Notes

on

SOME GEOLOGICAL FEATURES IN THE VICINITY OF QUEENSTOWN.

Introduction.

The following notes are the result of a brief examination of the country adjacent to the King River Mine, Lynchford, and of a reconnaissance trip up the west branch of the Queen River. Although no very detailed mapping was attempted, the observations made are of some importance in as much as definite evidence was obtained of the intrusive nature of the Queen River Porphyries. The occurrence of the rock types examined is shown on the accompanying sketch map.

Geology.

The principal rock types observed may be grouped as follows:

Sedimentary.

Silurian - Slates, shales, sandstones, conglomerates, limestones.

Recent - River Gravels.

Igneous.

Devonian - Quartz-Felspar Porphyries, Felspar Porphyries, Porphyrites (?) and Syenite Porphyries.

Silurian - Interbedded slates, shales, sandstones and limestones of Silurian age occur along the western side of the Queen River and extend eastwards over the greater portion of Queenstown. These rocks are similar to other members of the silurian system as developed throughout the State and need no detailed description here. There is abundant fossil evidence to place the age of these rocks beyond doubt.

A large xenolith-like block of slates and indurated sandstones, occurring wholly within massive porphyries, extends southwards from Lynch Creek. These rocks are generally similar to the slates etc. of the Silurian system and have been grouped with them.

Coarse conglomerates, grits and quartzites of the of the West Coast Range Conglomerate series extend from Gormaston Gap eastwards to Mt. Owen and for some distance to the north and south. On Mt. Owen these rocks appear to have the form of a large anticline.

The Devonian Igneous Rocks. - These rocks comprise quartz-felspar porphyries, felspar porphyries, porphyrites (?) and syenite porphyries. In general they are identical with other members of the so-called Porphyroid series as developed throughout the West Coast, and elsewhere in the State, and may be sub-divided into two major groups. One of these comprises the unaltered massive porphyries and the other their sheared and altered derivities. Detailed descriptions of the macroscopic and microscopic characters of both groups may be found in the recently completed report on the "Geology and Ore Deposits of the Rosebery District".

In some respects certain types of the porphyries of this district (generally referred to as the Queen River Porphyries) present some variations when compared with similar rocks occurring in other districts. The main point of contrast is a tendency towards greater basicity. Thus while many types of the Queen River porphyries may be described as quartz-felspar prophyries and felspar prophyries identical with similar types in other areas, quite a large proportion are considerably more basic and may be more correctly described as syenite porphyries &c. Two fairly typical specimens of these more basic types were obtained during our brief examination of the area. One was obtained from Lynch Creek below the King River Mine and the other from the West Branch of the Queen River at a point about forty chains below the Mt. Lyell Company's bottom dam.

The specimen from Lynch Creek is a dark green, medium grained rock composed principally of felspar phenocrysts set in a dense mass of chlorite. Under the microscope, the predominating felspar is seen to be orthoclase. This occurs in hypidiomorphic crystals and is rather turbid; under crossed nicols it shows the usual carlsbad twinning. Hypidiomorphic crystals of plagioclase with the usual lamellar twinning occur throughout the section but are subordinate to orthoclase. Both the orthoclass and plagioclase have undergone considerable replacement by carbonates. Occasional crystals of quartz are present; these are rather irregular in shape and some appear to have been partly corroded. Augite occurs as small irregular grains in chlorite. It is usually colourless and shows second order polarisation colours under crossed nicols. Although the amount of augite in the section is small, its mode of occurrence suggests that it was fairly abundant in the original rock but that it has now been altered to chlorite. The latter is scattered abundantly throughout the rock and occurs as grains, flakes and large irregular patches between the felspars. Calcite is a fairly abundant constituent; it occurs as irregular patches and grains and as a replacement after felspar. The amount of groundmass visible in the section is relabively small and consists of a microcrystalline aggregate of quartz and felspar. The only accessary constituents are ilmenite and magnetite. These occur as small irregular grains scattered through the rock. In many respects this rock has a granite texture when examined in thin section though it has a marked porphyritic appearance in the hand specimen. It may be described as a syenite porphyry.

The specimen from the West Branch of the Queen River is a dark green rock composed of phenocrysts of felspar and quartz set in a fine grained chloritic groundmass. Under the miccroscope the felspar phenocrysts are seen to consist of both orthoclase and plagioclase. Orthoclase predominates throughout the section and occurs as irregular crystals showing only partial crystal outlines. It is generally twinned and sometimes exhibits zonary structure. A few small irregular crystals of plagioclase showing the usual lamellar twinning occur in the section. The quartz phenocrysts may be hypidiomorphic or allotrimorphic and are often rounded and corroded. They are smaller and less abundant that the felspars. Chlorite is fairly abundant and occurs as irregular flakes and small grains. It also appears to be disseminated through the groundmass. The latter consists mainly of a microcrystalline aggregate of quartz and felspar. The proportion of phenocrysts to ground mass is roughly equal. A few small grains of calcite occur in the section. The accessory constituents are ilmenite and pyrite. In many respects this rock is identical with certain types of porphyries occurring in the Rosebery and Mt. Read districts. Practically the only important point of contrast is that it contains more chlorite than the usual common types. The rock may be described as a quartz-felspar porphyry.

In this district, the schistose derivates of the massive

porphyries occur mainly along the eastern margin of the main propyry mass. Practically the only opportunity we had of observing them was while travelling along the road from Queenstown to Gormaston. Here they extend from a point a little to the east of Queenstown as far as Gormaston Gap. As far as could be seen they are similar to the altered rocks of Mt. Read and Rosebery and consist mainly of quartz-sericite and chloritic schists.

There can be no doubt that the Queen River Porphyries form an integral part of the main belt of porphyries of the West Coast. Prior to the commencement of the systematic geological survey of the Rosebery district in 1930, the rocks of this belt were regarded as lava flows interbedded with sedimentary rocks of Cambro-Ordovician age. The work at Rosebery and evidence obtained in various other portions of the State during the past two years has shown that the porphyries are intrusive rocks belonging to the Devonian period of igneous activity. While the sum total of the evidence obtained in support of this view has been fairly conclusive it has been handicapped to some extent by the lack of exposures of the actual porphyry contact. It is pleasing to note therefore that, while at Queenstown, we saw one clear exposure of the porphyry contact and obtained evidence which places the age and relationships of the porphyries beyond doubt.

In McCusicks Creek, a small tributary of the West Branch of the Queen River, at a point about four chains up the left hand branch, the creek bed has been washed clean by sluicing. Here the contact between the porphyries and the slates may be seen quite clearly. It is quite clean cut and well defined though the actual line is rather irregular, there being small protusions of porphyry into the slates. In many places the slates are baked, toughened and contorted. Another common effect along the margin is that of contact brecciation, the porphyries being full of small angular fragments of slate. This exposure provides indisputable evidence of the intrusive character of the porpyries. Moreover, at a short distance to the west near the Lake Margaret tram the intruded slates and quartzites contain definite Silurian fossils, hence we are quite safe in regarding the porphyries as belonging to the Devonian period of igneous activity.

Gregory has described the above occurrence as a band of conglomerate, possibly occurring along a fault line, full of pebbles of the igneous rocks. We are quite at a loss to account for this description in view of the clean cut evidence of the intrusive character of porphyries, and we can only conclude that the creek bed was not exposed as clearly in his time as it is now.

Further evidence of the intrusive nature of the porphyries was obtained in Lynch Creek. Travelling up the creek from the vicinity of Lynchford Station the rocks are principally massive syenite and felspar porphyries. At a point about half a mile above the King River Mine these rocks contain a large xemolith like block of slates and sandstones. This is ten to fifteen chains wide and about half a mile long. It is oriented in a generaly north-south direction. On either side of this block the slate-porphyry contact is quite sharp and well defined. Moreover the porphyries appear to give off small quartz veins which penetrate the slates. In many places higher up Lynch Creek and also in Guilfoyle Creek, the porphyries contain numerous angular and subangular fragments of slate ranging in size from a few inches up to several feet. These occurrences undoubtedly represent material caught up by the porphyries during their intrusion.

Economic Geology.

Most of the important ore deposits of the West Coast Mineral Belt are closely associated with the great belt of intrusive porphyries of which the Queen River rocks form an intregal part. Thus we have copper-silver-gold deposits at Jukes and Darwin, copper at Mt. Lyell, zinc-lead at Rosebery, copper and silver-lead at Mt. Farrel, pyrite-chaleopyrite at Mt. Chester and zinc-lead at the Pinnacles. The lodes may occur within the porphyries, in the adjacent intruded sediments or along the margins of sedimentary xenoliths occurring within the porphyries. In the vicinity of the lodes the porphyries are generally sheared and altered, and hence the sheared zones are regarded as being the most favourable for the location of payable ore deposits. Ore deposits do occur within comparatively massive types of porphyry, but none of these have proved to be payable.

The auriferous quartz vein of the King River Mine occurs in a slightly sheared to massive syenite porphyry. Hence the geological conditions of its occurrence are generally unfavourable.

The alluvial gold found in various creeks heading into the porphyries may be derived either from small auriferous quartz or from the weathering of sulphide loads containing small quantities of gold. The general nature of the alluvial gold occurrences of the West Coast indicates that the latter is the main source of supply.

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