

comes from the surface or from beneath the water-level. In the first case, it is white, opaque, and mottled and striped with brown iron ore, or ferruginous slaty matter; in the latter it shows a bluish colour, is slightly translucent and glassy, and full of blackish spots and seams of slaty matter, which, as well as the quartz itself, are more or less densely impregnated with pyrites. With the exception of the O P Q Reef, Waipori, which produced from the old workings a very good average per ton, and promises richer yields from the new ones, the other reefs of this group are rather poor in gold, the yields ranging not much above 5 dwts. per ton throughout. Still, considering the thickness and extent of the quartz blocks, the facility with which they can generally be worked, and that sometimes the intervening mullock is worth crushing, on account of thin rich quartz seams traversing it, they ought to be profitable to work—*i.e.*, on a larger scale than has hitherto been the case—for at least several hundred feet in depth; more especially if attention is paid to the saving and treatment of the pyrites; and the truth of this opinion is in some measure already shown by the results of the Canada Reef Mine, which, though worked by shaft on a limited scale, produces from a depth of 80 feet, according to the manager's statement, a small profit from an average yield of 5 dwts. of gold per ton.

**SECOND GROUP:** *The Reefs of Bendigo, and the Rough Ridge, Conroy's Gully Reef, near Alexandra.*  
—My reasons for grouping these reefs together are based less upon their exhibiting unmistakable structural differences from the reefs of the other groups than upon their similarity to each other in several respects, touching mode of development and relation to the country. Their thickness is, in the average, but small, ranging generally from one half to two feet, and exceeding rarely four feet, and as far as workings have proved, they do not consist of solid quartz throughout, and but seldom so for any considerable extent in strike and dip (Logan's Reef). They represent, in fact, in certain respects, "block reefs," though with this difference from the true reefs of this class, that blocks of quartz and mullock of irregular size and outline are more or less irregularly intermixed, and do not, as those of the latter do, dip at certain angles, and in the same direction in strike. Most of the reefs of Bendigo show well-defined walls with clay casings, strike nearly uniformly east and west, are mostly traceable for long distances, and—what constitutes them very "strong" ones in a mining sense, and indicates permanency in depth—they traverse horizontally, or very flat-bedded mica schist vertically, or at very steep angles. The reefs of the Rough Ridge vary in strike, though not at large angles, and most are not traceable far in strike. They are generally not so well defined as those of Bendigo, and seem liable to frequent irregularities in strike and dip, contractions, and more especially to being faulted by slides; but these unfavourable features are apparently the results of surface disturbance only, and may disappear in depth. It is not uncommon, both at Bendigo and Rough Ridge, that reefs split in strike into branches, which, though deviating at first from, assume gradually again the strike of the main reef, and run thus pretty close and parallel together, some increasing to the same or even a greater thickness than that shown by the latter.

Besides "leaders" that dip towards them, so called "droppers," dipping at generally flat angles away from them, have also been observed in some of the reefs at both places. With regard to the mode of occurrence of the gold, the comparatively superficial work done on most of the reefs hardly permits to form a definite and generally applicable opinion. Judging, however, from those most extensively and deepest worked, it would seem that the metal is accumulated in rich shoots of variable width, that dip at rather steep angles in strike in the quartz blocks; whilst the portions intervening between the shoots, including the mullock patches, are poor, but generally rich enough, or of such limited extent as to render it the most economical to work them with the rest, without resorting to special selection. Excepting the yields from Logan's Reef, as unusually rich ones, those from the other reefs have been by no means low in the average, as they ranged up to 2 oz. per ton, and from hardly a single reef were they reported much below half an ounce per ton. Considering this, I was much astonished to see so many of the reefs and claims neglected (at the Rough Ridge over twenty claims were once worked, whilst at present only a single one); but the reason was explained to me to consist partly in the high prices charged for crushing, partly in expensive cartage, and more especially in the want of enterprising miners, those who worked the top having become afraid of the hard work and expense required in contending with the water. With regard to the prospects of the reefs in depth, I consider them, where the reefs are well defined, as favourable, both as concerns persistency in auriferous character and regularity in average size. But in speculating upon profits to be derived from future working, several important points must not be left unconsidered—namely, the comparatively small size of the reefs, expenses connected with getting rid of the water, and greater difficulty in extracting the gold from the quartz; for below the water level, which lies in several of the reefs considerably higher than one would suppose from their elevation above the nearest permanent surface water, the seamy quartz is throughout very metalliferous; in fact, it promises at greater depth to become more highly charged with metallic sulphides (iron and arsenical pyrites, galena, zincblende, &c.) than in any of the reefs of the other districts I examined. Timely attention to improvements in the gold-saving appliances is therefore highly advisable. The expense of working narrow reefs will, in depth, also considerably increase, in consequence of the increasing hardness and closeness of the country, which latter is comparatively more unfavourable to work on account of its horizontal bedding. However, against this may be placed, as a perhaps more than adequate set-off, the high dip of the reefs, which much facilitates working, and what is of greater importance, that the hardness of the rock in conjunction with its horizontal bedding renders the supporting of the workings very cheap and simple.

**THIRD GROUP:** *The Reefs of the Carrick Range.*—The generality of these reefs present in several respects quite distinctive characters from the reefs of the other groups. They are peculiar clayey ferruginous "mullock reefs" or rather "quartz-mullock reefs," so soft that they can mostly be worked by pick, without the aid of boring and blasting; and the quartz, which apparently forms no large percentage of their mass, occurs only in the shape of coarse sand and small angular and slightly rounded pieces—such reaching or surpassing the size of a fist being rather rare. Whether it represented originally interlaminations in the mullock, or was formed in veins, is uncertain, but a kind of banded structure in the line of dip of the reefs speaks in favour of the latter. These reefs vary in thickness from less than 1 foot to over 6 feet; they strike in all directions across the country, but are only of