

decomposed. They are therefore not rocks in which one would expect strong copper lodes to occur. The copper in chrome and serpentine rocks appears more in the manner of concretionary masses, in the same way that iron-stone appears in clay, than as distinct lodes. The copper undoubtedly exists in the North-west District, and one lode has been opened in the neighbourhood of Collingwood. The ore is a sulphide, and specimens I have examined contained from 22 to 25 per cent. of metallic copper. Copper has been found at various points along the eastern flank of the mountains, and the occurrence at intervals of the same rocks as characterizes the Dun Mountains sufficiently accounts for its presence, but no decided lodes have been discovered. The main slate range in the Northern Island extends parallel with the East Coast, but is as yet very imperfectly explored. The chief copper mines which have been worked in New Zealand are in the Province of Auckland—on the Barrier Island, from which place 2,323 tons have been exported as sulphide, and in Kawau Island from which about 2,000 tons have been exported, the copper being of the same character as that at the Barrier. Copper also occurs at Doubless Bay, but has never been worked to any extent. In the Thames diggings, copper ores are of frequent occurrence associated with the auriferous lodes.

20. Are there any practical suggestion which you could make with the view of promoting and developing of the copper-mining interest?—I do not feel competent to give a decided opinion, but I should say that the difficulty and risks of the first opening of copper mines in a country like this are such that I think any conditions proposed by the Government should be of the most liberal and favourable character.

21. Extensive deposits of sulphur, I believe, exist in different parts of New Zealand: would it not be possible to turn these to practical account?—I think the quantity of sulphur that exists has been greatly over-estimated. It occurs associated with the existing or extinct boiling springs which are found in a line through the North Island, and in White Island in the Bay of Plenty. The springs in the interior deposit domes and terraces of silica, and the sulphur that is found associated with them is condensed in the cracks and fissures of the deposits and in comparatively small quantities, and in such form that it could not be economically collected. On White Island, no doubt owing to the access of sea water to the sources of the heat, the chief deposit is sulphate of lime, or gypsum; and the sulphur that is found there is certainly in larger quantity than in the springs of the interior, but is also confined to the deposit in the cracks and fissures. It would require much more careful examination than I have yet been able to make of White Island, before deciding whether it could be made available for any kind of chemical manufacture; but I am not aware of any other source from which native sulphur could be obtained in New Zealand. The manner in which the blocks of gypsum have been coated with a thin film of native sulphur has led to exaggerated notions of the value of the deposits there. Manganese exists, and has been exported from the vicinity of Auckland. A strong lode of it occurs at the Bay of Islands, and fragments of rich ores of the same metal have been found in Otago and Canterbury. It is doubtful if it would become an article of raw export, but it might become of use in the event of chemical works being established in the Colony. The same remark applies to chrome. Cinnabar occurs only in Otago; but metallic mercury has been found near the hot springs, near the Bay of Islands.

22. Has there been any thorough exploration made to ascertain the source of the mercury in the Bay of Islands?—It has not been officially reported. I do not think it would be possible to discover more than what the vapours of the springs bring up to the surface.

23. Do you know of the existence of any deposits of lead?—Lead occurs at Galena in the Province of Nelson, and also at the Thames Gold Field. It invariably contains silver to a considerable amount. It has not yet been found in payable, workable quantities; but, like almost all other ores, the explorations hitherto have been of the most superficial character. Iron is very abundant in New Zealand, the lode stone ores occurring as veins in several parts of the Colony, but more generally in the form of iron sand, which is largely distributed, especially along the western slopes of both Islands.

24. What has been the obstacle hitherto to the manufacture of that sand?—I am at a loss to say; probably the high rate of returns expected have not been obtained from the small efforts that were made; and no doubt the outbreak of the war at Taranaki, where the only attempt has been made to work the sand, has retarded its progress. The black sand is adapted for making what is known as charcoal iron, and is largely used in Japan and many parts of India for the purpose of making the iron from which the finest qualities of steel are manufactured.

25. Is there any difficulty in Taranaki in obtaining sufficient supplies of charcoal for the manufacture of that iron?—Not the least, as it is all a bush country at the back. I should think some of the brown coals might be applied successfully to the manufacture of the iron sand.

26. Would not that iron sand be particularly adapted for the manufacture of articles such as American axes, spades, and tools of a superior description?—Certainly.

27. Do you think it could be manufactured at prices to compete with the foreign market?—The price of cutlery very much depends on the quantity and variety produced from an establishment. An establishment for making axes or one or two kinds of cutlery only would not be able to compete with the imported manufactures.

28. Would it not be advisable to manufacture it in a rough state, so as to render it available for export or for internal requirements?—If labour could be had at a moderate rate, it would.

29. What is the difference between this iron sand and the Swedish iron ores?—The same ore occurs in Sweden, but in a compact form. The chief difference is, therefore, the state of division in which the ore occurs. This lessens the expense of obtaining raw material, but increases the difficulty of manufacturing it into iron. I do not consider the presence of titanium is any advantage, as has been represented. The Taranaki sand contains less titanium than that from any other part of New Zealand. I have analyzed all the different black sands, and shall submit a table of the different compositions.

30. The Committee would be glad to hear any information regarding the coal deposits in New Zealand, and their adaptability to supply fuel for the Colony?—The carbonaceous deposits occur in New Zealand as lignites, the brown coals, and bituminous coals. There is one instance of a seam of anthracite. The lignites occur in the interior of Otago, and in other places in superficial deposits of