

longed to 18 in. to serve as a handle when lowering the lamp into the bottle. A short piece of small wax candle, such as is used on Christmas-trees, supplied the light. The candle-socket was made to fit just tight into the bottom of the lamp, and did not need any fastening. With these pieces of apparatus one was able to show the behaviour of the flame towards mixtures of air and coal-gas. The first experiment was made with one part of gas to nineteen parts of air. The naked flame of a small piece of candle attached to a wire was lowered into this mixture, and the character of the flame noted. The experiment was repeated with the same quantity of gas, but with one part less air, and the ratio of air to gas was thus gradually reduced till the explosive point was reached. This explosive point was found to be between thirteen to fourteen parts of air mixed with one of coal-gas. The quantity of air was then still further reduced till the maximum amount of explosive force was reached. One of gas to nine or ten of air gave the loudest explosion. With these quantities the bottle was half-full of water, the other half of the bottle being taken up by the explosive mixture of air and gas. To get a larger volume of explosive gas two parts of gas were mixed with eighteen parts of air, and the mixture fired with a naked light. A similar mixture of air and gas was then made, and the Davy lamp lowered into it. The gas was seen to inflame within the lamp, but there was no explosion.

To show the effects of a gas explosion upon animal life the bottle was again charged with two of gas to eighteen of air; a mouse was dropped into it, and the gas fired by a naked light. The mouse was singed and stupefied, but not killed, the small amount of carbon dioxide in the bottle not being sufficient to kill it. It was, however, quickly despatched by pouring into the bottle some ready-prepared carbon dioxide, the deadly properties of that gas being thus shown. These experiments have been described in detail, with the hope that some of those who work in coal-mines will perform the experiments for themselves, and thus learn by actual experiment the dangerous nature of the gases with which they have to deal. Many miners have not seen the faintest gas explosion; hence the weakness of their conception of danger, and their neglect of the safeguards provided for them.

Assaying.

Nelson has felt the wave of the mining boom, and during the last twelve months more assaying has been done here than in any previous year. In all 149 assays were made, most of them being fire-assays for gold or silver, but a few of them were wet-assays for copper. Judging from the quality of some of the stones sent for assay, there ought to be a considerable increase in mining in this district before long. The most interesting discovery of the year was the existence of gold in some of the copper-sulphide lodes of the Dun Mountain district. The gold was first discovered in the Monster Lode, at the head of Aniseed Valley; and later on an outcrop of gossan on Mount Claude, lying between there and the Dun Mountain, was also found to carry gold. The assay-value of these lodes is not high, but is sufficiently good to warrant extensive prospecting. Appended is a schedule of the assays from that district:—

Copper-sulphide (Monster Lode)—

			Gold.	Copper.
			4 dwt. per ton.	Not estimated.
No. 1 assay	...	...	4	
No. 2 "	...	...	2	"
No. 3 "	...	...	8	"
No. 4 "	...	...	4	"
No. 5 "	...	...	5	"
No. 6 "	...	...	4	"
No. 7 "	...	...	4	"
No. 8 "	...	...	6	4.08 per cent.
No. 9 "	...	...	4	3.48 "

Copper-carbonate, &c. (Monster Lode)—

			Gold.	Copper.
			Trace.	25.3 per cent.
No. 1 assay		
No. 2 "	"	24.0 "

Gossan outcrop (Mount Claude)—

				Gold.
				8 dwt. per ton.
No. 1 assay	...	...	...
No. 2 "	...	...	...	4
No. 3 "	...	...	...	3
No. 4 "	...	...	...	4
No. 5 "	...	...	...	5
No. 6 "	...	...	...	2

Miscellaneous Tests.

In addition to the assaying, several pan tests and blowpipe tests were made, a few only of which call for special mention. Some black sand from the Moutere Hills was found to consist largely of grains of chromite. This is an interesting geological discovery, as it proves that the mineral belt was being denuded at the time the materials of which the Moutere Hills are composed were being deposited. Some black sand from the upper part of the Motueka River gave, in addition to iron, reactions for nickel, but the test was not decisive. A visit to the Moutere Hills proved conclusively, by several pan tests, that that formation is gold-bearing, though nothing approaching payable stuff was seen. Some of the sedimentary rock from the district of the Enner Glynn Coal-mine was also found to contain traces of gold. These facts seem to indicate that a lead of payable gold might be found if properly prospected for.