### VIII.—Silurian.

These rocks, which probably are, throughout the Aorere Valley and the adjoining district to the north-west, of lower Silurian age, are more or less metamorphosed throughout; for though they yield *graptolites* at Golden Ridge, and at the south-east side of the Aorere are often called "felspathic slates and sandstones," I fully satisfied myself that the great body of the formation consists of metamorphic rock. Siliceous schist and quartzite, or quartz-rock, abound in some parts of the area covered by it, and this formation also includes areas of chloritic-schist, steatite, and crystalline limestone.

In the dark carbon-slates of Bedstead Gully and north-eastern bank of the Slate River occurs the Johnstone's United Company's Mine. In this the reef mined for gold dips at low or moderate angles to the eastward, or apparently, as contended for by Mr. Park, the auriferous quartz is a segregation along the bedding planes of the rock in which it occurs. The Johnstone's United is the only quartz mine being worked in this formation within the Aorere Valley, and, owing to the easterly dip of the vein or segregation, the area of stone on the line or shot of gold is limited, and another and longer tunnel at a lower level than the present will have to be driven to reach the stone towards the dip which contains the further continuance of the shot of gold.

### IX.—Granite.

This rock has its chief development over this district in Lead Hill and Mount Olympus, and as occurring at these localities it has been sufficiently described in the reports by Messrs. Cox and Park, and my work did not lead me so far as to examine either one or other of the granite areas.

### X.—Parapara Hæmatite.

In company with the Messrs. Washbourne, I examined this deposit and satisfied myself that a very large proportion of the ore is comparatively free from earthy impurities, such as quartz pebbles and grit. Formerly I was of opinion that, owing to the impurities present, the percentage of pure ore would be thereby lessened in some parts considerably; but it so chances that at the north end of the deposit, which is naturally the easiest of approach, and thus the first to be examined, there is an unusual amount of scattered stones and quartz-grit in the hæmatite. The western margin of the deposit also contains a greater percentage of the impurities mentioned; but the central and eastern parts contain an enormous body of ore of comparative purity. The deposit may be estimated at from 10 to 12 chains in width, 20 chains in length, and in places at least 200ft. in depth. More to the south there are other less extensive and less accessible deposits of the same kind. These hæmatite deposits have been the subject of notice and special remark in the reports of Messrs. Cox, Park, and J. G. Binns, and here it is not necessary to say more than a few words on the question as to how these deposits have been brought about.

Besides the larger accumulations extending southward on the coastal slope to Golden Bay, similar but much smaller deposits of hydrous hæmatite are met with on the sloping table-land on the south-east side of the Aorere Valley; and masses of limonite are met with in connection with the gravels of the main-slide both at Parapara and at Golden Gully. At many places also, the felspathic schistose rocks, by the oxidation of the iron contained either as minute crystals of pyrites disseminated through the mass or a change of the silicate to an oxide, becomes ferruginous in colour, and till more closely examined such rocks protruding above the surface appear to be limonite. In the neighbourhood of Parapara, where cuttings into the talcose-schist have been made, the rocks exposed at first were unoxidized, but afterwards became coated with a thin covering of iron oxide, and small botryoidal or kidney-shaped pellets, aggregated from this, strew the surface and indicate the source and manner of accretion of the larger masses.

To the eastward of the main mass of limonite there runs for some distance an exceedingly massive lode of iron-pyrites, which to the westward has not a clearly defined wall, but on this side passes into pyritous slate. From the decomposition of the sulphides in this pyritous slate and the removal by water of the products of oxidation and their subsequent precipitation, have arisen the mass of the Parapara hæmatite, or rather limonite, deposit. It has been said that the limonite deposit contains many masses having pyritous cores, thus implying that the deposit to a considerable extent resulted mechanically from the breaking-up of a large pyritous reef and subsequent oxidation from the surface affecting the masses more or less deeply. Pyrites are often met with at places in the deposit, but usually as thin veins in joints and lining cavities, but never, so far as I have observed, in such amount as would lessen the general usefulness and value of the ore.

Alex. McKay.

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## APPENDIX A.

The following letter was written under date from Collingwood for Mr. Gordon's information. Others have also been supplied with copies of it, and, as it could not be embodied at one place in the main report, nor if broken up would it represent that which has already been circulated, it has been deemed advisable to print it as an appendix to the report "On the Geology of the Aorere Valley, Collingwood County, Nelson."

17th July, 1896. Alex. McKay.

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Dear Sir,— Collingwood, 15th November, 1895.

Since my coming to Collingwood, I have made the various examinations specified and described underneath: 1. Appo's Flat: (*a*) The freehold of F. West, now held by the Parapara Hydraulic Sluicing and Gold-mining Company; (*b*) the north-eastern part of the flat held under lease by West, Adams, and Fell. 2. Glengyle Gully, including Hit-or-Miss Claim, on the saddle between Glengyle Gully and the upper part of Appo's Creek; Glenmutchkin, the two working-faces