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REPORT ON THE NORTH MOUNT VICTORIA GOLD FIELD.

*Government Geologist's Office,
19th January, 1900.*

SIR,

I HAVE the honour to report that, in accordance with your instructions, I visited Alberton on the 26th November, and remained there until the 8th December, examining the North Mount Victoria Goldfield.

The mines are on the northern and western flanks of Mt. Victoria, which rises 3000 feet above the township of Alberton, on the Dorset River, or 4000 feet above sea-level. The numerous auriferous quartz-reefs have been worked intermittently for a long time, at least since 1883. Mr. G. Thureau, a former Government Geologist, reported on the field as far back as 1883 and 1884. Since that time a good deal of work has been done, not always remunerative, however. Still, I believe some £50,000 worth of gold has been won from it, if not more. The short and rather tricky makes of gold-bearing quartz have often proved too much for the limited resources of prospectors; money, too, has not always been wisely expended, and this, in a field where more than ordinary managerial skill is requisite, has contributed to frequent failures, and the consequent disappointment of investors. Owing to this, the field has not been taken in hand by the public to the extent it really deserves; and the only companies which are now working there on a decent scale are the Ringarooma and the Central Ringarooma, both under one mining management. There are other gold properties, to which I shall refer later on, but their position at present is an expectant one. If the premier company go ahead, the outlying claims, most of which have been worked at one time, but are now idle, will have a chance of attracting capital. In this Report I have called attention to these claims, that they may receive their fair share of public notice.

The thickly-timbered country and heavy surface-soil on the mountain sides form impediments to geological explorations, but during my stay I learned enough to enable me to offer the following brief sketch of the geology of the field.

Seven formations are represented, which, in ascending order, are as follows:—

1. Silurian sandstones and slates.
2. A Silurian basaltic lava-sheet interbedded with the slates.
3. Quartz-reefs and elvans proceeding from a granitic source and traversing the slates, &c.
4. Sandstones, grits, and conglomerates of Permo-Carboniferous age (or Devonian?).
5. Intrusive dolerite or diabase of Mesozoic or lower Tertiary age.
6. Tertiary basalt, and auriferous alluvium.
7. Recent gravels of existing rivers and creeks.

Their relations are described in the following explanatory remarks:—

(1.)—*Silurian sandstones and slates.*

These are the strata which, from Waterhouse in the north to Mangana in the south, everywhere enclose auriferous reefs, and form the golden belt of eastern

Tasmania. They are accompanied here by the same succession of beds as is noticeable near Mathinna, further south. Recently, when on Hogan's Track, N.E. of Mathinna, I observed the identical conglomerates and quartz-grits lying on the edges of the sandstones, which I have seen here on the W. flank of Mt. Victoria, on the old track to Black Boy, now Mathinna. The Silurian sandstones and slates for the most part maintain the same general strike as is seen in so many places along the belt, viz.,—N. to N. 20° W. This uniformity denotes their physical connection all along the zone. The dip is mostly S.W., but varies a little according to local anticlines. The angle of dip is high, and the slates are often almost vertical. This position is characteristic of the old slates throughout northern Tasmania, and points to them being segments of large earth-curves, denuded now to nearly straight combings, rather than beds tilted locally by neighbouring disturbing influences. In the zone of oxidation the strata are soft, and of yellowish colour, and are then considered a favourable matrix for makes of highly auriferous quartz. At the New Mercury, both slate and sandstone are indurated sufficiently to be called metamorphic; the sandstone there is dark-coloured, and forms a tough, dense rock detested by miners. On the whole, however, I found quartz-reefs living in the harder descriptions of rock quite as freely as in the softer stone.

(2.)—*Silurian basalt.*

In Silurian times the igneous magma below this area was basic, as evidenced by an old basaltic flow visible in the tunnel of the old Crown Prince Mine, just over the N.E. brow of the Ringarooma Mount. The mine is high up the hill, 800 feet above the level of the Dorset. The volcanic rock is referred to by Mr. Thureau in his 1884 Report. I found it crossing the tunnel at 300 feet from mouth, N.E.-S.W., as a 2-ft. bed, conformable to the slates. The black slate upon which this contemporaneous sheet rests is indurated by the contact. The strata here have a different strike from those on the W. side of the hill, bearing E. of N. instead of W. The presence of this bed of basic lava suggests that in lower Silurian times in this part of the Island, whenever we meet with eruptive rock of the age of the slates, we may expect it to be of a basaltic or gabbroid nature. The later granites do not appear until in the course of time the underlying magma had grown acidic.

(3.)—*Quartz-reefs and elvans.*

In the long tunnel of the Ringarooma Mine we have an elvan course or dyke 22 feet wide, traversing the slates. It appears to run parallel with the bedding of the slate, but a small flucan on each side indicates its intrusive nature. It has a light grey to greenish compact felsitic groundmass, sprinkled with blebs of quartz and crystals of arsenopyrite, with occasional glistening crystals of felspar. It closely resembles in appearance many Cornish elvans. It has proceeded from the new

granitoid magma which had then supervened. Below this entire auriferous belt from N. to S. there doubtless lies, at an unknown depth, a substratum of granite. When the magma consolidated as granite in upper Silurian or more probably Devonian times, invading elvan courses were protruded, as apophyses, and the sedimentary rocks, already strained by earth movements, must have been further fissured, and the excess of silica deposited as quartz reef. At the same time I imagine the gold to have been precipitated from solution. Whatever its origin may have been, its existence in the reefs of quartz dates from the age of the reefs. This does not, however, exclude a possible enrichment of the upper parts of reefs by a dissolution and re-precipitation of some of the gold. The assumption of some such action seems almost necessary, in order to account for the very general patchy richness of the gold-bearing quartz near the present surface, and its falling off with increasing depth. On the other hand, the depths attained on this field are so trivial that it would be wrong to draw conclusions adverse to deeper work. As any elvans are presumably geologically contemporaneous with the reefs, they are not likely to fault the latter; and, as a matter of fact, no extensive faults have been observed on the field. The reefs themselves do not occupy fault fissures, and rarely show two defined walls; usually one of the walls is ragged. A few are supposed to be persistent for considerable distances, as makes of quartz are traced on their line at intervals; but without careful survey it is impossible to say whether such makes belong to one and the same continuous fissure. My impression is that a continuity will often be found to exist. The peculiarity of this field is that the quartz usually makes for a certain distance, when it thins out, and a fresh make is afterwards found ahead, often not exactly in the line of the first, but parallel to it, the miner being led over the intervening space by a mere thread or possibly strings of quartz running through the country. In this way a series of comparatively short lenticular splices of quartz occurs, to follow which requires the exercise of sound judgment on the part of the mining manager. Breastheads or faces of sandstone often appear to cut off the run of quartz abruptly, and the miners are apt to think that a disturbance has occurred and shifted the reef. I witnessed this phenomenon so often that I could not neglect its consideration, and in the majority of cases (without denying occasional minor faulting) I was led to the conclusion that the heads and faces were there prior to the deposition of the quartz which abuts against them. The reef channels have been formed by repeated short and irregular fractures, which have often failed to penetrate these heads. This is shown strikingly when a quartz-vein is suddenly arrested by a head and then splits up, taking a line of easy passage right and left along the face. The heads are interesting to students of mining geology, and would repay careful study. I am inclined to believe that for the most part they do not represent earth movements at all, but original changes in deposition and bedding, say, from regular laminations to amorphous, massive deposits, and *vice versa*.

The irregularity of the reef channels, and the frequent absence of any defined channel whatever, must necessarily invest mining here with some difficulty, and add to its expense. Fortunately, the country as a rule is easy working, and shoots of quartz are met with which are rich in gold, and pay for a good deal of dead-work. The Ringarooma Company afford a prominent instance. One cake of gold paid for driving their long tunnel (1100 ft.), another is paying for the purchase and

installation of their electric pumping and winding plant. One ounce per ton is a common bulk yield of auriferous shoots at shallow depths, and 2-oz. and 3-oz. stone is on record. Some phenomenally rich quartz was shown to me from No. 3 reef in the Ringarooma Mine, and very rich stone from the same Company's mine at the New River, as well as from the Central Ringarooma. From the nuggets found in Krushka's alluvial workings on the New River, Mr. Wm. Brown, the Ringarooma Company's General Manager, believes there is a rich reef on that part of the field, which is still to be discovered.

One of the conclusions which may be hazarded from a study of the whole field is, that these somewhat irregular quartz-channels may be expected to make into more constant solid reefs when a greater depth is attained.

(4.)—*Conglomerates and grits.*

These are seen in a horizontal position on the old Black Boy track, as mentioned above, about 1500 feet above Alberton. They lie unconformably on the Silurian slates and sandstones, and imply an unrecorded interval of geological time. The grits pass into coarse sandstones, and the conglomerates have a gritty, sandy matrix, enclosing quartz-pebbles, often of considerable size. These rocks require further study before definitely assigning them to the Devonian or Permo-Carboniferous systems; but, from their physical characters, I class them provisionally in the latter. They evidently mark a long line of beach north and south.

(5.)—*Dolerite (diabase).*

This is the igneous rock known in different parts of the Island under the names of trap, greenstone, bluestone, ironstone, &c. It forms the summit of Mt. Victoria, but the boundary line between it and the conglomerates lower down the flanks is concealed by surface-soil and by its own detritus, derived from the higher slope of the mountain; I therefore could not see whether there is any tilting at this junction, or what is the immediate effect of contact. The dolerite descends to the level of the Black Boy Track, 1500 feet below the summit of the mountain. About 500 or 600 feet above the track are what are called "the plains," a horizontal boulder-strewn plateau, from which rise the serrated and columnar crests of Mts. Victoria and Albert, 800 to 900 feet high. On the plain lie fallen columns of the same rock, and it is evident that the plateau is the base of a former extension of the columnar pile which now crowns the mountain. It is a much-debated question whether this dolerite, or diabase, as it is more often, though less correctly, called, which crowns so many of our mountains in Tasmania (Wellington, Arthur, Barrow, Saddleback, Nicholas, Ben Lomond, Dundas), and is so prevalent on the Tiers, forms the remains of a lava flow, merely capping these heights, or whether it is intrusive. In the latter case it either occupies the central parts of these mountains, or was an intrusive sheet (sill) between strata, the upper members of which have since been denuded. The nature of its structure precludes the lava theory, for it is undeniably that of an intrusive rock; but whether it formed a sill, or whether it intruded into the overlying sedimentary rocks *en masse*, can only be decided by investigation in the field. I refer at foot to recent papers on this rock*; the points raised are still

* *Igneous Rocks of Tasmania: Twelvetees and Petterd, 1898. (Tr. A.I.M.E., pp. 12-15.) Report of Secretary for Mines, 1898-9. Mesozoic Dolerite and Diabase in Tasmania: Twelvetees and Petterd. Igneous Caps of the Tasmanian Tiers: R. M. Johnston (Tr. Roy. Soc. Tas., 1899). Microscop. Studies of Igneous Rocks (Proc. Roy. Soc. Tas., 1896).*

unsettled, and any contribution of facts by independent investigators bearing on the subject will be received and duly acknowledged by this office. The great thickness of the diabase here (fully 1500 feet) is strongly adverse to the sill theory, especially when we consider that it may originally have been much thicker than at present. The section afforded by Mt. Victoria is of special interest in this connection. It is significant that the same igneous rock crops out in the Dorset valley, 3000 feet below the summit, and 1500 feet below its lowest exposure on the upper slopes of the mountain. Crossing the Dorset from Ringarooma, and turning S. along the road to Alberton, the diabase is seen descending towards the river, and forming the low spur which runs N.W. down from Mt. Victoria. Here, too, the contact with the sandstones is obscured, and going up the hill S.E., the rock soon sinks below the slates and sandstones which form the divide between the Dorset and the New River property of the Ringarooma Company. This is the only patch known in the district, and its occurrence here, so far below the upper exposure, favours the supposition that it is a protrusion from the main mass.

The acidic reservoir below this area had by that time plainly grown basic again; the magma recovered its basaltic or gabbroid nature; and, as is shown by the latest igneous flow on the road to the New River, where nodules of basalt are seen in the fields, it retained its basicity to later Tertiary times.

The intrusion of this doleritic rock into the Silurian sedimentary beds must have shaken the whole series considerably. I attribute to this cause the repeated small faults met with in the New River mines, especially in the Central Ringarooma. No violent displacements of the reefs appear to have taken place, but numerous minor heaves have given a little trouble in mining. Although the diabase in the spur mentioned above trends in the direction of those mines, it nowhere appears in their vicinity, and the small faultings are very likely to be the result of concussion from intrusions at some little distance.

On the theory which I have here suggested, the diabase of the lower spur is connected in depth with the central eruptive rock of Mount Victoria. It has welled up through the underlying granite, and would be followed down to any conceivable depth. I should think, however, it is not at all likely to interfere with mining, for it seems to dip under the sedimentary rocks on the Black Boy track at a very high angle. Still, its presence anywhere in the field would not be surprising.

(6.) (7).—*Tertiary and recent Deposits.*

I have referred to the Tertiary basalt on the New River road. This was most likely formerly continuous with the sheet on the west side of the River Dorset. I did not trace its boundaries, as the rock has no bearing upon the quartz mines of Mount Victoria. In the New River basin is auriferous alluvium, which may have been at one time protected by a basaltic covering, as well as other gravels and washdirt belonging to a more recent period. This ground is sometimes fairly deep. That worked by Mr. Krushka is from 15 to 20 ft. and upwards; and there is ground which may be deeper. The Mount Victoria reefs must have shed a good deal of gold in past times. Why more alluvial gold is not found is probably due to the large amount of scouring during the long period of elevation in later Tertiary and recent times.

Ringarooma Mine.

This is owned and being worked by the Ringarooma Gold Mining Company, Limited, on 53 acres, above the Dorset River. The sections are 151, 152, 814, 890, 904-93G, each 10 acres, and 112-93G, 3 acres, the site of battery. The company has been in active work since December, 1894. The present manager, Mr. William Brown, took charge in March, 1896, since when, without taxing the shareholders, the mine has paid for its own development, the erection of its battery and buildings, the purchase and installation of electric pumping and winding plant, the purchase and development of the New River freehold, 317 acres; the purchase of working plant, manager's house, the old Victoria plant, tailings and leases, and the Bright Star pumping plant (now being used.)

The battery consists of 10 heads, with foundations and framing-up for 15 heads. It is driven by a 38-ft. water-wheel, 25 h.p., supplemented by a 25 h.p. engine to supply deficiency of power when the water falls off in summer. At present the engine is being used for the electric plant. The steam is generated in a 100 h.p. boiler. Framework is now ready to receive a second engine of 50 h.p. The stamps weigh 7 cwt. each, mortars, the ordinary style of boxes, tables 10 feet long, covered with electro silver-plated copper. For this plant one of the new Wilfley's ore concentrators is now on the way out. The present concentrators are Alve's patent wire cloth ones; these will be taken up, the Wilfley put in their place, and the Alve's then placed at the end of the Wilfley. The Wilfley is in principle a riffled table with a differential movement, the motion being quick at the outer end of its stroke, and slower at the inner end. This motion helps to separate the minerals, and the more distinct the separation, the easier it is to adjust the table. The tables have a good reputation for catching float-gold and for making clean concentrates.

A fine electric plant for pumping and winding, and for lighting battery and mine, has been started, and is just approaching completion. A telephone wire connects the battery with the mine, half a mile distant. The dynamo is 500 volts, and works up to 70 h.p., running 500 revolutions per minute. The motor for the winding gear is 25 h.p., and the pump motor is 20 h.p. The pump has 6" working valves and 7" pipes. Pithead pulleys, 3 feet. Forty lamps in mine light tunnel and drive to the main shaft and chamber. At the time of my visit 37 hands were employed at the Ringarooma Mine. This mine is only two miles distant from the New River Mine, on the other side of the hill in a direct line, and an aerial tramway is being thought of to bring over the quartz from that mine to the Ringarooma battery, instead of crushing it, as now, at the New River mill. The company have raised from this mine 2435 tons quartz, which on crushing yielded 3174 ozs. retorted gold, realising £3 18s. 0d. per oz. This return averages 1 oz. 6 dwts. gold per ton of quartz. The first four crushings yielded at the rate of 2 ozs. 11 dwts. 14 grs., 2 ozs. 0 dwts. 20 grs., 2 ozs. 4 dwts. 13 grs., and 2 ozs. 8 dwts. 11 grs. per ton respectively.

The mine-works consist of adit-levels, with their connecting rises and stopes, in addition to which a main winze, or underlay shaft, is being sunk to operate upon the reef below the present deepest workings. Three tunnels, the Premier, Rosalind, and the Long Tunnel, have been driven E. into the mountain to intersect reefs exposed on the hillside, and running roughly parallel with the slope of the hill. The main reefs are the Gumsucker

and Rosalind (these two are really one), and the Premier. The former is the most westerly, and the out-crop of the latter is visible 240 ft. further up the hill to the E., in which distance a vertical height of 80 ft. is gained. The horizontal surface-distance between the two is 225 ft. The Gumsucker dips 75° to the E., while the Premier dips from 78° to 80° to the W.* The Gumsucker reef has been exposed in the mine to a depth of 275 feet on the underlie, and, with the Premier, has been cut in all three levels; in the upper, or Premier level, at 80 ft. from surface on the underlie; in the Rosalind level, at 150 ft.; and, in the main tunnel, at 300 ft. From the angles of dip at their lowest observed exposures I judge that the main shaft now being sunk will bottom on their junctions in another 150 or 160 ft. It is apparent that this shaft has been admirably planned, for it will give access to the most promising physical feature of the mine, the junction of the two master reefs, where experience teaches that an enrichment of stone is very likely to occur.

Long Tunnel.

A main tunnel has been driven E. 1134 ft., and has intersected both reefs in depth, as mentioned above, as well as a third one (No. 3.) The true dip of the latter reef is not yet ascertained. At 1010 ft. in, N. and S. drives were opened on the reef. The tunnel at that point intersected the Gumsucker channel, carrying a few inches of quartz, but so unlike the N. Rosalind and Gumsucker stone that it was continued 40 ft. E. before returning and driving N. and S. The tunnel was afterwards advanced further 80 ft. to the other reefs. The country rock crosses this tunnel, bearing N. 20° W.—S. 20° E. The first 380 ft. are in sandstone, then a change to slate occurs. About a couple of chains in a 3-ft. channel is cut through, containing quartz charged with iron sulphide, but poor in gold. This might very well be driven upon when funds are available. At 10 chains in, a dyke of light grey and greenish flinty quartz-porphry (elvan) crosses the level. It runs apparently, most likely only apparently, with the bedding, is 22 ft. wide where cut across, and has a dig on each side. The base is very compact, and is sprinkled with blebs of quartz, crystals of arsenopyrite, and an occasional crystal of felspar. Detailed description of same will be furnished in my annual petrographical report.

North drive from this tunnel has been driven 80 feet. In the first part of this drive I noticed that the hanging-wall carried stone a couple of inches to a foot wide. Here, as elsewhere through the mine, the foot-wall is ragged, ill-defined, and can hardly be described as a wall at all. A few yards N. the vein leaves the reef-channel and runs away E. into the slate, thinning out to a mere streak. The channel was followed a few feet further N., and a little gold-bearing stone was found, not more than 2 inches wide; but in the stopes above it attained as much as 2 ft. width. Behind the end is the Winsome winze, which, worked from above, gave a yield of 3 ozs. per ton from its first crushing. The channel in the end of this drive is filled with slate, or sandstone and slate, and has fair walls, 3 ft. 6 in. apart. The dip is steep, and has here changed to the W. This end, usually called the N. Rosalind end, is the extreme N. end of the Gumsucker channel. Payable stone came down the Winsome winze to within 30 ft. of this level,

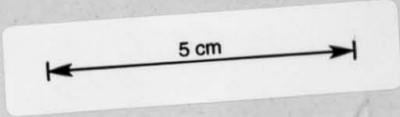
* In Australasia the terms "dip" and "underlie" are often used as if they were completely synonymous, which they are not. The one is the complement of the other, the angle of dip being the inclination measured from the horizontal, the underlie, that from the vertical.

when it pinched and dwindled to a length of only 2 ft., and gradually died away to what is seen in the back of level. Just behind the end is a crooked drive going off to the W., and brought up by a fault which displaced a parallel channel further W. In this end a vein of quartz leaves the foot-wall and passes over to the hanging-wall. The stone is barren, carrying a little pyrites. Possibly it is the same as that just visible in the end of N. drive. Massive sandstone on each side; channel, slate or sandstone.

South drive has been driven S. and S.E. for a distance of 245 ft. The first 40 ft. were on stone 3 in. lying against the hanging-wall. This was worked down 12 ft. below sole of level, and gave a return of 3 ozs. gold per ton. Here there is a fault which has displaced the reef to the E.; and, from this fault northwards, the reef is called North Rosalind. There is a small vein to the E., outside the channel, carrying gold. The eastward heave is $4\frac{1}{2}$ ft. In the Rosalind adit, 130 ft. above this, the heave is 12 ft.; but in the bottom of the stope, 12 ft. below this drive, the fault was hardly noticeable. The stope, which extends southwards for 100 ft. in length, to a depth of 12 ft. below level, has proved this ground. It carried a foot of stone of fair quality. According to Mr. Brown's Report, the north end of this shoot* was very good; the south end also good; the middle payable, though bunchy. In the middle of the shoot, the main winze or underlay shaft, $12' \times 4'$ in the clear, is being sunk, and has now reached a depth of 65 ft. It is intended to open out at 58 ft., leaving 10 ft. or 12 ft. for sump. At the mouth of shaft a large chamber has been excavated, 40 ft. long \times 18 ft. wide, and 12 ft. high. It is electrically lighted with six 16-candle power lamps; and, when I was there, an electric winding-motor was being used temporarily for pumping, pending the fixing of a new pumping-motor, just arrived. The water is giving no particular trouble; about 500 galls. per hour are being raised; and there is power enough for 750 gals. I noticed that Mr. Brown had introduced a device of lining the pulleys with blackwood, to save the rope. The reef in the bottom of shaft was 4 ft. wide in S. end, 2 ft. in N. end, and 5 ft. in centre. It showed 2 ft. 6-in. stone at the S. end, 4-in. stone at N. end on hanging-wall.

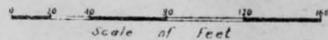
Returning to the S. drive, a few feet S. of shaft, the gold-shoot terminates. The dip of the reef then changes to the W. A buck-reef goes off on the E. side in slate country, 40 ft. to the South Rosalind. A prospecting crosscut has been driven here 27 ft. to cut the No. 3 channel, but without any result. The drive was then continued S.E. another 80 ft., on what is called the South Rosalind reef. The stone is irregular, but highly payable. There is stoped ground above here right through to surface. Thirty feet above there was a shoot of very coarse gold, 12 ft. in length, shortening as it went up, and lengthening going down. The drive to be opened out from the main shaft will come right under this, and, in all probability, will lay open a very valuable block of ground. In this drive the walls continually form elbows, which give the drive a crooked course. The manager says he has noticed that on the apex or elbow of the wall, when he is on the run of gold, he always finds the stone poor and thin. but, after turning the angle, the stone grows richer. He further remarks

* The word is often spelt "chute" by mining engineers, but the English form of spelling is followed by the officers of the N.S. Wales and Victorian Geological Surveys, the American (U.S.) Geological Survey, Professor Louis in Phillips' Ore Deposits, and others. Mr. R. L. Jack doubts its correctness, and prefers "chute."

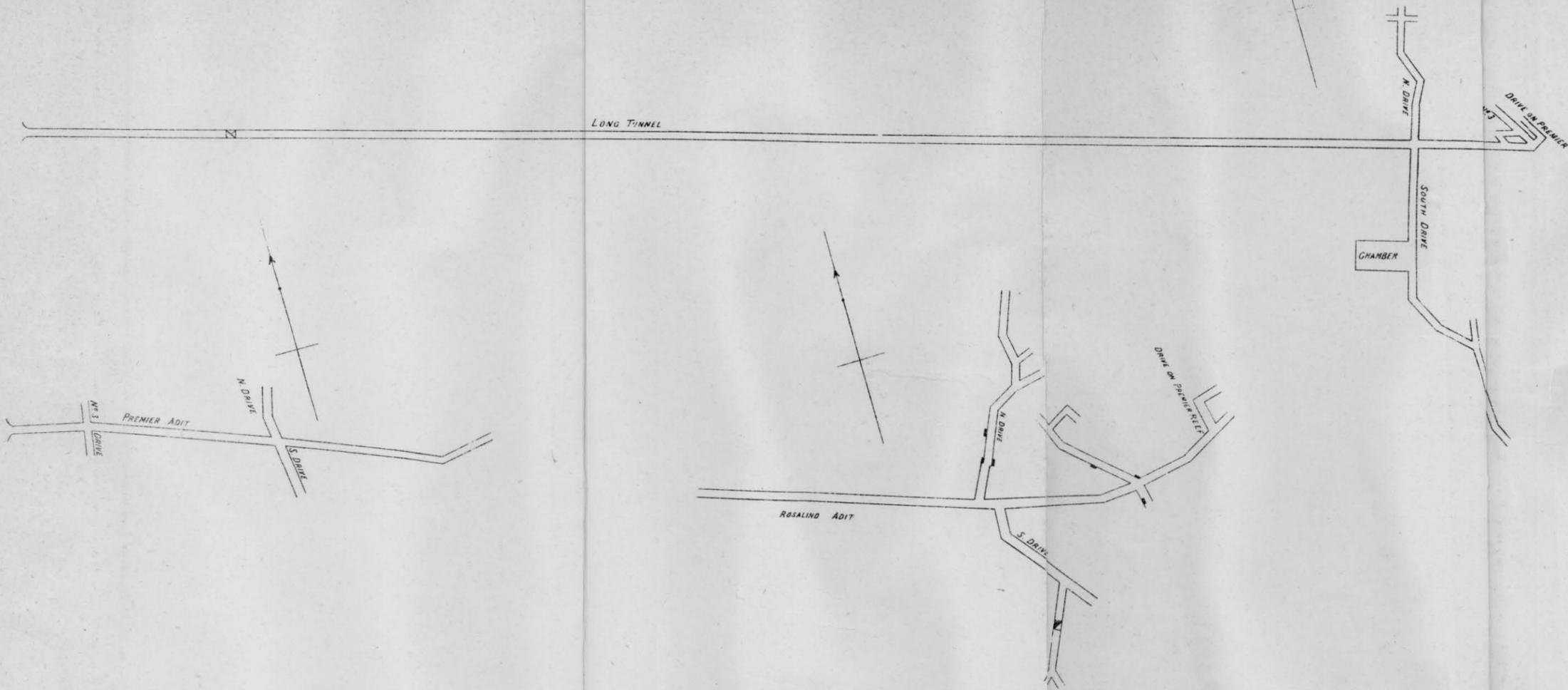


RINGAROOMA MINE

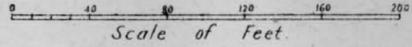
SHOWING TUNNEL AND DRIVES



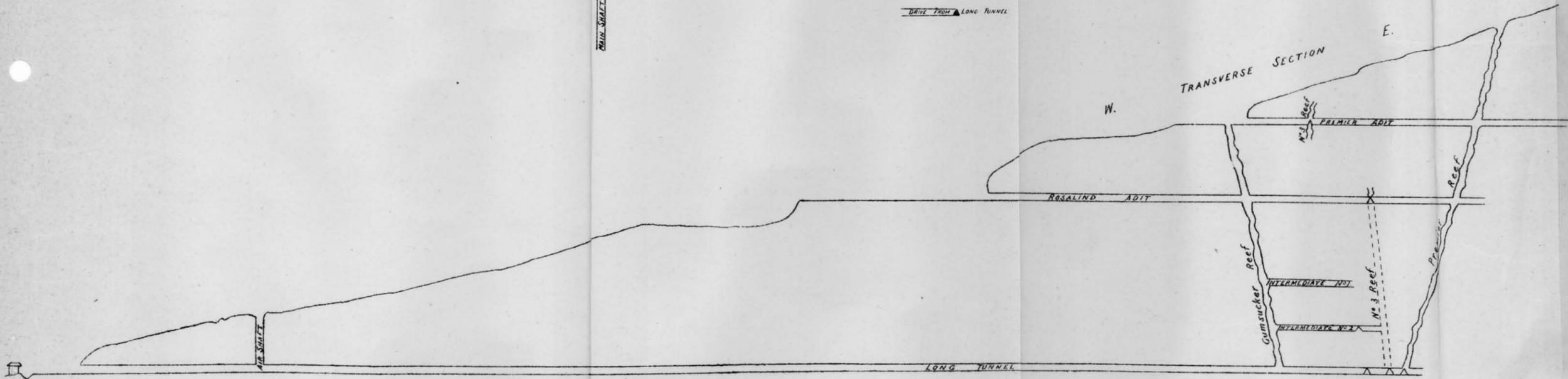
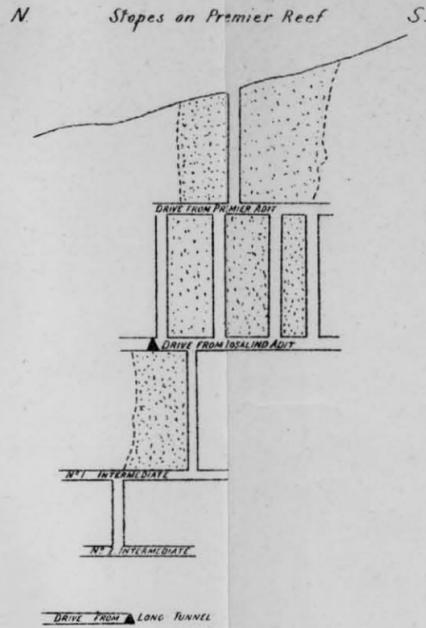
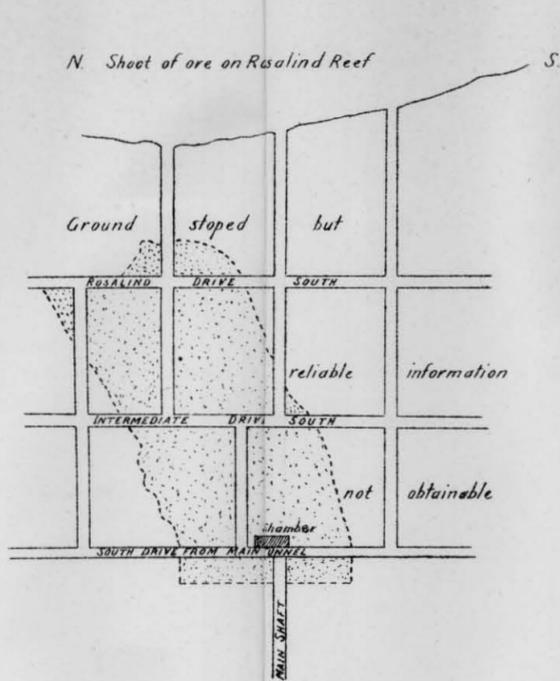
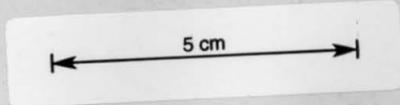
W. H. Twelvrees
Government Geologist



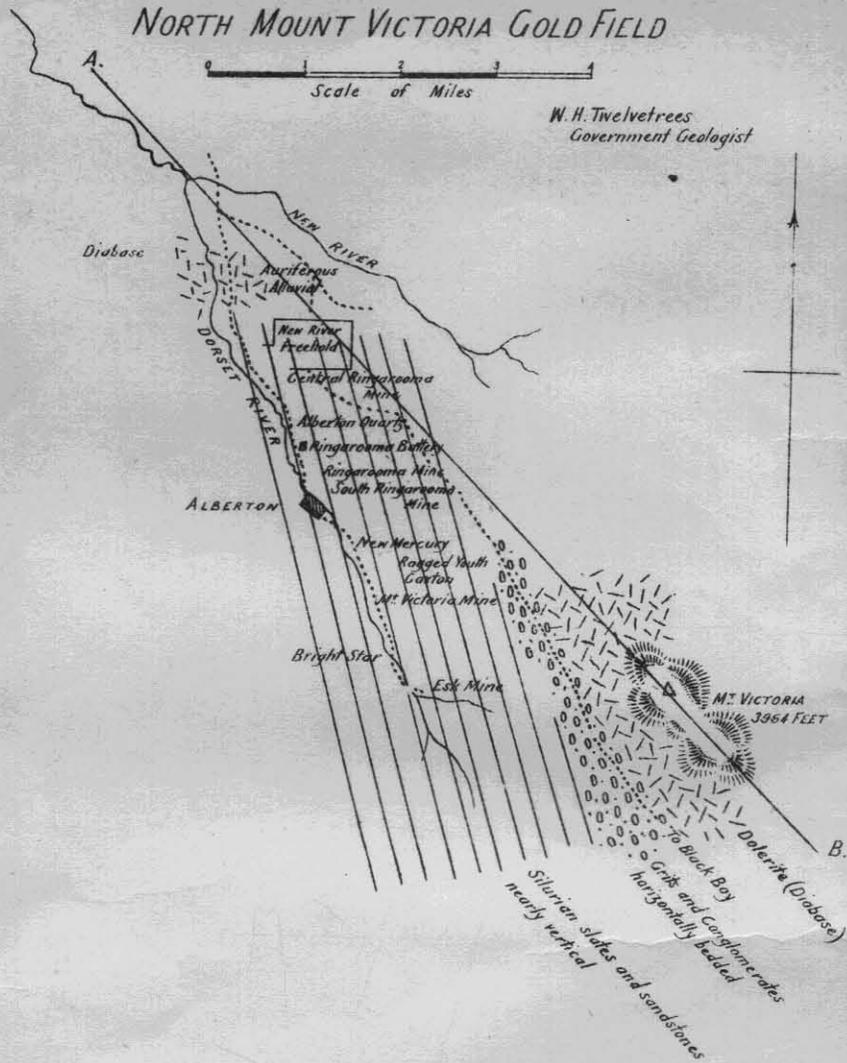
RINGAROOMA MINE



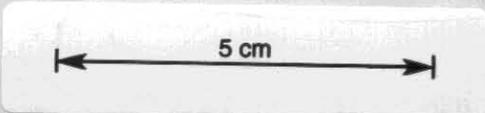
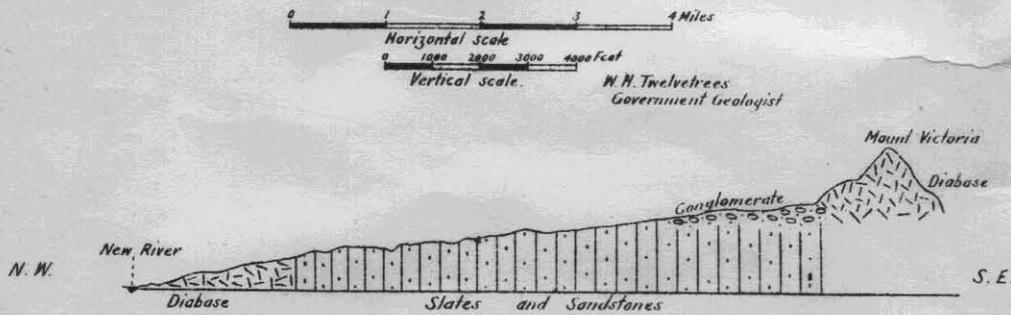
W. H. Twelvrees
Government Geologist



GEOLOGICAL SKETCH MAP
OF THE
NORTH MOUNT VICTORIA GOLD FIELD



NORTH MOUNT VICTORIA GOLD FIELD
Section on line A—B



that all through the mine, whenever the dip of the reef becomes steeper, she gets poorer, and if it changes to the W., the reef grows absolutely poor. The last 16 ft. of this drive was in barren stone, and then the level was stopped. This was nearly a year ago. The underlay in the end has gone back again to E. I could not recognise any true channel, still, in the 3-ft. face there is about 7 in. of barren bunched stone. One of the first things in a proper programme for developing the mine would be the resumption of this drive. It is a pity that financial considerations made it necessary to stop it. As a pioneer drive it will have to be continued, for both it and the level below from shaft must be carried on together. The future programme must also include the driving of crosscuts E. and W., just south of the main winze, where a barren vein has crossed the level. The ground there evidently needs exploring. Whether the southern end of the reef has been violently displaced from the northern part, and the ground between is barren or not, can only be satisfactorily explained by work from the new shaft. The stone upon which the shaft is being sunk may possibly be found to extend beneath this ground; if it does not, then crosscutting will prove it, and I should not be surprised if such work disclosed a main reef-channel, for the South Rosalind drive certainly does not show the appearance of being on a proper reef, although, as the manager says, the absence of walls ought not to be allowed to weigh much, for the same feature recurs all through the mine. At any rate, crosscutting ought to settle the point, and would intersect the Premier and No. 3 reefs as well. This is the most important part of the mine. The shoot above the southern portion of the drive indicates a disposition to increase in length as it goes down, and if it can be connected with the 100-ft. shoot near the main winze, the outlook here will be rosy.

Coming back now to the main tunnel, it is continued another 100 ft. into the hill, when it intersects the Premier reef at a depth on the underlie of 300 ft. from surface. This reef underlies W. towards the Gumsucker. At its intersection the reef-channel is about 3 ft. wide, and is somewhat split up, showing a foot of stone, intermixed with slate, and a nice dig on the E. side. The quartz here is on the footwall, shown in a short drive N.W. The end is in curly sandstone, with quartz veins; the dig is still here, and 3 in. of stone lies on the footwall. Just south of the drive, on the Premier reef, there is a drive N.W. on what is believed to be the No. 3 reef, which has an E. underlie. Above this was good ground, payable all the way down to within about 30 ft., when it started to run poor and bunched. No. 3 seems to run against the Premier wall, and then go N. and S. The stone extends 3 ft., wall to wall, but is poor, only just gold-bearing. This end is 27 ft. N. of the end of the Premier drive, and that reef ought to come in here. The stopes above are said to have measured from 10 to 30 ft. of 3-ft. stone, cutting out every now and then, but, taking good, bad, and indifferent, averaging 1 oz. gold per ton. The manager tells me that where the stone was widest it was the richest. The No. 3 has every appearance of junctioning at this spot with the Premier reef, and a comprehensive plan of future development would include the exploration of the united reefs in depth. A short crosscut from the bottom of the main shaft will intersect them. The main tunnel should also go ahead into the hill, with a view of cutting any parallel reefs. Its continuation for about 400 ft., more or less, would bring it under a reef higher up the hill, known as No. 5 reef, which it would

intersect at a depth of about 450 ft. This reef is an old discovery, which is said to have yielded good stone at one time. A couple of shafts have been sunk on it 60 or 70 feet. As things are at present, it is quite impossible to say which way the reef runs, or whether there is any reef-channel at all: but it looks as if it were parallel to the Premier, with a spur running W.

Intermediate Levels 1 and 2.—Two intermediate levels have been driven on the Gumsucker and Rosalind reef, between the Long Tunnel drives and Rosalind drives. No. 1 is 70 feet below the Rosalind adit on the underlie, and No. 2, 110 feet. The latter is more or less a repetition of No. 1, and I did not examine it, confining my inspection to No. 1. About five yards S. of the winze from the N. drive from Rosalind adit, the N. Rosalind reef has been driven upon S., and stoped out up to Rosalind level. There was very good stone in these stopes, 18 inches wide. A few feet further south, with hardly a break, in fact, merely an elbow, the Rosalind reef runs into the Gumsucker. Going south, both the channel and the stone appear to die out; further south again, black slate and quartz are seen; what may be called the wall (though true walls are absent), then gets a W. underlie. A little barren quartz in the country is all there is to guide one. The South Rosalind reef here runs N., and there is very probably stone lying between it and the Gumsucker 40 to 45 ft. apart. In the S., or rather S.E. end of the drive, the slate country is running with the level, and nothing is seen in the face beyond a slaty seam, a few inches wide, on the W. side. Work seems to have been stopped in this end about a year ago, as there was nothing to lead them on in the driving. Above this level everything has been stoped out right through to surface, and underfoot to the lower level. I could not help noticing here, as elsewhere in this mine, that a good deal of judgment is required in driving, and it seems to have been fully exercised. The quartz has a habit of running away spur-like outside the channel. For two or three feet these spurs are often very good in gold, but do not persist vertically for any distance, up or down.

Returning now to the N. drive on the Rosalind-Gumsucker reef, the vein, 2 inches wide, crosses from the E. to the W. wall. Going northwards, dabs of quartz occur here and there, but nothing payable. Still further N. is a patch of stone in the middle of the drive, and then the wall breaks, and slate comes in. Near the N. end of the drive is the Winsome winze. There was a horseshoe body of rich stone at this end, and the same shape was observed in the stope above. I got to within 30 feet of the end of the drive, which was blocked with mullock. The stone behind the block was reported to have returned 1 oz. to the ton. A barren reef is said to cross the level. Whenever such reefs are met with underground, they are worth attention. Going back to the winze, a crosscut, No. 3, has been driven E. A few feet in a small vein was cut, showing gold. It was followed for some feet with no results. The same vein was also cut in a lower crosscut, between this and the bottom level. On the footwall of No. 3 reef, good stone came down from the level above to within a few feet of this drive. The reef has been driven upon here south for 30 feet, but it runs with the country, and has not proved to be of any value. It was not seen in the crosscut, but flat leaders are common. Further east is a blow of stone, and in driving N., 30 tons of quartz were taken out in the drive; 25 tons of this were crushed, and yielded 25 ozs. gold, thus paying for the crosscut and everything connected with it. This is the

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hanging-wall of No. 3 ; the other is called the foot-wall reef. The reef here abuts on a cross-wall, and spreads out right and left. The blow, when risen on and stoped out to 30 feet, ran out to the apex of a cone, but no trial was made to see whether the stone would make again. Another big blow, 4 ft. wide, comes into the W. with good gold ; there is only a foot of slate between them ; west of the blow is the footwall. Above this the hanging-wall took the gold, and the foot-wall ran barren. Further on, a quartz-stringer, barren, runs with the country. Here are crosscuts : W., 12 feet, found nothing ; E., 22 feet, only siliceous seams cut.

Rosalind Adit.

This has been driven into the hill 400 feet, and is 142 feet above the bottom tunnel. It intersects all three reefs in its course, Gumsucker, No. 3, and Premier.

At 205 feet in a drive goes north, cutting the Winsome, from which winze 24 tons of stone were got, yielding 72 ozs. gold. The winze is now used as a pass for the Premier stone. A few feet further on in the adit there is a short drive N. on the Gumsucker reef, which is brought up by a break. It is, however, picked up again in the Rosalind N. drive 14 feet to the W. At 220 feet the Rosalind drive S. leaves the adit on the course of the Gumsucker reef. Here it is above the centre of a good shoot of stone, going down a few feet N. of the main shaft. This is the S. end of the shoot, which is 50 feet long, and extending in length downwards towards the S. The N. end of it drops vertically. At the S. end of the stone there is no reef-channel or veinstone to be seen ; only sandstone in the roof and pure slate in the face. From this point the drive goes through barren country, leaving the Gumsucker, and continuing till the South Rosalind is cut.

In the adit a reef between the Gumsucker and No. 3 was intersected, driven on a few feet N., and risen on a little in the back of level. At 321 feet in, No. 3 reef is cut and driven upon N. and S. The S. drive is only 23 ft. in length, and is unimportant. The end is in slate, and no stone is visible ; but there is an old winze sunk in the level to a depth of 30 feet, which is said to have given stone worth 8 or 9 dwts. The drive on the N. side of the tunnel goes 76 feet in a N.W. direction. It carried a small reef with 4" to 18" good average stone lying on footwall. The ground above is all stoped out to above the Premier level, as well as underfoot. Thin, flat, and other leaders of quartz are seen running with the country, and the end breaks into the Winsome drive.

Proceeding to the end of adit, we come against the Premier reef, which has come down 150 feet from surface. The reef is 4 feet wide, intermixed with slate. A drive N. goes 25 ft. alongside the reef, which is then tapped. It has only been broken into 2 ft. 6 in., but not cut right through. I imagine that the quantity of slate found in it discouraged further work. Quartz veins, 1", run through the slate-matter. Nothing has been done on the reef at this spot during the present company's time, and it does not look at all promising. But there was gold above, and it is possible for it to make again below. It certainly is a little better in the long tunnel below, where it has a better channel, containing more stone. This promises better for its intersection by a crosscut from a lower drive from the main shaft. Again, though in the Rosalind adit it has no wall of any kind, it has one in the long tunnel.

Premier Adit.

This is the upper tunnel, and has been driven into the hill 352 feet to intersect the Premier reef at a depth of 80 feet from grass. At 50 feet in, the level cut the No. 3 reef, which had never been seen at surface, although the latter is not more than 25 feet above the back of the adit. This is an object lesson in underground exploration, and shows how easy it is to miss valuable reefs. The No. 3 reef was never suspected to exist, has been worked all the way down to its junction in the bottom level, 200 feet, and has proved highly payable throughout, excepting the last 30 feet, which was poorer. The stone up here was not more than 12" to 15", but widened going down. Short N. and S. drives, 15 feet and 10 feet respectively, show 6 inches of stone in N. end, and there is estimated to be about 15 tons in the S. end.

One hundred and forty feet further in the Premier reef is cut, and the adit continued 160 feet beyond. The reef has been driven upon N. and S. The north drive, 39 feet, shows a 10-ft. channel with about a foot of confused lode showing in the face. The stone has been poor and patchy. The stope over the back, where the channel was 8 feet, had 5 feet of stone of low grade, but in this part of the mine six or seven dwts. will leave a profit. The south drive, 46 feet, is in a 6-ft. channel of dark sandstone, with a wild cat running across it. The lode is about 2 feet wide, and consists of makes of quartz cutting out and making again in splices. The stone is on the footwall. The stope over the back of level was in 4 feet of low-grade stone.

The bearing of the Premier reef varies at different horizons. In the Premier adit it varies from N. 1° 30' W. to N. 2° W. ; in the Rosalind adit it is N. 10° 37' W. ; in the long tunnel, N. 31° 20' W. ; and a surface observation which I took was N. 6° W. It has been fossicked a good deal at surface without much return. The stone on its outcrop is laminated, and of good appearance. It is said to have been traced a good distance both ways, but more survey work at surface is required before the outcrops can be identified with confidence.

The prospects of the mine undoubtedly centre in the work at the main shaft, which will prove the ground below that already stoped. No great depth has been attained yet, for the bottom of the shaft is still about 70 feet above the bed of the Dorset River. From what has been said of the positions and dips of the reef, it is plain that the sinking of the shaft will furnish splendid facilities for the necessary exploratory work, and if the run of stone continues from above, and improves a bit, it will soon pay for the sinking. The sinking should be continued steadily to the anticipated junction of the two reefs. That junction is, without question, the great feature of the mine. The south drive from long tunnel is one to be resumed at the earliest opportunity ; and the long tunnel itself ought to be continued. With these exploratory works in steady progress, the mine ought to be in a position to give a good account of itself. Its past record proves it to have a backbone. It occupies a good place among the gold-producing mines of the Island, but requires increased outlay on dead work to thoroughly establish its position, and make it a permanent mine.

I now proceed to describe the mines further up the Dorset River, owned by the Ringarooma Gold Mining Company. The first of these is the—

New Mercury Mine.

This is situate 40 chains S.E. from Alberton, and the leased property comprises the following sections :—

631-93G, 10 acres ; 633, 2 acres ; 634, 2 acres ; 1363, 10 acres ; 797, 10 acres ; 798, 10 acres ; 799, 10 acres ; and 303, 1-acre battery site. It is approached by a good road along the river Dorset to the battery, 25 chains from the township, and then a track 15 chains long leads up to the mine.

The mine is an old one, and was worked as far back as 16 or 17 years ago on two parallel reefs, 230 feet apart, which, from time to time, yielded good gold returns.

The upper works are entered by a cross-cut tunnel, now 8 or 10 years old, intersecting the reef (No. 2), which has been driven on N. and S. In the N. end the face is ferruginous sandstone, carrying iron-stained quartz, a few inches up to a foot thick. Further back the stone had been wider, from a foot to 30 inches, dipping W., and on the hanging-wall of drive. When it widened it got very mullocky. The reef-channel is about 2½ ft., filled with sandstone seamed with small quartz veins. In the S. drive the dip has turned over to the E., and there is good-looking quartz on the footwall. This stone appears to have split up in going south. It is all stoped away up to surface. When Mr. Brown began work, the depth of stone stoped was 12 ft., and about 15 in. wide, but in sinking on it it was found to enlarge, going down clean, but poor, with only a little gold on the footwall. This winze, sunk by the present company, was connected with the No. 2 level below. Under-hand stopes were worked below the level, about 50 feet long, yielding 6 dwts. gold per ton. There are two cross-courses in this drive, one of which has been driven on in the lower level. At the S. end of the old stopes there was nice-looking stone, but the crushing which was taken out did not yield remunerative results. In the S. end the apparent channel is 4 ft. wide, filled with horizontal layers of dark sandstone, and with a quartz vein on each side. The appearance is that of country rock fissured by separate veins, but in my examination of the mines in this district, I have grown accustomed to these vague, ill-defined reef-channels. The reef might make better below.

No. 2 Level.—The No. 1 lode cut in this level has been worked all the way down from surface, 60 to 70 ft., and was payable even with under-hand stoping. The shaft took all the reef when they came to open out. A vertical 2-in. vein runs on the E. side; the other was followed down some 20 to 30 ft. How deep, exactly, I cannot say, as the winze could not be plumbed, and the water was running over into the level. In the N. drive, on reef where the No. 2 tunnel intersects the lode, it was from 4 in. to 12 in. thick, and comparatively barren, but down in the winze, a little better. The lode a little south of the main chamber split up into two branches, the one being, as just stated, comparatively barren, the other going N.E., carrying the gold, but very irregular, and has not been further prospected. How far the S. drive goes in could not be seen, owing to a block.

Proceeding further in this No. 2 level, the No. 2 lode is cut, showing solid 8-inch low-grade quartz; but in extending the crosscut E. a mullocky formation was met with, showing gold freely in places, but the whole width only yielded 4 dwts. North and south drives have been put in. In the north drive a rich vein comes in from the west; the drive connects with No. 1 level above by a rise. The stone is very irregular, now widening, now thinning; the maximum width said to be 15 inches. Above, it is partly stoped out, but gave a yield of only 2 dwts. to the ton; in the sole of level, however, where the winze comes down from No. 1 level, it went as much

as 1 oz. to the load. Sinking was continued 6 feet below the level on stone over 1 oz. in value. The stone crushed from this winze was 92 tons, yielding 32 oz. gold, the principal part being derived from the last 16 feet of the winze. The best gold in the mine is at this end of the shoot, which is pitching N. It is said to have been very fine: in the battery nothing was in the boxes—all on the tables. We are, here, about 120 feet ahead of the low-level tunnel. Above, the stone ranged from 15 inches to 5 feet, but the only gold was on the footwall, and the quartz was very poor. Under-foot, it is estimated at 25 dwts. per ton. The last crushing was in 1897, when 98 tons returned 76 ozs. gold; but this parcel included a lot of mullock. A crosscut north requires putting in here. In the end is metamorphic slate with vertical bedding, or slight inclination to the E., with 2 inches of quartz on footwall side, though there is really no proper wall. Above the end, the quartz is said to be clean and poor, but better below, though broken up a good deal.

In the S. drive on this lode the rock is extremely hard. Four inches of quartz goes on in the back, and makes on the western side of drive; it then breaks off, and I could see nothing in the end but metamorphic sandstone, with no signs of any walls.

No. 3 Tunnel.—A low tunnel has been driven to some 92 feet under the above workings. It has advanced about 140 feet, but the metamorphic sandstone and slate-rock which it traverses has been so hard that the contractors have repeatedly relinquished work. The driving has cost from 30s. to 35s. a foot. The country rock crosses it with a bearing of N. 17° W. Although the rock is unusually hard, harder than at the N. end of the Mt. Victoria field, the formation of the quartz-reefs does not seem to have been detrimentally affected thereby. The quartz itself is charged with iron and arsenical pyrites, and has a favourable appearance for gold. Gold, moreover, is visible in the stone, and, as said above, it is often very finely divided.

Looking at this mine as a whole, the aim should be to get below the No. 2 level, where the underfoot stope on No. 2 lode indicates fair stone going down. The water difficulties prevent any further work on it from above. The No. 3 tunnel will give access to the ground below this good shoot, and at the same time prospect No. 1 lode, about which the reports are conflicting. Despite difficulty in letting the work, it ought to be pushed ahead.

I notice last year's published accounts of crushings from the mine to June 1st state 107 tons quartz as returning 34 ozs. 8 dwts. retorted gold. This stone was from the old backs. It is, consequently, quite evident that the future of the mine depends upon the result of future exploratory work, which ought to be taken in hand seriously as soon as funds permit.

There is an efficient crushing-mill on the Dorset River, fixed in 1898, comprising ten head of 9 cwt. stamps, with electro-silvered copper plates and blanket concentrators. The motor is a 40-ft. water-wheel, sufficient for 20 head of stamps. The company have half a mile of fluming. The water here fails earlier than at the Ringarooma battery, lower down the stream, but there is sufficient supply during nine months in the year.

Ragged Youth.

This mine has recently been taken over by the Ringarooma Gold Mining Co. It is situate on a ten-acre section (1288-93G) to the E. of the Dorset River, and

about 20 chains S. of the New Mercury. The upper workings are high up on the hill, above a small creek flowing into the Dorset.

Going through the mine from above, downwards, a tunnel has been driven N.E. into the hill, where a shaft has been sunk 25 ft. to the level below, and continued on the underlay from that level to the creek, another 80 ft. The stone was stoped as the shaft was sunk, and I was told it was payable all the way down, but the quartz was getting less in quantity, though still good quality. The first crushing of 32 tons yielded $54\frac{1}{2}$ ozs. gold. There are good backs over the upper level, but the stone is poor, so far as explored.

The shaft between the upper level and the one below shows that irregular stone lives down. It makes and dies out intermittently. In sinking, there would sometimes be 3 ft. of stone, frequently not extending beyond the ends of the shaft, then a blank, with no indications whatever. In the N. end of the level the face is sandstone, with irregular veinlets of quartz. All through it is impossible not to see that cross-cutting is the first duty here. There are certainly walls in the drive, but behind these are probably others, for there is not the slightest proof that the present walls are the true ones. This level is short, and only 25 ft. below shaft-collar in the upper one. The country strata are sandstones, and run N.W.-S.E. Eighty feet below, measured on the underlay, is the low-level tunnel. After intersecting the reef, the latter was driven on N. on stone 6 ft. in length, (altogether there is a shoot 20 ft. long), which then gave out, after giving 14 or 15 tons of quartz for crushing. There is nothing now in the end but slate. Cross-cuts require to be put in behind this end.

The stone is very buncy in this mine, and the reef-channel difficult to follow. Some exploratory work is still necessary to locate and further prove the reef. It lives down, but is irregular, and when work ceased was not sufficiently payable to have to contend with water. Thirty-two tons of stone were crushed from prospecting the upper part of this section, but did not pay, though free gold showed frequently, and good mortar prospects were obtained. The sum of £1007 3s. 6d. was furnished to me as the proceeds of crushing since June, 1897. The crushings in 1899, 62 tons, were scarcely payable, yielding only 54 ozs. 11 dwts. of gold.

The mine will have to be worked by low-level tunnel, which will do away with the expense of hoisting by windlass, and supply ventilation. The former expensive way of working may have contributed to the unsatisfactory results, but some dead-work is now essential to explore the ground ahead of the bottom workings.

Mount Victoria Mine.

Seventy chains S.E. of Alberton, on the right bank of the Dorset River, is the dismantled battery of the old Mount Victoria Company. The 42-ft. water-wheel is still left. Twelve of the stamps have been transferred to the Ringarooma Company's freehold property at the New River. The latter Company have acquired the two ten-acre sections (1433 and 1567) formerly held by the Mount Victoria Gold Mining Company.

The mine has been worked by adit levels. The highest is about 270 ft. above the main road, and is known by the name of the Montana tunnel. It has been driven about 220 ft. on the course of the reef, which bears N. 35° E. The reef had 10 in. to 3 ft. of clean stone. The first 250 tons are said to have returned 2 ozs. 3 dwts. per ton, but the quality fell off later, and

came down to 15 or 16 dwts. per ton. A large boulder of gold-bearing quartz was shed from this reef, and carried a few fathoms down the hill; and, upon its discovery, the Mount Victoria (then the Montana) Company was floated. From this reef, I was informed, £20,000 worth of gold has been taken, and from the extent of the workings I can well believe it. The full length of reef worked and traced on surface is about 6 or 7 chains. The slate and sandstone strata of the country cross the reef, bearing N. 10° W. At the entrance of tunnel a spur goes off from the lode in a N.W. direction. It carried good gold while it lasted, but gradually died away. The reef is 5 to 7 ft. between walls, and has been stoped at surface for a length of about 100 ft., and these stopes go right down to within 25 ft. of the back of the low level, about 250 ft. on the underlay.

No. 2 level is 90 ft. below the above, and has been driven upwards of 300 ft. At first it is a crosscut, but intersects the reef, which is much the same as above. The stone gave out, and no attempt was made to prove the ground on either side by cross-cutting. A small parallel reef was tapped by a short cuddy, but cross-cuts should have been boldly extended right and left. A winze goes down to the level below. There was a good block of stone 5 or 6 ft. wide along here in the N. drive. The S. drive is short.

No. 3 Tunnel, 90 feet below No. 2.—This is a long tunnel, driven about 600 feet to intersect the reef. This done, 150 ft. were driven each way. The stone went underfoot here down to within 25 ft. of the No. 4 tunnel, when it was cut off abruptly by a floor. The N. drive in the No. 3 tunnel has a good footwall, but the hanging-wall is broken. At the northern end of the stopes over the drive the reef pinched, and though it was driven upon about 70 ft. further, the pinch continued, and only a little bit of stone was found, which gradually grew poorer until a quartz cross-course cut off the reef. Here the former owners made a mistake. By all mining rules the reef should be found somewhere on the other side of the cross-course, but absolutely no attempt has been made to pick it up by means of cross-cutting.

No. 4 Bottom Tunnel.—This has been driven 1300 ft., but it never cut the reef. Where the shaft from above breaks through, there is a little vein which gave a prospect just sufficient to show that gold lives down. Cross-cutting exploratory work is badly needed in this tunnel. I do not look upon the flat floor which interrupts the stone above as a serious displacement. The quartz-channel will probably be found again on a parallel side-line, which would be picked up by a little prospecting. The Mount Victoria reef has not been traced south. What is known as Marr's reef comes across the bottom tunnel as a wide, mullocky formation. A shaft has been sunk on it some distance north, and 12 or 14 tons quartz taken out, which I was told returned 1 oz. gold per ton. This reef keeps on parallel with the main road. A good many trenches have been cut, and a little stone has been found here and there. The larger stones found at surface probably do not belong to Marr's reef, but have come down from the Wilson, Caxton, and Victoria reefs, which are all parallel, or nearly parallel, runs of stone.

Above No. 1 level 70 feet of backs have been taken out, which would make about 340 ft. on the underlay of stone worked on the Victoria reef. The last work done was by tributors, four years ago. The mine had been idle before that for seven or eight months; in fact, the Mount Victoria Company worked it intermittently

off and on for a long time. That company had a good run of stone, and their work has conclusively shown that payable shoots of considerable extent do exist in this field. Though the reef has been interfered with by a floor, too much importance must not be attached to this. Such floors and heads occur continually in the mines of this district, but, so far as I could see, they are, as a rule, older than the quartz veins, which had not sufficient force to break through them, but followed neighbouring lines of fracture, providing ready-made channels for the passage or segregation of the silica.

In the Mount Victoria mine perseverance in searching will, I think, result in the re-discovery of the line of stone. There is, moreover, no reason why it should be confined to ground above the present bed of the river. That bed was once very much higher, and as its level had nothing to do with the quartz or the gold then, we need not assume that it has any detrimental effect now. Though the mine has high backs there is no necessity for confining work to adit levels. The reef doubtless lives in depth, and if adequate capital be forthcoming a portion of it should be devoted to the exploration of the lode at deeper levels.

New River Mine.

On the eastern side of the spur from Mount Victoria, called the Ringarooma Mount, the Ringarooma Company have purchased J. H. Conder's block of 317 acres 3 roods 20 perches, upon which are several auriferous quartz-reefs. This is known as the New River property, from the river of that name which flows into the Dorset. The southern boundary is one mile N.E. of the Ringarooma battery, in the Dorset valley. It is reached by a $1\frac{1}{2}$ -mile track over the mountain, or by the carriage road which goes round a few miles, skirting the base of the hill. On this road we have the patch of dolerite protruding through the slates to which I have already alluded, and further on, past the cemetery, red basaltic soil in the fields and nodules of basalt proclaim a former covering of lava. Turning off south into the company's freehold, low ground is traversed, which has been leased to Mr. F. W. Krushka for alluvial work. There is a nice quantity of wash here; the ground is 15 to 20 ft. deep; some good gold is found, but patchy. The nuggets which turn up from time to time seem to suggest that a richer reef awaits discovery on the New River property than any yet discovered. These workings passed, the New River battery is reached. Here twelve head of stamps are working. The battery was put together by Mr. Wm. Brown out of an indifferent second-hand plant, part of the old Mount Victoria crushing-mill. When I was there everything was working very smoothly. The battery is crushing 12 tons of stone per 24 hours, sometimes 15 tons; 100 tons per week could be put through easily. The mine is 29 chains up the valley from the battery southwards, and the stone at present has to be carted to the stamps, but it is proposed subsequently to carry a tramway through from the mine to the mill. 28 hands were employed at this mine when I was there.

A few yards south of the battery there has been some costeaning. It is intended to work this formation, which has been opened upon for 40 ft., and is gold-bearing throughout, every prospect being payable. It consists of gossanous matter at surface and quartz veins below.

The main mine-works are on the tunnel-lode known as No. 1. There is a good outcrop at surface, stones picked up at random carrying payable gold. The

bearing of the reef is N. 60° to 66° E., and its dip 75° to 80° . It runs into the hill, and a tunnel has been driven on it for 200 ft. The shoot of payable stone is 150 ft. long in the tunnel, and 60 ft. at outcrop. For this length it has been stoped up to surface, 75 ft. on the underlay. At the outcrop it is from 18 in. to 4 ft. wide, and in the tunnel, from 9 in. to 3 ft. Taking the whole length of the stope, it may be reckoned as 2 ft. of payable quartz. An oblique fault marks the eastern boundary of the body of stone, and 3 ft. of stone has here gone underfoot, which will be cut by the level below. A good deal of water drips through the fault. The shaft from surface will serve to draw the mullock up, and, continued downwards to bottom level, will let the quartz down. With this width of payable stone, and a vertical distance of 40 ft. down to the bottom level, good results should be obtained. The fault is clean and steep at the W. end of the stone, which is bounded by a thin vein of manganese. In the end of the level a flat floor in the roof cuts off the stone, which goes off to the N., but the latter spur does not look as if it were the real reef, which must be ahead of the present end.

Forty feet below the above is the low-level tunnel, which will be the main outlet for this mine. A hopper will be fixed at the mouth, and a tramway constructed for delivery of stone to the mill. In about 30 feet more the stone ought to be reached coming down from the level above.

Higher up the hill on this freehold, to the N.W., is a reef running N. and S., about the same strike as the Central Ringarooma reef on the section to the south. The full width of outcrop is 4 feet, of which about 2 ft. 6 in. is clean stone. A shaft has been sunk 15 ft. in good stone, which, however, has contracted to 6 inches at the bottom. This stone looks kindly, and is of fair quality, but there has been no crushing. The same lode has been cut again to the N. A long adit is proposed as the best way of working this reef.

Over on the opposite or eastern side of the creek some reefs have been exposed on the slope of the hill. Trial shafts have been sunk on these, known as Nos. 2, 5, and 6. No. 5 is an old shaft which has been sunk 60 ft. on a narrow quartz-vein running all the way down without widening to anything like a good body of stone. Good prospects are obtainable from the stones thrown out, but there seems to be hardly enough quartz at this particular spot to encourage much outlay.

No. 6 is a shaft a little to the E. of the above, and the two reefs may possibly be the same, though not enough is known of either to determine the bearing. No. 6 looks roughly parallel with the New River reef. The shaft has been sunk 72 feet on fair stone, 8 in. to 1 ft., which, however, contracts in length. There is visible gold in the stone, of which 24 tons have been crushed, returning 18 dwts. gold per ton. Mr. Brown estimates that a hundred tons could be stoped out, returning fully that yield. A low tunnel, not more than 250 feet in length, would give 160 feet of backs, and thoroughly drain and ventilate all upper workings.

No. 2 is a shaft sunk 60 ft. on a reef which is thought may be the No. 1 tunnel lode now yielding highly payable stone. The last stone gave good prospects, but the length of the shoot is not known. There seems to be plenty of quartz, but all of it is not considered payable. Mr. Brown intends testing this.

The Tiger reef is a lode situate just outside the E. side-line of the Company's freehold on Mrs. Singline's block, but included in the leased property of the Company. Two shafts have been sunk on it: the western

one 40 ft., and the eastern one 70 ft., on 2 feet of heavy stone. These were worked about four years ago. No reliable information is available; report says the first crushing went 1 oz. gold per ton, and subsequent returns only 9 dwts. The gold in the stone is said to be coarse, but I could not see any in the stuff at mouth of shaft. I could see that the slope of the hill has been costeamed all the way up, and plenty of stones are said to have been found, with heavy gold. Should any arrangement be made for resuming these abandoned shafts, the manager would first connect both, take out the stone, and see what it is worth.

The New River property is very good-looking country for gold. The returns now being obtained from the tunnel-lode are paying the owners very well for their outlay; the country can be worked easily and economically; and there are several spots on the property where outlay on prospecting work would be judicious. Such work could well absorb £1000 per annum. I am of opinion, too, that such work is highly necessary, for if work is exclusively restricted to any single reef in this field, results are likely to be disappointing, and may prove disastrous. At the time of my visit a 350-oz. cake of gold was turned out from 345 tons quartz crushed at the New River battery. The previous crushing had yielded 18 dwts.; and the mine had 150 tons of 1-oz. stuff to begin the new year with. These results are palpable, and should encourage the owners to provide adequate capital for the development of the property.

Central Ringarooma Mine.

This property comprises 33 acres—1351-93G, 10 acres; 1406-93G, 10 acres; 1352-93G, 10 acres; 1407-93G, 3 acres—situate south of and adjoining the Ringarooma Company's freehold at the New River. Fifteen hands were employed at the time of my visit.

About 140 feet above the smithy a tunnel has been driven upwards of 200 feet in slate country N 74° E. The slate rocks cross it, running S. 36° E. Sixty or seventy feet in, a 3 or 4 inch vein carrying gold, crosses the level. At the end of tunnel, the vein, where intersected, was not very rich, but a fault here throws it back east. It is, however, brought back again in the north drive at nearly the same angle. A few yards further north in the drive a fault crosses it at nearly a right angle. The best stone in this direction made up to and before reaching the fault. The vein was then supposed to be cut off, but was picked up again N. of fault, showing rather glassy quartz, but good gold. Here, a pass comes from surface, with fair gold in stone, averaging 15" to 18" from top to bottom. This is the north end of a stope which extends over the back of level for 40 feet south, returning good gold. The reef-channel can hardly be said to be identified yet. In the back of level the stone is 8 inches; in the end, 4 inches; but wider in the sole. Before the fault came in there was 2 feet of clean, good stone. The reef dips steeply to the W., and its bearing is approximately N. 20° E. It is driven on at 70 feet below surface, measured on the underlay. A few yards in the S. drive from tunnel is another fault, which has heaved the stone to the E. side of drive. About 4 inches of stone continues, and will be driven on, but in consequence of these heaves the direction of the drive will be very sinuous. In this end there are two diverging bands of stone. The one on the wall will have to be left for the time being, and the one in the direction of the drive followed,

At 72 ft. above these workings a level has been driven 60 ft. on the course of the reef. At the mouth the stone is poor. Not far in is a shaft from surface 20 ft. The crushings went 11 dwts., but it is estimated that half was mullock, and that the real value of the stone was 15 or 16 dwts. There is fair stone going along here, but it is cut out by a fault. This fault is to the south of the one below. The frequency of these faults is a feature on this side of the hill. There are six of them altogether in this mine—one here, one ahead, and four below. Beyond the fault a few yards have been driven here in country, but since I was in the level I hear the reef has been found again, 8 ft. to the E., where there is 2 ft. of stone. The outcrop is seen a few yards up the hill, with stone some 2 ft. wide, and another foot of stone carrying arsenical pyrites, to the E. of the foot-wall. It is intended to sink on it. This reef has been traced at surface for about a chain, horizontal distance.

On the top of the hill, on Section 1351, is a reef known as Pennefather's lode, in the usual yellow sandstone. It has been opened upon down to 15 or 16 feet. The vein at surface is 6 or 7 inches, at bottom, 5 in., carrying disseminated gold. Fourteen tons of stone returned 21 dwts. per ton. To the south is a 40-ft. shaft, from which a cross-cut was driven, intersecting the reef, but operations were stopped in consequence of the sections below being formed into a no liability company. The reef dips S.W., and has been traced at surface for a chain S. 60° E. It is proposed to continue to sink on the underlay.

Outside the smithy I saw about 50 tons of quartz in the hopper, ready for crushing at the New River mill. The gold in the Central stone is of medium grain, though often very fine—paint gold. Still, very coarse gold also occurs. The road to the mill has been made at the joint expense of the two companies, and they are both under one mine management. The positions of the properties of these companies favour the construction of a proposed joint tunnel along the E. and W. side-line which separates them, the cost of this prospecting work to be shared by both companies. The Ringarooma Company would work northwards from the tunnel, and the Central, southwards.

The most troublesome feature in this mine is the occurrence of numerous small faults. These give rise to a series of small displacements of the lode, but I do not see any signs of them being serious, though they cause expense and interrupt regular work somewhat vexatiously. These movements have naturally occurred since the time when the reefs were formed, and, in looking round for their cause, I see no source so probable as the shocks produced by the upheaval and intrusion of the dolerite (diabase) which forms the core of Mount Victoria. This eruptive rock is not confined to the summit of the mountain, as has been very generally supposed, but is exposed by denudation 3000 ft. below the crest, on the Alberton road, near the cemetery. This intrusive band or boss forms the low spur on the E. side of the Dorset, and strikes S.E. in the direction of the New River and Central properties. I could not trace it across into those properties, but I infer that it may be closer than is apparent. In any case, this disturbing element is comparatively close at hand, and though it is not seen at the mine, and does not actually cut off the lodes, the shock of its intrusion has shaken the ground, and given rise to the numerous little faults met with underground. Despite the interference caused by these, the mine is being economically worked, and has fair

prospects. With the necessary capital for exploratory work, it should, under the present judicious management, do well.

As the preceding mines are owned or managed by the Ringarooma Company, I have dealt with them successively, notwithstanding their scattered positions. I now proceed to mention the other mines upon the Dorset side of Mount Victoria. Of these the most important is the

South Ringarooma Mine.

This is held by the South Ringarooma Gold Mining Company, and comprises 35 acres—1196, 1195, 1194-93G each 10 acres, and 453-93G, five acres—to the south of the Ringarooma Company's sections, on the western slope of Mount Victoria.

The main works are on Section 453. Just inside the S.W. angle of the section are some shafts sunk on a reef bearing a little to the W. of north, and which no doubt passes into the Ringarooma Company's ground. These shafts are now abandoned and inaccessible. Maynard's shaft has been sunk 30 feet, and the reef stopped at bottom for 14 feet. There is another shaft further south, and connection has been made between the two, 30 feet in all being stopped. The country is soft yellow slate, favourable for auriferous quartz, and £300 worth of quartz is said to have been taken out and crushed at the Premier battery. The figures supplied to me were, 77 ozs. 16 dwts. gold from 53 tons quartz. The stone in the reef is very irregular and intermittent for 200 or 300 feet. A shaft was sunk by the old Strahan Company 70 feet on the reef, which there runs N. 3° W.; this is about 100 feet N. of Maynard's shaft. Proceeding north, two more shallow shafts have been sunk; some of the stone went 2 ozs., but was not more than 3 inches in width; a little quartz can be traced all along.

To work this reef in depth a tunnel was driven at 100 feet below shaft-collar, and the reef cut after driving 170 feet. Thirty feet were then driven N.W., and 80ft. S.E. on the course of the reef. At 80 feet S.E. the quartz gave out, and the drive was continued 60 feet further, without recovering stone. There is said to be still stoping-ground overhead, but I do not attach much importance to it unless its value approaches 1 oz. per ton. The north drive is a short one, having come to the end of the good stone met with when the reef was cut; 19 tons of quartz, giving 44 ozs. gold, were got from this drive. In the end of level there is now 6 inches of poor stone; the face is soft slate; the reef has good apparent walls, but runs with the country. In this level 9 tons stone were got over back to bottom of old Strahan shaft, which gave 17½ ozs. gold. The underhand stope, about 18 feet long, and in one place 18 feet deep, gave 12 tons of quartz, returning 13 ozs. 12 dwts. The South Ringarooma Company started to extend level from bottom of Strahan shaft in a S.E. direction, but the stone grew poorer. The company followed the reef some distance, and took out a crushing, 46 tons, which returned 20 ozs. gold, or 9 dwts. per ton. In the S.E. end of stope there is still a little stone; overhead it is somewhat veiny, but stronger underfoot. No stone was got past this in driving the level. There is a good hanging-wall to reef; the foot-wall has been taken down in driving. The wall dips N.E. The end is slaty and confused, and the reef has been supposed to be faulted, but I do not think there is much disturbance, for the hanging-wall is continuous. The fact that the surface line of reef above this end is further south is no proof of faulting, and I have frequently found the surface and

underground bearings of reefs in this mountain far from identical. Crosscuts have been put in right and left without disclosing anything but country on either side; if the cross-cuts are not considered long enough, the one on the south side should be extended. An inch or two of stone is showing in the end, deflected across the foot-wall side. In this level a leader was followed a few fathoms west, with nice gold, while it lasted. A lower level, 80 feet down, has been driven about 60 feet, but nothing payable was found.

What is called No. 2 reef is stone just south of the present end of No. 1 level, as shown in a trench, but nothing more is known of it yet. No. 3 reef, or Duke's show, is on section 1195-93G, about 500 feet above the Dorset River. At surface on the track a 3-inch quartz-love is seen bearing N. 60° W., and has been traced a few fathoms each way. The stone attains a maximum width of six inches, and shows a little free gold. A few yards further east a drive has been put in on the course of the lode for about 15 or 16 feet, with stone about six inches thick, but not very regular, often a hardened band of slate seamed with quartz. The end of the drive is all slate, barring a bluish quartz vein, said to have yielded a little gold, by crushing; none was visible in the stone.

No. 4 reef is a N. and S. one, in the northern part of section 453, but the shaft which has been sunk on it has broken in. This was sunk a long time ago, and good gold is said to have been obtained from it, but I could obtain no certain information about the returns. From the bearing of the reef, it ought to have been met with in the No. 1 workings.

The last crushing from the South Ringarooma Company's ground was in August, 46 tons returning 20 ozs. 2 dwts. gold.

It is evident that this Company has dormant chances, which may develop after more prospecting. Previous work has been confined to getting to gold-bearing stone, and taking it out. When the shoot gave out funds were insufficient for the necessary prospecting, which should have gone on *pari passu* with the productive work. It was abundantly plain to me during my visit to Mt. Victoria, that the policy of risking everything upon a shoot of gold, as has been done over and over again in this field, is simply suicidal. The shoots in this district are too short and capricious to rely upon any single one as the exclusive support of a mine. The dead-work must be kept a good way ahead, and in different parts of the property, so that when one run of stone fails another may take its place for a time. This means that the South Ringarooma Company must prepare themselves for some considerable outlay on exploratory work before much can be said about their prospects. They have, however, as fair a chance as others on the field; some good gold has been found on their property, and there is no reason to think that it has given out permanently.

Recommendations.—No. 1 level, S.E., should be continued further, and the cross-cut S. extended some distance. No. 2 level must be driven steadily, to prove the reef. A long cross-cut N.E., between 300 and 400 feet, would intersect reefs 1, 2, and 3, at a depth of over 200 feet, and prove the Company's ground in a satisfactory way, perhaps cutting reefs underground of which there is no sign at surface.

Alberton Quartz Mine.

The Alberton Quartz Mining Company holds 64 acres, besides water-rights in the Dorset Valley, on the

hill-slope just north of the Ringarooma Company's mine. The mine is situate about 300 ft. above the road to Alberton. The country-rock consists of the same slates and sandstones as prevail in the adjoining mines, and with the same bearing, viz., 10° to 20° west of north. There is, apparently, no break in the lines of stratification; and, no doubt, the same strata are, continuous on their strike all along this spur; for, as far as I could see, the glens and ravines descending to the valley of the Dorset result from denudations, and do not mark lines of fault.

Just inside the S.E. angle of sections 995-93G (formerly 697) to the north of the boundary line of the Ringarooma Company's section 890-87G, a shaft 121 ft. has been sunk on the W. slope of the hill, about 320 ft. above the Dorset Valley. At surface there was quartz underlying W., but some 10 or 12 ft. down the dip changed to E.; and in the bottom, which I could not reach, it is stated to be to the W. again. A cross-cut has been started at bottom of shaft to cut the reef eastwards, which it ought to do in between 40 and 50 ft. As the hill slopes to W., there would not be much use cross-cutting W. The south boundary seems scarcely a chain off, and I do not see why the cross-cut was not continued to the E. side-line. I was told it was stopped twelve months ago. Assays have been made of the stone, which is reported at 15 dwts. The stone which I saw lying about contained a little pyrites, and might yield a few colours. It is thought that the Premier reef of the Ringarooma Company runs into this section from the south. It looked to me as if the line were a little east of the shaft, and, if continuous, that reef might pass outside the side-line, but really nothing positive can be said without exact survey; as the Premier reef underlies W., it may possibly dip into this property. The other line of reef, the Gumsucker, ought to come into the section. In this hill the reefs cannot be easily traced at surface, and there is also considerable variability in their directions, so that the identification of lines of quartz is in a great measure conjectural. The make of quartz in this shaft, assuming the longer diameter of the shaft to represent its direction, bears N. 7° W., which corresponds fairly well with that of the Premier, but it is doubtful whether the two are the same line of reef.

On the creek, about 100 feet lower than the shaft, is an adit level, No. 3, called New Discovery, driven about 60 ft. N. 37° E. on the course of an auriferous reef. The hanging-wall is defined, and carries, in places, 4 to 6 inches of stone; the footwall has been taken away in the drive. The reef dips S.E.; it is pinched in the end, where there is nothing but a small vein. A breasthead comes across the face. The yellow slate and sandstone country seems a little mixed and disturbed. A little quartz has been taken out over the back of the level. I was told that 46 tons stone from this drive was crushed for 8 dwts. per ton. A few tons still remain in the paddock.

In the central part of the property are two reefs, No. 1, running N.E., and No. 2, bearing N. 4° E., and these two should junction towards the N. I could not enter the levels driven on these reefs. No. 1 was unsafe, and No. 2 was banked up with water. I was told that 175 feet had been driven on No. 1, and a small crushing taken from the back. At entrance there was a good body of quartz, but poor; a little also underfoot in the approach. The shoot of gold appears to have been short. The stone is said to have been as low as 4 dwts., and a small crushing up to 18 dwts. On the

other hand, Mr. James Clark, in his published report of 12th December, 1895, states that 170 tons of stone gave an average yield of one ounce of gold per ton. The winze in tunnel is reported as having given a small crushing of 2 ozs. 16 dwts., but the stone was irregular, sometimes a mere thread. Before the level was started, a small quantity of stone was obtained from the old Endeavour shaft, giving as much as 18 dwts., and some even 26 dwts.

A level has also been driven 80 feet on No. 2 reef, and stone stoped from the backs is reported to have returned 12 and 15 dwts. per ton. These levels being now inaccessible, I could not form any opinion on their prospects. Supposing the reefs in the ends to be traceable still, it will take a few hundred feet more driving to bring them to the junction, where they would have good backs. As they have been discontinued, I have no doubt the quartz has given out, and the ends probably have an unfavourable appearance.

There is a 10-head battery with copper plates and tables driven by a 16-h.p. Robey engine, with hoppers, and a tramway from the mine. The battery is in good condition, not more than four years old. Evidently its erection was premature.

The mine exhibits, as far as I saw, some of the least promising features of the reefs of this district. Its quartz-makes and gold-shoots are short and irregular, and while some of the stone has yielded fair returns, the bulk of it has been too poor to be remunerative, and there has been too little of it to be satisfactory. However, the ground worked is rather high up the slope of the hill, and it is just possible that as the workings get deeper, the mine may improve. Wherever on this field any good returns have been obtained in shallow workings, I believe the quartz, if followed in depth, will lead eventually to more important and permanent reefs. The mine must, however, stand on its own merits, and not be judged by the adjoining Ringarooma mine. My observations led me to conclude that the reefs in the shallow zone in this mountain cannot be depended upon in their linear extensions. They are not uniform in character for any distance, and hence you cannot deduce their behaviour in any given section from their appearance and character in the adjoining ground. I believe this uncertainty will disappear at a greater depth, but that depth is hardly likely to be within the reach of a merely moderate expenditure, and I do not think it is attainable by simple adit-driving.

Caxton Mine.

This is situate on Section 1525-93G, 10 acres, 40 chains S.E. of the New Mercury battery, and about 20 chains E. of the Dorset River, a few hundred feet up the N.W. slope of Mount Victoria. The ground is held under a prospecting licence, for the purpose of exploring a quartz-reef, bearing S. 40° E., and dipping N.E. No work was being done at the time of my visit. At surface there is an old shaft on the reef which is 2 feet 6 inches between walls. The reef walls here are good, and stone said to have been from wall to wall. The lode has been traced further S.E., and stoped at surface down to about 15 feet. The channel then becomes filled with country, which gives place to poor stone. Following the reef-channel at surface, it is of irregular width, bulging in places, but finally contracting as it approaches the section boundary.

An upper level was driven on the reef 200 or 300 feet, right to the boundary, but I could not get into these workings, as there is a block, caused by the fall of old

timber in the shaft from surface. The level was reported to me as having been started on stone, when blank ground was met with, which lasted to the shaft, 40 ft. in. In one place a stope has been carried up to surface. I was told that several crushings had been taken out, some returning 15 to 17 dwts. gold, and 30 tons going as high as 1 oz. Mr. Thureau, a former Government Geologist, however, reported the average of the stone obtained in his time as 10 dwts. 9 grs. per ton.

Sixty or seventy feet below this level another one, No. 1, has been driven on the reef for about 300 ft. A shaft comes down from surface through the upper level, and the stone used to be passed down from that level to this one, and then trucked out to the shoot. At the entrance to the level is an underhand stope for 30 or 40 feet, which has the reputation of having given 100 tons of quartz, worth 80 ounces, or 16 dwts. per ton, when the work in this field was started, some 16 years ago. Then came poor ground for 20 ft., succeeded by another make of fair stone, worth 10 to 15 dwts. The front block of stone and the next block have been stoped up to surface.

Still lower is a tunnel, 90 ft. vertical distance, driven N.E. for 120 ft., to intersect the reef, but requires continuing 40 or 50 feet further. Want of funds prevents this from being driven at present. This is a pity, as it can be driven for 20s. a foot, and the whole future of the mine is dependent upon it. Nothing further can be said respecting this mine for the present, except that the most important and essential work is to continue the bottom tunnel and see what the reef is like as it goes down.

Telegraph Mine.

This is also known as Duke's, on a 5-acre section (1338-93G), about 100 yards E. of the Ragged Youth. A short tunnel, about 40 ft., has been driven from the track on a reef-fissure in a N.E. direction. The channel is about 4 ft. wide, and is bounded by good walls underlying S.E. There was some nice bunchy quartz on the heap at entrance to the drive, but I could see none in the end. The face is soft, and has clay flucans. Six tons of quartz are said to have been crushed, and I heard the yield variously stated from 3 to 5 dwts. Evidently it was not payable. Though the stone has given out it may make again, considering the defined nature of the walls, and some costeaning work ought to be done further up the hill.

Bright Star Mine.

This reef is on sections 448, 1176-93G, on the W. side of the Dorset River, about 30 chains N.W. of the Esk claim. The mine is now abandoned, and the shafts are filled with water. The pump shaft is said to be 50 feet deep, the upper shaft about 45 feet. The reef has been driven upon, and some crushings have been taken out. As in most of these abandoned mines, the first stone crushed was the richest, and is said to have returned over one ounce of gold per ton. Later yields were 14 dwts., and two crushings, a year or so back, are also reported, at 14 dwts. This tale of early rich stone was related to me at the various deserted claims with monotonous uniformity, and, as in some instances I have not been able to refer to published returns, I cannot vouch for the accuracy of the figures, though I have always tried to trace them to the best sources available. I am, however, the more disposed to credit such yields, in that some of them are substantiated by authentic accounts, and also because I see from the actual experience of the Ringarooma Co. in their different properties, that patchy rich

stone, not far from the surface, is a very common occurrence.

Esk Mine.

This is situate on section 534-93G, 10 acres, about two miles S.E. of the township of Alberton. It is on the N.E. side of a small creek flowing into the Dorset. This part of the Dorset valley is picturesque, with sassafras and fern-tree glades, and would attract tourists if they were assured of finding suitable accommodation. If the Government would open a track from the Dorset Valley up Mt. Victoria, and put up a shelter-hut on the plains from which the serrated summit rises, and where there is plenty of pure water for cooking and drinking, the ascent of the Mount, which offers no difficulty, and commands an extensive view, would become a favourite item in tourists' programmes; two hundred pounds would cover the whole of the outlay. The township, too, would provide additional accommodation. A prospector's track, too, from the head of this valley, is required, to connect with the Mathinna track, which has been made to serve the farmers rather than the miners. A bridle-track is all that is wanted, and would pass through the mineral belt. From this part of the valley is only five miles to Hickson's mine, if a track is taken through.

On the aforesaid section the Esk syndicate drove a tunnel nearly 300 ft. E. to intersect a quartz-reef upon which a shaft had been sunk from surface. The tunnel approach is for 40 ft. in soft ground before entering the slate. At between 260 and 300 ft. the reef was cut, bearing N. of E., underlying south, and showing a couple of inches of stone on the foot-wall. In the end of the drive, about 90 ft. below grass, the reef-channel is 3 ft. wide, between nearly vertical walls. The hanging-wall is the better defined. Water is dropping inside foot-wall, and a stray piece of quartz is on the wall. The end is slate and mullocky. The appearance is not promising. The slates cross with a strike of N. 50° W.; over the back, behind the end, there is a stope for 25 ft. with bunchy stone. Eight inches is the maximum thickness, but it is poor where wide, and has now contracted to 4 inches. There would be about 60 ft. more to stope up to surface.

About 100 yards up the hill to the E. is an old shaft known as Krushka's, which has been sunk 25 ft. on the underlay of the reef, trenched all the way up the slope. The reef here is rather solid looking, 3 to 4 ft. thick in the shaft. It carries two varieties of quartz,—one a grey description, in some of which free gold can be got, and the other of a bluish tinge, only yielding gold on burning. Both sorts are charged with arsenical pyrites, which, decomposing, sometimes impart a greenish hue. Higher up the hill another reef is seen, which ought to junction with this one further E. I remarked that the country up here was sandstone, while slate prevailed in the tunnel below. Still higher, some 50 ft., are both sandstone and slate, and there is some auriferous vein quartz; but the small veins run with the slates, and I should not advise outlay on them.

The Esk Mine is for the time known as the Duke-Ransome, and these two prospectors were putting up a stamper to see if it will pay to take stone out of the stope, as the ground is easy working. They told me 4 tons had been crushed, giving 10 dwts. per ton, and 3 or 4 tons more are now ready for treating. About 130 ft. more driving would bring the level under the Krushka shaft, where about 100 ft. of backs would be obtained, increasing with the hill. The continuation of the drive is necessary to prove the mine; later work would depend upon the result of driving.

Crown Prince Mine.

This is an old abandoned mine, above the Alberton Quartz Sections, just over the eastern brow of the hill, about 770 feet above the main road. The reef can be traced at surface about a foot wide, with only a few colours. A shaft has been sunk on the reef about 80 or 90 feet. The first 100 tons of quartz returned between 17 and 18 dwts. gold per ton; afterwards a party took out 10 tons for 1 oz. per ton; but a final 50 tons did not pay for carting and crushing. A deep adit tunnel had been driven 400 feet, when it intersected the reef, which has widened out to 6 ft. at that depth. Where cut, it had good walls, and drives were opened out on its course each way. The quality of the quartz is poor. At about 300 feet from tunnel entrance, a 2-ft. bed of porous felsparless black basalt occurs between the bedding of the Silurian slates. I take this to be a contemporaneous lava-sheet. The absence of felspar in this basalt, and the abundance of skeletal forms of magnetite give a peculiar stamp to this rock, which will be microscopically examined in due course. It is the only occurrence of such a rock that I have observed on the field. This mine is not far from the old track to Black Boy. Situate as it is, at such a height, the reef would have to be rich to yield payable results.

General remarks.

In the Mount Victoria District the country rocks do not appear to influence the lodes sensibly. The yellow slates are looked upon as favourable country, but these are in the zone of surface decomposition, and the gold in that zone has probably been dissolved and re-precipitated, with an increase in purity, and more concentrated. Where the country near a reef is pyritiferous it is a sign that the reef too is charged with pyrites, and where the quartz contains iron sulphides it is considered promising for gold. This is only what has been observed elsewhere. Dr. Don, of New Zealand, arguing against the lateral secretion theory, emphasises the result of his examinations, viz., that the country-rock only carries gold when it carries sulphide. Pyrite is a known precipitant of gold, and its association with gold must be considered to indicate an action of that kind, especially as there is reason to believe that the gold in auriferous pyrite is confined to the outer zone or precipitating surface. See Rose's *Metallurgy of Gold*, 1894, p. 143:—"Some authorities have contended that the metallic gold is disseminated mechanically through the mass of pyrites, but the action of potassic cyanide in dissolving the whole of the gold out of comparatively coarsely-crushed pyrites, seems to point to the correctness of the view that the interior of the crystal is not auriferous, the deposition of the gold being superficial, so that the enrichment of the pyrites is confined to its crystalline faces, and possibly, but not probably, to its cleavage planes."

We can therefore understand how it is that the presence of pyrites in quartz-reefs is welcomed as a favourable sign. When we, however, proceed to the further question of the origin of our quartz-reefs and their contained gold, we find ourselves in the domain of pure theory. As far as the quartz is concerned, we know, from microscopical analysis, that it was the last element to crystallise in granite; that it was the residuum, so to speak, which filled up the interspaces of the other crystals in the rock. If silica were present in excess, we may surmise that it would be ejected from the solidifying granite, together with any gold in solution which it might contain. On this theory the gold is not necessarily referred to the barysphere or zone of heavy metals; at least we cannot trace it proximately to a

deeper origin than the granite zone. Any theory professing to account for its introduction into that zone is purely hypothetical.

The water, or water-vapour, which was emitted from consolidating granite, ascended with its auriferous contents (or, rather, reascended, for it must first have descended, the ascent being a later phase of its circulation), and, during its ascent, the decrease of temperature and pressure must have contributed to the precipitation and deposition of the contained gold. The influence of different country-rocks upon the gold contents of quartz-reefs has been urged in favour of the derivation of gold from the strata traversed by the reefs. That some influence has been exerted by the adjacent strata may be conceded, but it is not so strikingly and uniformly apparent as is often imagined; and these strata may very possibly affect the precipitation of the gold through their different conductivities or other properties, instead of shedding original gold into the vein-quartz.

The splices of quartz, the frequent absence of walls, or any line of demarcation between the lode and country-rock in the Mount Victoria mines, furnish an argument for use by those who believe both quartz and gold to have segregated from the neighbouring sedimentary strata. It may be used by those who favour the derivation of the gold from sea-water, and its subsequent collection into quartz-veins from marine sediments,—an ingenious theory, which fails, however, to cover the absence of gold mines from Tertiary marine sediments, and their presence in volcanic lavas. Nevertheless, I believe the quartz (and consequently the gold) to have had a deep-seated origin, though the lines of its passage may not be so regular as we could wish. It is this irregularity which leads me to suppose that larger and better-defined channels will be found at a greater depth. The only element which could disturb this prospect is the diabase, which possibly underlies the field in places. As long, however, as we encounter no intrusion of that rock, we need not trouble ourselves about the effect of its proximity.

I terminate the record of my examination of the field with a word upon its prospects. With the fair yield of gold in the past, it deserves a bright future. At the present time it ranks as the third productive goldfield in the Colony, and if the Ringarooma Company can secure the introduction of capital to work their important properties on an adequate scale, the whole district will most likely enjoy a considerable revival, and some of the other claims will be re-started, and fresh discoveries made. The frequency of good gold contents in the courses of quartz is highly suggestive of further gold-shoots still undiscovered; and the trifling depths attained by the shafts makes a despairing policy quite ridiculous. I feel sanguine that a goldfield will, sooner or later, be found below the present workings, but success, I think, will largely depend upon the discretion with which the work is taken in hand. Small claims must be amalgamated, and properties worked on rather a large scale, with more than one string to their bow.

I have to thank Mr. Wm. Brown and Mr. Martin for assistance and information given during my visit, and Mr. Geo. Maynard, who acted as my guide to many of the mines.

I have the honour to be,

Sir,

Your obedient Servant,

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