description it will be seen that the Mount Victoria Gold Field, embracing the three groups, still maintains a high character. There is abundance of payable quartz obtainable if only *systematically* and *conjointly* worked. So far as could be learned, not one of the reefs had been followed along its course to more than 150 feet, and the greatest depth is under 200 feet, which appears insignificant when compared with other quartz mining districts, especially as it is well known that very good stone has gone under foot at some of the deeper levels. Having obtained the yields above referred to, there is actually no evidence of the yield of gold per ton that *should* have been got, considering the modes of extraction adopted and the style of appliances in use by nearly all those companies who have erected crushing plants.

2.—PRESENT TREATMENT OF ORE AT MOUNT VICTORIA.

The Premier and Mercury Companies employ waterwheels of large size as motors, whilst the Mount Victoria Company uses a portable steam engine for that purpose. The first named proprietary crush by means of ten heads at a speed of from 75 to 78 blows per minute. The crushed sands pass through gratings having 200 holes per square inch, and at each set of tables, besides the mercury ripples, two copper plates electro-plated with coin silver, and which are afterwards charged in the usual way with quicksilver—on the Californian plan—are used for amalgamation. Blanket strakes follow, and the whole process of intercepting the fine gold terminates with the two sets of Cornish "tyes." The battery manager, one of the oldest and most experienced in Tasmania, declares that those copper plates are very excellent for amalgamation outside the boxes, and that there is no question as to their superiority over the common copper plates. This battery, &c. was found in good working order, clean, and evidently well looked after.

The Mercury Company have fifteen heads, of which, however, five are owned by the Caxton Company; the speed of the camshaft gives but 65 blows for each head per minute, and their gratings are pierced for 200 holes per square inch. Common copper plates, charged with mercury, and the requisite number of ripples to each of the three tables are used, and the crushed material from each table passes over blanket strakes, from which it falls into a channel (launder) in which it is conveyed to a Berdan basin (one for each battery) for trituration with quicksilver in order to produce amalgamation of any gold thereby liberated.

The Mount Victoria Company employ steam for working their crushing plant of eighteen heads, *i.e.* six heads in each box; their gratings have 225 holes to the square inch. The ripple tables are lined, each with four common copper plates, and they have also the usual number of mercury ripples for each table. The blanket strakes are 21 feet in length, and the blanket sands are regularly gathered and stored for future manipulation.

It will be seen that, without the Californian electro-plated silver copper plates, the whole of the processes of collecting the gold from the crushed matrices are such as has been used for many years back with quartz-crushing; indeed, in one instance, a machine was permitted to be operated as could not but result in loss. At the Mercury Company's plant crushing was carried on at a low rate of speed, thus inducing loss of gold, as experience has taught battery managers; besides that, the plant was found in a dirty state, with grease and oil dropping everywhere; especially was this found to be the case with the bearings and the cams of the camshaft, and thus greasy matter was seen on the boxes and the splashboards at the head of the tables. Then, again, the Berdan basins were set up at too low an angle to allow them full effect in grinding and amalgamating. That this state of affairs, so easily prevented by a little more care and attention by the person in charge, was productive of a loss of both gold and quicksilver I make no doubt, and that opinion was fully borne out by the fact that tailings or waste taken from the creek some 40 feet outside, or away from the battery house, yielded to the pan, in my presence, about 1¾ lbs. of valuable pyrites, and several largish globules of mercury evidently charged with some amalgamated gold. Under these circumstances it is really not surprising to see so promising and very valuable a mine depreciated as it has been, and having so detrimental an effect on the whole goldfield or goldfields in Tasmania.

3.—SUGGESTIONS AS TO FUTURE MINING OPERATIONS AND TREATMENT OF AURIFEROUS QUARTZ.

In crushing veinstone of this character it is shown how absolutely necessary it is to have it reduced to a very fine-grained "pulp," in order to facilitate the *mechanical* liberation of the gold contained; and it should be recollected that this class of gold is much finer and lighter, on the average, than any or the finest alluvial gold in the rivers or at the sea beaches.

The stamped veinstone, as issuing after crushing from these Mt. Victoria crushing plants, is associated with gold as follows:—

Firstly.—Free gold, capable of concentration with water, and subsequently of amalgamation with mercury.

Secondly.—Laminated and honeycombed gold, easily carried off by impure and too much water.

Thirdly.—Gold mechanically mixed with and enclosed in the coarser particles of pyrites, which require to be reduced still finer in grain to liberate the gold.

The great loss in working is in the "float" or laminated and honeycombed gold. It is difficult at this stage of operations at Mt. Victoria to determine the exact amount; but elsewhere, with similar processes, even when the utmost care is exercised, it amounts to from a sixth to a third of the gold in the ore. It has been proved that stamping is the more economical process, especially where the veinstone requires to be finely crushed, and that pans, rollers, &c. should follow. At the same time it should be borne in mind that the more opportunity is given for the stamped ore to come into contact with the mercury the greater will be the per-centage of gold collected after amalgamation. For instance,—in California and Nevada the boxes are lined *inside* with thick strips of copper plates, electroplated with coin silver and amalgamated with mercury,—thus inducing, by means of the slightly aciduous water used in crushing—the result of stamping sulphuretted veinstone—an electro-galvanic reaction, highly favourable to that important process of amalgamation.

Late discoveries claimed to have been made in connection with the introduction of *direct* electrical action on the stamped gold ores flowing over the tables, &c. from the boxes, or the gold gathered in the mercurial ripples, appear as yet to be in the theoretical or experimental state; though undoubtedly they, or any other method by means of which the gold now escaping can be collected, deserve every attention and encouragement.

With quartz as at Mount Victoria, of the very hardest and densest description, it is suggested that the following might be adopted with advantage; viz.—

1. Stone or ore breakers, as permitting larger quantities per head to be crushed.

2. Stampers not to have less speed than, say, 80 blows per minute.

3. Gratings with 300 holes per square inch, and all worn out boxes to be replaced by new patterns having but *one* grating frame for the whole length of the box, and the gratings to *overhang* the splash-board so as to give more splay to the water and sand in the boxes. Boxes inside to be fixed with strips of electro-plated (silver) copper plates. (See diagram *)

4. For each table with ripples to have three electro (silver) copper plates. These should be manufactured in the battery-house, as could easily be done.

5. Blanket strakes 20 feet in length.

6. Pans (revolving) or berdans, set up at an angle of 40 degrees or more.

7. Hunter's Rubbers, which machines perform three very requisite operations at very little expense of motive power, and are well adapted to the manipulation of Mount Victoria quartz. They grind the pulp finer; they concentrate the pyrites simultaneously with amalgamation of the thereby liberated gold; and they collect the greatest per-centage by any other apparatus of *float* or *floured* gold or quicksilver. (See diagram.†)

If this course of treatment of auriferous quartz be adopted there will be at the several stages of the process a continuous accumulation of pyrites still impregnated with some gold, and therefore valuable. These sulphurets, it is recommended, should be carefully collected and stored, because as these mines get more developed in depth and at various levels, the time will not be far distant when these pyrites will afford employment to a local roasting furnace and subsequent grinding, or possibly the more thorough process of chlorination, for the extraction of the gold they contain.

In thus advocating a more scientific treatment for the quartz in that locality I am but following up the advice I tendered to the mine-owners in my Report in March, 1883; and I am perfectly certain that had my advice been followed, this goldfield, instead of being in a languishing state, would be on the road to prosperity.

The Everett leaseholds are, so far, the most elevated in the Dorset River watershed. By following the old Black Boy track or a shorter and more recent track over the dividing range above Everett's, the head waters of the Dan Rivulet, having a fall to the South Esk River, are reached. On the former track the metamorphic schists and silurian slates, with sandstones, are, at the base of Mount Victoria proper, overlaid by fine-grained sandstones and beds of coarse conglomerates of the carbonaceous formation. A leading spur descending south to the Dan from the south south-western flank of the mount consists wholly of metamorphic schists interspersed with veins of quartz, and at about eight miles south-west from Alberton across the Dan Rivulet the Golden Point Company's leases (30A.), or "Kerrigan's Discovery," are located. Their gold-bearing reef has been traced on

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* This diagram was taken from my "Synopsis of a Report on Mining in California and Nevada, U.S.A.," published by the Victorian Mining Department.

† Ditto.

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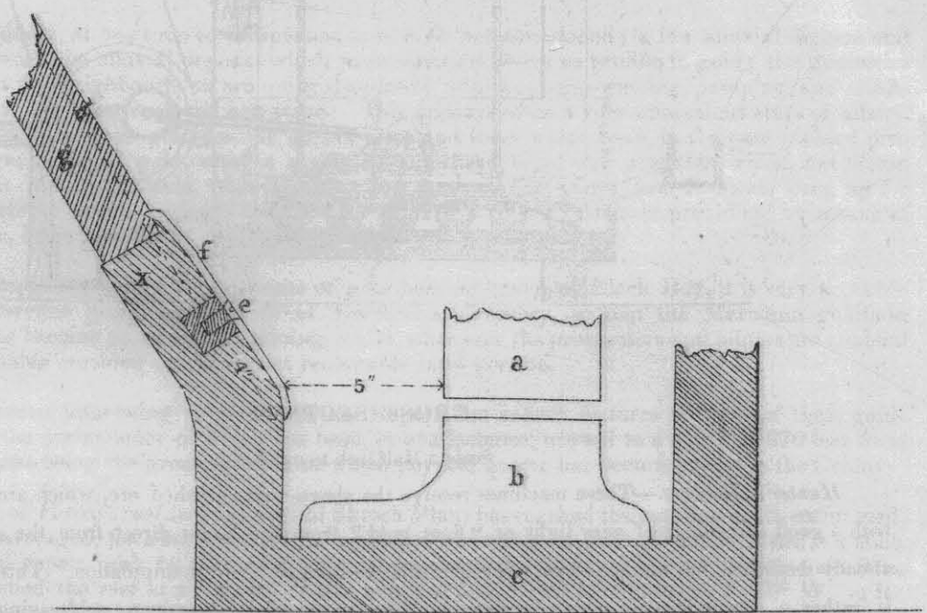
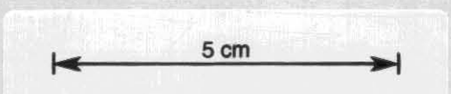
ELECTRO COPPER PLATES IN BOXES

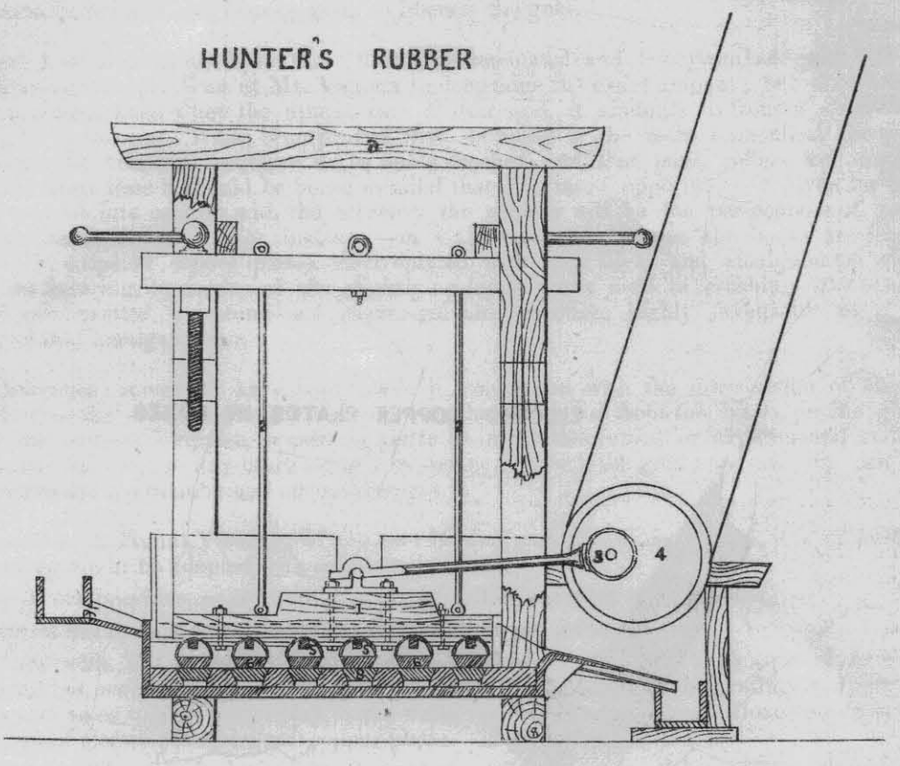


CROSS SECTION

a Shoe.
b Die.
c Boxes.
e Holes plugged with soft wood.
" Screw countersunk in Copper Plate.
f Copper Plate.
g Gratings Frame.
h Line for Gratings.



HUNTER'S RUBBER



CROSS SECTION.

Scale : Half inch to one foot.

Hunter's Rubbers.—These machines receive the above—viz., crushed ore, which are still impregnated with a good percentage of very light or "float gold," from the tables direct from the grinding pans, as already described, but neither steam nor chemicals are used in their manipulation. This Hunter's rubber is rather a complicated machine, combining, like most other American gold-saving appliances, two or three different actions, viz., grinding, amalgamation, and concentration. It has a similar appearance, it will be seen, as the old shaking tables, and its motion is also similar; but in detail it differs materially from the former. From the frame-work *a*, well stayed, depend two bearers (1), by means of four bars of round iron (2, 2), and these are rocked fifty-five times a minute by two eccentrics (3), and pulleys (4), with a stroke from 5 to 7 inches. Six pieces of pine wood (5.5.5.5.5.5.) are bolted to the bearers longitudinally, their tops being round and the bottom square, where they are armed at the bottom with the same number of shoes (6.6.6.6.6.6.), all these being the really movable parts of the machine. In a strong cast-iron box a false bottom is laid by means of alternate strips of wood covered with electro-copper plates and cast-iron dies, in the same longitudinal fashion, so that the shoes rub upon the dies and thereby grind the ores. At the same time the tops of the wooden strips (5) are covered also with electro-copper plates, and as they are immersed, any, in fact nearly all the float gold liberated by the grinding is collected at the apex of each cylindrical copper plate, and the pyrites are also concentrated in this box. This is a very valuable machine, as it collects from 10 to 12 per cent. of gold that would otherwise float away with the blue slimy water, which it is well known is allowed to escape elsewhere.

WILLIAM THOMAS STRUTT,
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the surface for over 120 feet in length, and two shafts, one hundred feet apart, as well as other surface workings, disclose a fine compact body of auriferous quartz, the cap of which is strongly impregnated at the joints with ferro-manganese. The gold-bearing ore itself is of a highly mineralised description, chiefly through the occurrence, in the laminations, of the sulphides of iron, arsenic, and zinc, all of which exhibit, after decomposition, a considerable amount of free gold. This indicates that the gold will be associated at greater depths with non-decomposed sulphurets, rendering the adoption of more than the ordinary means for saving of gold necessary The reef is 2 ft. 6 in. in width, and it produces large massive blocks of quartz; the bearings of same are S. 76° W., having an underlay to the south-west; in places, however, it is nearly vertical. The general appearances of this lode at the surface and at a depth of from 40 to 50 feet in the two shafts, where the gold is also more plentiful, is very encouraging, and nothing is now wanting but a suitable plant of crushing machinery to reimburse the owners for the outlay had and to be incurred, for without a crushing plant on the spot the mines cannot be wrought to advantage or with profit.

Proceeding down the valley to the confluence with the South Esk River, it is noticed that the western ranges are of the same geological structure, and in all probability also auriferous in parts, and they continue to be so to the southern side of that river, where the old Black Boy or Mathinna goldfield is located.

That goldfield, at one time so prosperous, is now all but abandoned; a few alluvial diggers still work and re-work the alluvial deposits which were formerly found so prolific in gold; the numerous quartz reefs in this neighbourhood are quite abandoned, and the steam-winding, pumping, and crushing machinery has been removed elsewhere. This appears to be a very anomalous state of affairs. Here there are numerous gold-bearing quartz veins and lodes which have, in the past, yielded profitable average yields of gold, without a single stamp-head being now available, whilst, but fifteen miles away at Mount Victoria, there are, at a low computation, from 15 to 20 heads hung up for want of quartz to crush, owing chiefly to the want of a proper system in providing, by means of deep adits, &c., large reserves of quartz in the stopes and workings.

In addition to the *known* vein deposits of gold-bearing quartz at Black Boy, it is very probable of other discoveries being made south of Kerrigan's discovery, so that the Mathinna goldfield promises yet to become an important mining centre, whenever the prospectors and miners are enabled to employ suitable crushing machinery at reasonable rates per ton.

It may prove interesting to recall, in this Report, the salient features of some of these gold-bearing reefs, the permanency of which has been, in one instance, proved to a depth of 670 feet from the surface—that being the greatest depth to which payable quartz has been followed in the Colony.

The City of Hobart reef (see Geological Sketch Plan) has reached the extreme depth mentioned, and this lode averaged, for a width of 3 feet, a yield of one ounce of gold per ton. There is a shaft in pretty good repair sunk to that depth, with three compartments, and the bottom cross-cut from this shaft reached the reef at a distance of one hundred feet. This lode, bearing N. 55° W., so far as could be ascertained, was never followed in its course for more than 50 feet each way from the cross-cuts, or for 100 feet altogether, thus indicating that only a single "block" of auriferous stone had been worked, and as no further prospecting had been carried on *beyond* either end of these levels, it is problematical whether or not other "blocks" similar in value exist between the walls of such lode. This has been found to be frequently the case in other quartz-mining districts, and it is certainly worth a thorough trial.

In summarising the above and the following statements it should be borne in mind that a considerable lapse of time has intervened since these mines were being worked for the supply of quartz to the crushing mills, and that since the removal of that machinery this goldfield has undoubtedly retrograded so far as population and yield of gold are concerned.

The North City reef is situated a short distance to the north-east of that of the City of Hobart. It has been tested to a depth of 100 feet, exhibiting an average width of 3 feet, for a yield of 5 dwts. of gold per ton. The bearings of same are very irregular, strongly indicating a junction with the first-mentioned lode at no great distance to the south-west. The East City reef, still farther to the north-east, occurs in soft country rocks, the yield being also about 5 dwts. per ton. These three lodes could be worked very economically from the deep main shaft, as the distances to be driven are not at all great, nor is the country rock too hard for carrying out the work contemplated at too great an expense.

The Champion reef, close by, also averaged 2 feet in width; it carried a coarser kind of gold, at the rate of 7 dwts. per ton.

The same may be said of the Prince of Wales; and quite a number of other reefs were discovered in this neighbourhood as well as to the south-east of Mathinna township, but they could never receive proper attention from the causes already described—viz., want of crushing machinery.

The Eldorado reef appears to be of a promising character. It is about 3 feet in width, and two shafts 100 feet deep each have been sunk in the ground, and an adit has been driven for a length

of 350 feet, but failing to strike the lode at that lower level caused a suspension of operations. It is now stated that if the tunnel in question had been continued for less than another 50 feet the reef would have been met with. There appears to be every inducement to do this, because, with the regular thickness of the reef and an average yield of 2 ozs. of gold per ton, it should turn out a good speculation. The last crushing of nearly 100 tons of quartz from this mine gave the satisfactory yield of 2 ozs. 17 dwts. of gold per ton.

The alluvial gold from this goldfield is of a very pure description, solid, and altogether a very excellent sample of the precious metal.

Passing on towards Fingal, 18 miles distant, it may be observed that in the broad valley of the South Esk River and the adjacent western foothills an extraordinary accumulation of recent fluviatile gravels are exhibited, and that the older alluvial (pleistocene) gold drifts of the Black Boy goldfield gradually dwindle away and become too poor in gold for profitable working on their debouching from the narrower gullies and entering upon the very wide and extensive valley of the South Esk River. (See Plan at A.A.) This is only in accordance with the experiences had at other and much more extensive goldfields, where, as a rule, it has been observed that the gold is distributed through much larger and extensive beds of gravel, rendering the collection of such gold too expensive and tedious to be profitable. As the percentage of the gold in the bulk of the gravel decreases in the corresponding rates with the greater distances at which those deposits occur, from their original matrices, *i.e.*, the quartz reefs, so depends the existence of "deep leads" or "gutters" on the *closer* vicinity of such auriferous quartz lodes. Of the older pliocene drifts—"lower gold drifts"—chiefly composed of waterworn *quartz* pebbles and boulders nothing could be observed, consequently "deep leads" in the strict sense of the words appear not to have been formed in this locality. And those contemporaneous sheets of basalt, which, in deep gold lead districts, mark the epoch and serve as a covering for those valuable deposits, are wanting to complete the evidence in favour of their existence. It is possible, however, that remnants of the "Newer Pliocene" or "Middle Gold Drifts" occur near the pleistocene (alluvial) or upper gold drifts. Judging from the great thickness of these fluviatile beds of gravel, and the great extent of same in this valley, there must have been, in prehistoric times, a stupendous scour periodically, which in all probability interfered with the deposition of gold in payable quantities on the underlying bedrocks.

The Mangana goldfield is located about seven miles north north-west of Fingal township, and for that reason it occupies the most southern extremity of the auriferous belt of country which commences at Waterhouse. Originally the Mangana alluvial gold deposits have been very rich, but now they are very nearly exhausted, and the reefs in that neighbourhood have, in the past and present, had considerable attention. What has been stated of the gravels, &c. occurring in the South Esk valley is the more applicable so much lower down that principal watercourse, especially after receiving the tributaries—viz., the Break o' Day, Fingal, and Mangana creeks—as these have no doubt intensified the scour reported above. This is borne out by the fact that, for instance, the Mangana Creek, opposite the Alpine G. M. Co.'s battery, has a fall of over 400 feet to the South Esk River at Fingal, or at the rate of over 60 feet to the mile.

The Alpine G. M. Co.'s tunnel has been driven for a length of 200 feet S. 72° W. to the lode they are working, which observes a bearing of S. 22° E. The tunnel has been continued for other 225 feet beyond the reef, or 425 feet altogether. The lode averages from three to four feet in thickness, with the quartz strongly mineralised by the usual sulphurets, the yield of gold per ton ranging from half an ounce to over an ounce for such a quantity. A very marked difference was noted in the character of this auriferous quartz as compared with that obtaining farther north on the same belt of country. At Waterhouse, Mount Horror, Mount Victoria, Kerrigan's, and Mathinna the ore is found to be of a very dense description and very hard. Here it is very friable, permitting same to be mined and crushed at considerably less expense. As a matter of fact, it so much resembles the gold-bearing quartz from the deep levels at Bendigo (Sandhurst, Victoria), as to render the distinction quite perplexing. A tunnel has been driven on the boundary of the Buckland and Alpine freehold and leasehold properties, in which the Alpine reef was intersected at 200 feet from its mouth, and same was continued for other 225 feet, or 425 feet altogether. The lode was likewise passed through in an air shaft, whereby over 150 feet of backs were proved to be comeatable at this tunnel level, and as that adit is located 600 feet above the Alpine Co.'s tunnel, in which, however, that lode had not yet been cut, the preliminary workings are of an enduring and promising character. It should be mentioned in this connection that at a distance of 440 feet from the mouth of the Alpine Co.'s tunnel the No. 2 Government diamond drill was employed to bore almost horizontally, in order to ascertain the character of the ground ahead, and if possible to strike other auriferous veins. The bore was successfully, and under great difficulties, owing to the extreme density of the strata, extended to a total distance of 520 feet—the longest borehole (horizontal) in the Australias—without succeeding to strike other reefs, except of proving the extreme end in a more quartziferous country, not auriferous however, and affording very valuable information as to the description of rocks this deep adit will have to be eventually driven through.

The gold-bearing stone at the upper level dips north in its strike, and that "shoot" of stone appears to lengthen on the course of the lode. After examining these matrices in the workings I concluded that they were of a permanent character, and that they should be exploited from deep

adits, when nothing so far as could be seen would prevent these mines from being placed amongst our profitable gold mines. The topographical formation of the country near and at the mines is eminently favourable for the construction of deep tunnels.

A few remarks on the Tullochgorum prospecting area are added to this Report for the purpose of drawing attention to matters connected with gold-mining operations in that locality; should a "deep lead" exist there it will be of very considerable importance to this Colony; also with a view of drawing comparisons from a geological point of view between the lower gold drifts—older pliocene—so extensively worked with such splendid results in Australia and America (California) and those alleged to occur in the South Esk valley. If the deep gravels now brought to light in the cores of the diamond drill are also of that age, then the opinions of well known and prominent geologists who have carefully examined this matter, in reference to their great established commercial value of those older or lower gold drits of the pliocene era, and the unproductiveness or non-payable character of the still older miocene, must be considerably modified.

About a mile below the junction of the Mangana Creek with the South Esk River a very considerable amount of work has been effected in order to prove the existence of a deep lead which is said to exist thereabouts. A number of boreholes were put down by manual labour, and afterwards a main shaft was sunk, equipped with steam-winding and pumping gear, through the gravel to the bedrock; finally the Government No. 2 diamond drill was also engaged for still further testing this ground for gold. Gold has been reported to have been found in the former, but it has also been stated that the drives from the shaft failed to disclose same, and but very little gravel on the bedrock. By means of the diamond drill one bore was sunk to a depth of 253 feet, bottoming on sandstone, interspersed with veins of calcite as underlaying the higher gravel; and preparations were just about completed for the commencement of No. 2 borehole.

The distance of this prospecting area is about five miles from the Mangana and 22 miles from the Black Boy quartz reefs, and, as these constitute presumably the sources of the supposed deep gold deposits here, it should, for instance, be remembered that at Ballarat their deep "gutters" or "leads" become so impoverished from their former so well-known *unparalleled richness* in gold within less than three miles from their auriferous matrices as to have rendered all efforts to obtain profitable or even payable results futile.*

At the goldfields mentioned in the foot-note *quartz* forms the principal and characteristic constituent of their deep gravel deposits or lower gold-drifts, in which it occurs as the base and in the form of "drifts," "pebbles," and small to large boulders, which are frequently cemented together thoroughly by ferruginous matter, *i.e.*, decomposed iron pyrites, at the higher levels or beds, but which, at the deeper bottoms of these gutters or leads, remain in their original state as sulphurets.

The lithological character of the lower Tullochgorum wash or deep gravel deposits, on the other hand, as shown by the cores of the diamond drill, differs very materially from those just now described, as they exhibit in a gritty and, at the bottom, calcareous base rounded *pebbles* only of hard metamorphic schists, some of quartzite and greenstone only.

This latter mode of occurrence differs consequently altogether from the *true* pliocene gravels in the gold-producing countries mentioned, and from those also which have been found here in Tasmania beneath two distinct flows of basalt at Lefroy and the Back Creek, as described in my Reports Nos. 45 and 118 of 1882, and afterwards recorded by the Foreman of the No. 1 diamond drill.

Under these circumstances it would be interesting and probably instructive to wait further developments by means of the diamond drill, as the one core examined would not give sufficient data to form a decisive opinion upon, but at the same time it is quite probable that Mr. A. R. C. Selwyn's—formerly Director of the Geological Survey of Victoria, and now Director-General of the Geological Survey of the Dominion of Canada—opinion† on the *miocene*—older than the pliocene or lower gold drifts—of the Golden River and Moorabool deposits also applies to this deep ground. If I have been correctly informed, there exists here a *false bottom* near the Tullochgorum shaft, which to the east and south-east overlies the still deeper ground, held to be of the miocene era, overlying also at much less a depth a "gutter," the value of which has not been, on the same authority, sufficiently ascertained, nor have the tests of boreholes or workings been of a character to settle this important question definitely.

G. THUREAU, *F.G.S.*

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* Winter's Freehold, Leviathan, City of Ballarat, and other mines; also at Bendigo, Malmsbury, in Victoria, Alta Lead, California, and many other mining districts.

† Notes on the Physical Geography, Geology, and Mineralogy of Victoria, pages 21 to 26, by A. R. C. Selwyn, Director of the Geological Survey of Victoria: Melbourne, September, 1866.

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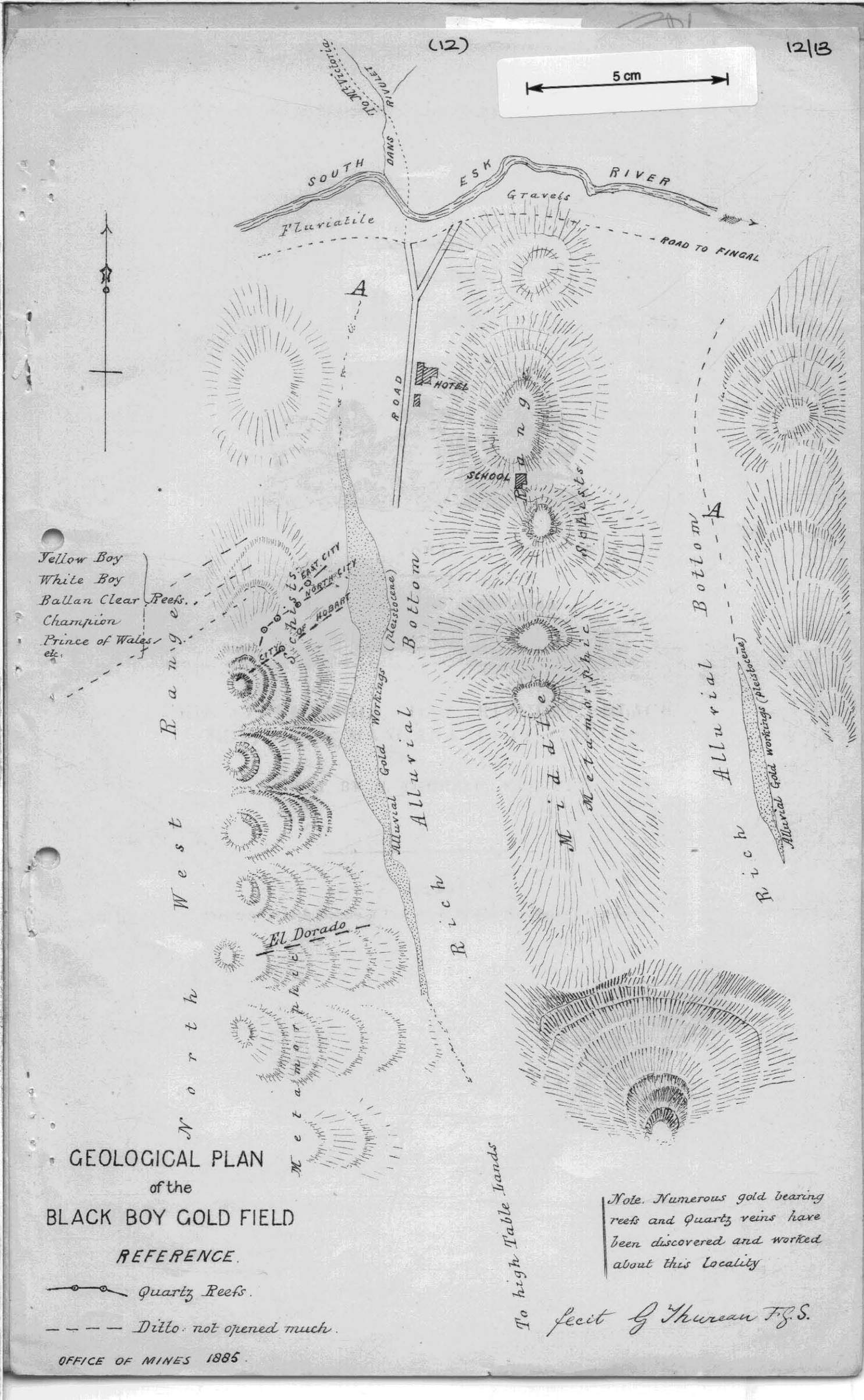

GEOLOGICAL PLAN
of the
BLACK BOY GOLD FIELD

REFERENCE.

Quartz Reefs.

Ditto: not opened much.

OFFICE OF MINES 1885.

Note. Numerous gold bearing reefs and Quartz veins have been discovered and worked about this Locality

fecit G Thureau F.G.S.

GEOLOGICAL SKETCH PLAN

OF

Mt VICTORIA GOLD FIELD

SHOWING ALL THE REEFS OPENED AND THE PRINCIPAL WORKINGS

SCALE TEN CHAINS TO ONE INCH

Dect: G. Thureau F.G.S.,
Decbr: 1884.

REFRENCES

NORTHERN GROUP

1. Gumsucker reef; lower tunnel
2. do. do, upper tunnel
3. No 2 reef
4. No 3 reef
4. No 4 reef
5. Eastern Reef
6. Strahan Reef
7. Mt Victoria United Reef
8. Endeavour Reef
9. Crown Prince reef (outcrop)
10. Crown Prince reef (in adit)
11. Dyke of volcanic rock "Aphanite"

MIDDLE GROUP

Mercury reefs; a, c, No 1 reef at surface and lower level
do do b, No 2 reef
d, Wilson's reef
e, do. do. (main west "leg")
f.f.' Caxton reefs
f' No 1 Tunnel on reef
g. Montana reef and tunnel
h. Mt Victoria reef

SOUTHERN GROUP

I Loane's reef
II Everett's east reef
III Everett's west reef

Shafts thus ●
Reefs do. ⋱ Shaded blue where gold bearing
Tunnels do. ⋀
Volcanic do ▬▬

Note. The reefs occur in Schists – silurian and metamorphic

5 cm

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