

evening from 7 to 9. In these classes I was very efficiently assisted by Messrs. McLymont and Goodlet, and, when he was not otherwise engaged, by Mr. Montgomery. In these classes also the students themselves carried on the various operations. The students were arranged round several large working tables, provided with stands of test-tubes, filtering appliances, spirit lamps, solutions of metallic salts, and the various acids, alkalies, and other chemicals required in the testing processes. In the first part of the course they applied the proper tests under my guidance to solutions containing only one metal at a time. In this way we dealt with solutions of gold, platinum, silver, lead, mercury, copper, cadmium, arsenic, antimony, and tin; iron, nickel, cobalt, manganese, and zinc; also, in some cases, barium, magnesium, and calcium. Having mastered the tests for the metals in solution, one at a time, we proceeded some distance with the processes for identifying the metals when several are present in the same solution. The time at our disposal, however, at one place, did not admit of a thorough study of this branch of analysis, and we had to leave it to the more leisurely attention of the permanent staff in the schools of mines.

We then entered on a very fascinating and important branch of analysis, in which we dealt with the ores themselves, grinding them in the mortar, treating the powder with the proper acid (nitric, muriatic, or sulphuric), or mixture of acids (generally aqua regia, a mixture of strong nitric acid and strong muriatic acid), boiling to dryness or otherwise, stirring up the residue with water so as to get a water solution of the metal, and then applying to this solution the proper tests in the proper order till the metal was discovered.

When the stone contained, as was generally the case, more than one metal the processes for identifying these in each other's presence were gone through, thus bringing to bear all the knowledge, practical and theoretical, acquired in the earlier parts of the course. In this way we analysed minerals containing the following metals: Gold, silver, lead, mercury, antimony, platinum, zinc, copper, iron, nickel, and manganese. We also tested in the same way scheelite, worth from £20 to £25 per ton, and occurring in various parts of Otago from Naseby to the head of Lake Wakatipu, limestone, wolfram, and various silicates. We also extracted tin from tinstone by fusing it out with the proper fluxes, and afterwards subjected it in solution to the various tests for that metal. In some of the classes we also examined ores, containing the metals named above, quantitatively to determine the percentage of metal they contained; also coal of various kinds, to determine the percentage of water, ash, gas, and fixed carbon.

During our prolonged stay at the Thames we had time to go through pretty nearly all the work described above; but at the other centres visited it was quite impossible, in the time at our disposal, to go through more than the simplest part of so large a programme. At every place I visited during the session under report, as well as on my tour round the southern goldfields the year before, the attendance was almost invariably increasing during my stay, and my feeling was, on the eve of leaving many a goldfield, that I could well stay there for a couple of years and find plenty to do among the mining classes all the time. The men are not only most intelligent and very well-informed—in many cases, on subjects altogether outside their own pursuits—but are, as a rule, to which I have not found any exceptions, of a genial, straightforward, and kindly disposition, which makes it a positive pleasure to have any dealings with them. I know I am going out of my way in making these observations in a formal report, but I must be allowed to state my experience of the mining community in my own way.

IV. My own lecture was delivered usually from 9 to 11 or 11.30 p.m., and always closed the day's proceedings. The subject of lecture was one or other of the following course:—

1. How quartz reefs were formed.
2. How gold came into the reefs.
3. How other metals came into the reefs.
4. The chemistry of gold.
5. The methods of testing gold-bearing stone.
6. The chlorination process for extracting gold from iron pyrites.
7. The conditions to be observed in the roasting of metallic sulphides.
8. The La Monte furnace.
9. The ores of silver and the processes for the extraction of silver from its ores.
10. The processes for assaying and testing silver-bearing stone.
11. Copper and its ores.
12. The extraction of copper from its ores.
13. Tin: its occurrence and extraction from tinstone.
14. Lead and antimony: their ores and metallurgy.
15. Iron and its ores.
16. The smelting of iron ores.
17. Mercury: its occurrence and the methods of extracting it from its ores.
18. Sodium amalgam: its manufacture, properties, and uses as a gold-saving appliance.
19. Nitric acid and muriatic acid: their manufacture, tests of their strength and purity, and their properties and uses for testing ores, and on the goldfields generally.

I have been often astonished at the patience with which the miners would sit for three or four or sometimes five hours listening to a lecture on some of the above subjects. They were always freely illustrated by experiments; but it was not evidently these, but their intelligent interest in the subject of lecture, and their ability to follow it clearly in all its essential details, that kept the men on their seats to its close.

A look at the above list of subjects of experimental lectures will show how well they are suited to an intelligent mining audience; and it is to such subjects as these that I wish the attention of the teaching staff of the chemistry department of the goldfields schools of mines to be directed.

V. When Mr. Montgomery was lecturing, during my absence at some other centre, he took for his subject some geological or mineralogical subject, or some subject connected with gold- or silver-