

mica schists, composed of alternating laminae of pure quartz and micaceous earthy material, the former usually predominating. There are also occasional bands of chlorite and mica-schists of silky texture and more argillaceous character. These metamorphic rocks form the bed-rock at Cullensville, in Marlborough, and all the Otago goldfields visited by me. The comparative paucity of large defined auriferous quartz reefs traversing these rocks renders it difficult to account for the vast quantity of alluvial gold obtained where they prevail, but the most feasible explanation appears to be that gold exists, though sparingly, in the quartz laminae of the rocks themselves, and in the numerous small veins, nests, and bunches of quartz which also occur in them, and that the enormous and oft-repeated degradation and denudation of the rocks, and the final concentration now appearing in valleys, rivers, and creeks of the more durable and weighty materials, brought about the accumulation of alluvial gold in such large and easily-won quantities as rewarded the early prospectors.

The quartz reefs in this series of rocks present similar features to those of Reefton, inasmuch as they form in blocks or shoots, which in some cases become attenuated or poor with increasing depth, while in others their downward limit has not been reached. Of the mines visited in this group the first was the Ravenscliff Mine, on the fall towards Waikakaho Creek, in the Marlborough District. Here the rocks are foliated quartz and mica-schists, much corrugated in parts. The mine was not being worked; but in the lower tunnel, some 600ft. below the crest of the range, there were visible some "makes" of quartz, much of which appeared to be simply segregated quartz veins and bunches belonging to the country rock. The so-called lode lies between bands of strongly foliated rock, more argillaceous than the bulk of the formation, and has usually a good foot-wall, but an indistinct hanging-wall. I was informed that numerous assays made of the stone indicated fair yields, and that some trials of small parcels gave results representing 1oz. of gold per ton, but that the actual bulk returns from the battery did not exceed 4dw. per ton.

In Otago the first reef visited was the O. P. Q. reef, near Waipori, twelve miles from Lawrence. The outcrop of this reef is a large body of stone running north-north-west, with an easterly underlie. Shallow workings along the line extend for more than half a mile, and the yields are stated to have been at the rate of 9dw. or 10dw. per ton. In a tunnel along the reef from a gully the face shows a wide track with quartz in it, and a well-defined hanging-wall, the country rock being the prevailing quartz and mica schist. Much of the ground above this tunnel has been stoped out, and there is close to it a shaft said to be 200ft. deep, now full of water, whence a considerable quantity of stone was stoped, yielding from 1oz. to 1½oz. per ton, and good quartz passing underfoot. This was abandoned on account of the great cost of fuel when work was last in progress, but from the information given there seems no reason why the reef should not be payable under the existing more favourable conditions. Other reefs, as Gairs, the Sheba, and Solomon reefs, have been worked from the surface to as much as 100ft., but at present lie neglected.

The Cromwell Reef, Bendigo, is on a high range east of the Clutha Valley, about twelve miles above Cromwell, and has been extensively worked along the surface for a length of fully 1,000ft. and to a depth of 420ft. in the principal workings. The lode is very regular, between two good walls bearing west by north, and underlying northward at a steep angle. The width in the adit-level averages 3ft., sometimes increasing to 6ft. At the 520ft. level in the shaft a cross-cut 187ft. south reaches the lode and drives thence along, it having been extended 250ft. in each direction. The lode is only a few inches thick at the east end, increasing to nearly 3ft. under the old workings, and then pinching to a "track" at the west end. At this level the stone is stated to be auriferous but poor. It appears that this alternate widening and narrowing has been a feature of the lode all the way down. Considering that the reef certainly continues downwards between well-defined walls, and that £500,000 in dividends is stated to have been won from the workings down to the 420ft. level, it appears highly advisable to exhaustively prospect the downward continuation.

Near Macetown, up the Arrow Valley, the mines visited were the Premier and the Tipperary. In the Premier Mine, 3,400ft. above the sea, there are the main or No. 1 lode; No. 2, carrying a short shoot of auriferous stone; No. 3, or Moyle's reef, nearly parallel, and close to the main lode; and No. 4, or Loop lode, so called because it curves upward like an inverted saddle reef. The main lode has a well-defined hanging-wall, striking north-west and underlying south-west, and the shoot of auriferous stone is about 60ft. long, with a pitch north-westerly. The best stone appears to have been found where the several reefs closely approach one another, and there is known to be good stone going underfoot at the lowest tunnel-level. The tunnel was being extended to meet another shoot known to exist in the upper workings, and exploration downwards was in progress to find the continuation of the main shoot. Moyle's reef has two good walls, but the filling is principally crushed schist, without any regular quartz-formation.

The Tipperary Mine is some 800ft. below the level of the Premier. Here there is a large shoot underlying south-west and pitching north-west and passing away in the latter direction to a mere track, the foot-wall is the best defined. From the upper workings quartz has been stoped to as great a thickness as 36ft., the yield at the lowest portion being stated at from 7dw. to 9dw. per ton. Another shoot, known as No. 2 shoot, occurs to the south-east, but does not extend to the surface, and both shoots pass underfoot. A deep-level tunnel is being driven to cut the reef at a lower level.

A mine known as the Sunrise in this vicinity is described as being 5,000ft. above sea-level, and as consisting of a single block or shoot of auriferous stone, extending downwards, but not being worked on account of the cost of cartage.

Close to Arrowtown, at about 1,100ft. above sea-level, is the Criterion Reef, worked thirty years ago. Nothing definite can at present be seen, but by the old workings the strike appears to be north-north-west and the underlie west-south-west. The stated size of the reef is from 18in. to 3ft., the pitch of the shoot being to the northward, and the yields obtained were at the rate of 1oz. per ton to the amount of 1,300oz., but work was discontinued on account of the heavy expenses at the time. Assuming the correctness of the above information, obtained and communicated to me by Mr. Healy, of Arrowtown, there appears to be reasonable inducement to further explore this reef.