

Manganese.

This occurs in New Zealand mostly as oxides or carbonate. Some silicate has also been encountered. It has two principal uses in the arts: (1.) In the manufacture of chlorine for bleaching-powder. The introduction of the Weldon process, in which much of the oxidized manganese is recovered and returned to be used over again in the earlier stages, has lessened the demand. (2.) In the manufacture of iron and steel. Here the manganese as oxide serves a double purpose, assisting in the elimination of phosphorus, and at the same time enhancing certain valuable properties in the metal produced. It is in the latter connection that it is most valued in modern practice. Steel containing manganese—within certain limits—is very much harder than ordinary steel of the same degree of carburisation.

The most important occurrences are at the Island of Waiheke, Auckland Harbour; Bay of Islands, Auckland; Kawau Island, Whangarei, etc., Auckland; Kaurau and Clutha, Otago.

The value of manganese-ore produced to date is £61,791.

Lead.

A few tons of lead-ore has been shipped, mostly from Te Aroha, Auckland. A large number of lead minerals are known to occur in various parts of the colony. At Collingwood, Nelson, a few tons of silver-lead ore has been mined.

Chromium.

The chief deposit at present known is at Dun Mountain, Nelson. It is found, in fact, all through the mineral belt across the north end of the Middle Island.

Chromium is required for the manufacture of special steels for armour-plate and other purposes.

The value of chromium-ore produced to date is £38,002.

Antimony.

With reference to this metal, it is difficult to say in what part of the country it is not found. No discoveries of possible commercial significance have been made in Canterbury, Hawke's Bay, or Taranaki; but elsewhere antimony lodes are as plentiful as leaves in Vallombrosa. The deposits which may on present evidence be considered of most importance are situated in the west coast of the Middle Island and in Central Otago.

The two important factors in fixing the value of the deposit are its richness in antimony and facilities for shipping. Practically all the smelting of antimony is done in Germany. The ore must contain 50 per cent. of antimony to be saleable, and prospectors are often misled by the metal being finely disseminated through its matrix.

The value of antimony-ore produced to date is £52,598.

Tungsten.

Scheelite is found in veins in schists all over Central Otago. Some 30,000 pounds' worth has been mined, crushed, concentrated, and shipped.

Much interest is being taken in this mineral at the present time by local investors.

Nickel.

This is the only other metal which on present showing holds out much prospect to the mining operator, and even with this there is little reason for extravagant hope. Some ore from the Collingwood district appears to warrant further inquiry, and attention might be directed with advantage to the Mahurangi district.

Other Metals.

Zinc has been discovered in the Thames and Collingwood districts, but usually as an undesirable constituent in ores worked for other metal.

Molybdenum as sulphide has been reported from Dusky Sound, Otago, and from the West Coast between Greymouth and Westport. Lead molybdate is said to have been found at Dun Mountain, Nelson.

Arsenic as arsenical pyrite is widely distributed. No discoveries of commercial importance have been recorded.

Cobalt has only been discovered in traces.

Mica.

This mineral is known to exist in rocks on the west coast of the Middle Island, perhaps the best deposit being

at Milford Sound. So far as published records show, it has never been mined.

Reef Gold and Silver.

In October, 1852, a reward of £500 was offered by the authorities of the Auckland Province for the discovery of a payable goldfield, and within a week this was claimed by Mr. Charles Ring, a settler, who had recently arrived from California. The find consisted of auriferous quartz and some minute particles of gold-dust from the Kapanga Creek, Coromandel Harbour, Cape Colville Peninsula. A rush took place, but died out within six months, only 1,200 pounds' worth being won. The largest nugget was valued at £10.* Yet from these small beginnings sprang the gold-mining industry of New Zealand, an industry which has added to the world's store gold to the value of no less than £69,124,539,† and silver to the value of nearly £900,000. Of this total of over seventy million pounds sterling, £18,000,000 has been won from quartz reefs.

In 1905 the product amounted to £1,356,995. There were 3,558 men employed in the industry, and plant to the value of £1,945,430 was in use, consisting of 112 crushing-machines, 2,075 head of stamps, and 230 berdans.

The returns for 1905 show an increase in product but a decrease in number of men employed as compared with 1904. Seven fatal accidents occurred during the year.

The Geology of Gold in New Zealand.

Gold is found in association with silver and other minerals in New Zealand under very different conditions. H. A. Gordon says,‡ "Gold is found in the alluvium derived from and in metamorphic schists in Otago, Westland, Nelson, and Marlborough; in slates of Silurian age in the north-west district of Nelson; from slightly metamorphosed or unaltered Devonian and Carboniferous rocks in Southland, Otago, Westland, Nelson, Wellington, and Auckland; from rocks of volcanic origin near Dunedin (Otago) and over the gold-fields of Cape Colville Peninsula. Gold in small quantities has also been obtained from serpentine in the Dun Mountain Range, Nelson; in haematite from Maharahara, Hawke's Bay; Collingwood, Nelson; Whangarei and Bay of Islands, Auckland. It occurs also in antimony-ore (stibnite) at Reefton and Langdon's in the Grey Valley, Nelson. Native silver has been obtained from schistose rocks in Bruce, Lake, and Vincent Counties, Otago; from Carboniferous rocks in Kawau Island; in the volcanic rocks in the Golden Crown Mine, Thames; Waihi Mine, Waihi; Talisman Mine, Karangahake; and at Opitonui, Auckland. Ruby ore (sulpho-arsenide of silver) occurs at Puhipuhi, in Carboniferous rocks; in the Great Barrier Island, at Thames, Waihi, and Karangahake (Auckland) in volcanic rocks; and as an important constituent of tetrahedrite silver occurs at Richmond Hill, Collingwood, Nelson, in gneissic schist; and as a telluride at the Thames, Auckland; with galena, as silver-bearing lead-ore, at Mount Rangitoto, Westland, in mica-schist and gneissic granite; in the Owen and Wangapeka Valleys, Nelson, in Silurian slates."

In other words, gold is found in stratified and igneous rocks of all ages. The matrix is usually quartz, and may be so highly mineralised as to be nearly black or pure milk-white,‡‡ except for the specks of gold showing in it.

The sources from which the gold in our alluvial deposits has been derived can be indicated in a few unimportant instances.‡‡‡ The work of the Geological Survey may eventually—if pushed to an end—result in the location of the mother-lodes if still in situ, but the reefs when found may prove to be too poor to pay for working. Again, the gold may be derived not from definite and easily recognizable

* Hochstetter, "New Zealand," pp. 94 et seq.

† Up to end of October, 1906; other minerals are only brought up to the 31st December, 1905. Auriferous concentrates to the value of some thousands of pounds sterling per annum are included under "Mixed Minerals" in departmental reports.

‡ "Mining and Engineering," 1906, pp. 12 et seq. q.v.

‡‡ Some stone in Victoria Range, Inanghwa County, Nelson, is like this.

‡‡‡ McKay: "Gold-deposits of New Zealand."