

in argillites in the north-western slopes of Mount Starveall, but the quartz veins seen by our Survey in this locality were exceedingly barren.

As shown in the next section, some of the copper-ores carry small quantities of gold and silver.

(2.) *Copper*.—Mining for ores of copper has been carried on at intervals in the Dun Mountain Subdivision since the early sixties, and even before; but the results have never been really successful. The principal deposits are near Dun Mountain and in the watershed of the Roding Stream, or what is popularly known as the Aniseed Valley. Near Dun Mountain at least fourteen small deposits of copper-ores occur in serpentinised pyroxenites, and frequently with nelsonite, with which the copper-deposits seem to have some genetic relation. More or less desultory prospecting work was done on most of these deposits—shafts sunk, tunnels driven, &c.,—and some ore was shipped to Australia. However, operations for the main part ceased long ago, and the workings have in many places collapsed. From the surface inspection and from an examination of such of the underground workings as are open, none of the prospects appears worthy of further exploration. The original ore seems in every case to have consisted of pyrrhotite and chalcopyrite. At the surface, the oxidation products—native copper, cuprite, tenorite, malachite, and chrysocolla—occurred, and formed the rich ore which was found worth shipping. In the Aniseed Valley a great number of prospects have been found along the continuation of the so-called mineral belt—a name applied in Nelson to the serpentine rocks stretching south-westward from D'Urville Island through and beyond the Dun Mountain. The principal deposits, named from the northward, are the Duckpond lode, the Saddle lode, the Jackson lode, the Imperial lode, the Mount Claude lode, the Monster lode, the United lodes, the Champion lode, the deposit between the Serpentine and Hacket Streams, and, lastly, the Johnston Mine, on the Serpentine. The Duckpond, Saddle, Jackson, Imperial, and Mount Claude lodes are all very small deposits, which closely resemble each other, and which are on the Hill, known as Mount Claude, between Jackson's Stream and the Roding. On every one of them a little prospecting-work has been done; but in every case the writer was told the deposits looked more promising on the surface than in depth. The deposits all consist of short, narrow lenses, showing at the surface a ferruginous gossan, with stains of malachite, chrysocolla, a little cuprite, and generally magnetite. Where development on the prospects extends any distance below the surface their oxidation products are replaced by pyrrhotite and chalcopyrite. In the writer's opinion, the only one of the small deposits in Mount Claude that might warrant a little further prospecting is the Jackson lode, and even that seems a rather unpromising speculation. The Monster lode, or, more correctly, lodes, consist of several disconnected lenses of very low-grade copper-ore occurring in serpentine close to the border of an inclusion of argillite, and in intimate relation with some irregular dykes of nelsonite. As elsewhere, the lenses show a ferruginous gossan at the surface, with rare malachite stains, but, just below, pyrrhotite, containing a very little chalcopyrite, appears. On two lenses extensive exploration has been conducted, tunnels driven, shafts sunk, &c., but both deposits were found to diminish in size and to show no improvement in quality in depth. The more easterly of the two lenses has an average width of about 10 ft. 8 in., and a length of about 16 ft. 6 in. The ore exposed in the open cut consists of pinkish pyrrhotite. A carefully collected sample obtained from a cut in this deposit assayed:—

Gold	..	..	..	..	..	..	7.5 gr. per ton.
Silver	..	..	..	..	..	..	15 gr. „
Copper	..	..	..	..	..	..	0.53 per cent.

The more westerly of the two lenses, which runs in a general direction of about 20° west of north for some 53 ft., has a maximum width of 5 ft. 6 in. The ore away from the immediate surface consists of pinkish pyrrhotite with a little chalcopyrite. A representative analysis of the ore on the surface at its widest exposure is as follows:—

Gold	..	..	..	..	..	3 dwt. 10 gr. per ton.
Silver	..	..	..	..	..	2 dwt. 4 gr. „
Copper	..	..	..	..	..	0.95 per cent.

In the shaft sunk at this point the lens can be traced downwards for at least 50 ft., and it is said that traces of ore were found even lower during excavation, but no ore-body could be discovered in the drive below (some 112 ft. below the mouth of the shaft). Though from a casual surface examination the relatively wide lenses of the Monster lode seem promising, their very low grade and the fact that they show no continuity in depth scarcely warrant further exploration in this locality.

The United Mine has been worked more or less intermittently for years, and under various auspices. Until the beginning of the year it was controlled by the Maoriland Copper Company, but this has now given place to a company bearing the name of the Copper Development Company.

On the whole, the mine may be said to be well developed by seven levels, which are connected with each other by winzes and rises. The levels are numbered from top to bottom from 1 to 7. The uppermost level, No. 1, is partially collapsed, and No. 6 entirely so. The others are all free of access.

The ore now visible consists almost entirely of cupriferous sulphide, though there is said to have been some rich gossan, bearing malachite and native copper, and in several of the levels, notably No. 4, a very little malachite with native copper has been discovered. The sulphide consists mainly of pyrrhotite, containing small amounts of copper, nickel, cobalt, gold, and silver, and with this is more or less chalcopyrite. In the upper levels the latter mineral may even predominate in places, but there is a marked depreciation in quality with depth.

As elsewhere, the ore is in shattered serpentine cut by nelsonite dykes, and occurs in very irregular narrow lenses, which soon die out both along the dip and strike, to be replaced by others. The lenses run in general a little east of north, but there are many variations from regularity. The dip is always at a high angle, and both to easterly and westerly.