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REPORT ON EXAMINATION
OF
KING RIVER AREA

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KING RIVER AREA
LYELL-EZ EXPLORATION.

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26th February,

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To: Mr. G.F. Hudspeth.

REPORT ON EXAMINATION OF KING RIVER AREA

Dates of Examination: 14th-21st February, 1958.

Party Leader: P. Rodda.

Personnel Employed: G. Seymour.

Man days in Field: 16

Location of Camp: That about 2 miles from Lyell Highway on old Kelly Basin Line.

Means of Transport & Supply: By Land Rover from Queenstown.

General Topography of Area

The area studied is bounded on the north and east by the Lyell Highway and Nelson River, and on the south and west by an interpreted fault. The King River runs through the area. To the west of the King River, there is an extensive flood plain at a higher level than the present river with a ridge of Crotty Quartzite rising above it. Between the King and Princess Rivers the ground is the dissected remnant of an old flood plain. Between the Princess and Nelson Rivers are the main ridges of the area, with a general N-S trend.

Geological Investigation and Findings

With the exception of the ridge of Crotty Quartzite which had already been studied, there were no outcrops of rock on the plain to the west of the King River. A short visit was made to the Crotty Quartzite in the hills south of the postulated fault, in the south, to see that rock

type. It was found to be quite sheared in a direction approximately north (345° - 355° trend). Several poorly preserved fossils were found - probably brachiopods, but perhaps lamellibranchs.

Along the old Kelly Basin line, sections in cuttings showed that the surface is mainly gravel and rubble, consisting of both water-worn pebbles and boulders, and scree from the mountains to the west. In one boulder of Owen Conglomerate, the main constituent, serpentine was found; also several small pebbles of it nearby (LEE 351).

The main outcrops of the area are on the hills between the Princess and Nelson Rivers, also along the Princess. In most of the area the rock is a sheared quartzite (LEE 347), the trend of shearing being 340° - 410° in most of the northern part but about 310° in the south. The bedding is generally not visible. In some places the quartzite is unshaped; it is strongly jointed and generally has clear thin bedding. Most of the ridges have the western side a dip slope of 25° - 40° , the east side being much steeper; the ridges trend N-S which seems to be the strike of the quartzite. Parallel veins of milky reef quartz often occur in the quartzite, sometimes several en echelon; in places there are small vugs filled with tiny quartz crystals (LEE 354). At two localities there are abundant pipe-stems in the Crotty - up to 6-9" long, and $\frac{1}{2}$ -1" in diameter, with generally oval cross section. Some are much thinner, about $\frac{1}{8}$ ".

Near the Lyell Highway, about $1\frac{1}{2}$ miles S.E. of the Princess River bridge, is an outcrop of white quartzite interbedded with much finer quartzite, approaching a shale or mudstone.

Slates occur in some places, one on the King, one on the Princess and near the Lyell Highway. On weathering they may produce quite thin laminae though some outcrops about water level are quite blocky. The

trend of the cleavage is the same as in the quartzite nearby. The bedding could only be seen on the King River where it is similar to that in the quartzite, and near the Lyell Highway where it is variable.

An outcrop beside the road at the Princess River bridge shows both cleavage and bedding very clearly. The bedding shows up by different coloured bands - light and darker gray - also by slightly differential weathering, the lighter rock being weathered a bit more. The cleavage is undeflected when crossing the different bands, and the grain size seems about the same, so this must be due to slight changes in type of detritus supplied during sedimentation. On the Princess River further south, this slate has bands of distortion crossing it, in which the cleavage trend is between about 30° and 60° . These bands are from $\frac{1}{4}$ " to about 2" wide; they join sometimes. This slate contains occasional small crinoid columns.

At two places just east of the Princess, a semi-consolidated rock was found - a conglomerate or perhaps tillite. The more southern outcrop consists of a cliff section about 20 feet high, rising to about 60-70 feet above the present river level. The other, a much smaller outcrop, is at a similar height. The boulders range up to 1 foot in diameter and are mainly quartz, shale or slate, and dolerite. The cliff section reveals a fairly low degree of sorting - there are bands and lenses consisting mainly of boulders and pebbles, then others of finer material. The bedding is approximately horizontal.

Dolerite boulders are scattered over most of the area, resting on the surface. Some are quite large, up to 10 feet long (LEE 352).

Just south of the postulated fault which bounds the area studied, on the west of the Nelson, a small outcrop of Gordon limestone occurs in the

form of a sharp anticline plunging at 30° on bearing 310° . Another outcrop was seen further down the river in a cliff. The limestone is a dark blue-grey, with veins and aggregates of milky calcite, also small aggregates of siderite (LEE 356). There is another rock type which seems to be a weathering product, coating it in places, and in other places appearing to be bedded with it. It is a porous pinkish-fawn rock (Lee 356). Just to the north of this is an outcrop of iron stained rather weathered Gordon (LEE 355).

Fossils in the Area

A single boulder of quartzite was found which had in it a highly fossiliferous band (LEE 348, 349) containing internal casts, with some external moulds, of brachiopods (rhyconellids and orthids or strophomenids), and corals, both solitary and massive. This boulder was not in situ and was not found near any outcrop. It may be of use, however, in extending the Crotty fauna and perhaps in improving the known limits of the Crotty Quartzite.

Several parts of external moulds of brachiopods, or perhaps lamellibranches, were found in the Crotty to the south of the postulated fault, near the old Kelly Basin line. Small crinoid columnals were found in the slates on the Princess River.

Summary

The rock in most of the area is Crotty Quartzite with some shale. The bedding is in most places masked by strong shearing, which trends about 310° in the south but swings round to $340^{\circ}-10^{\circ}$ in the north. The ridges between the Princess and Nelson Rivers are in general strike ridges, the west side being a dip slope of $25-40^{\circ}$, with a much steeper east side. Crinoid columnals occur in the shale and the quartzite contains abundant

pipe stems in some places.

A semi-consolidated conglomerate or tillite was seen in two places; at one place the bedding appeared to be horizontal.

On the west side of the Nelson River, south of the postulated fault which is the southern boundary of this area, occurs a small outcrop of Gordon limestone, in the form of a sharp anticline plunging at 30° on bearing 310° . This is in an area formerly ^{considered} Pre-Cambrian. A further outcrop could be seen in the bank of the river further down.

A single boulder of quartzite was found with a highly fossiliferous band containing internal casts of brachiopods and corals (solitary and massive).

Peter Rodda.

P. Rodda.