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THE GEOLOGY OF THE TYAUGHTON LAKE MAP SHEET
BRIDGE RIVER DISTRICT

by

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INTRODUCTION

The following essay is a generalized description of the geology of the Tyaughton Lake Map Sheet, Bridge River District, British Columbia. The material was obtained principally from observations made in the field by the writer, with some reference to the following Canadian Geological Survey reports:

- (1) W.S. McCann - 1920
- (2) C.W. Drysdale - Summary Report, 1915
- (3) V. Dolmage - Summary Report, 1928, Part A

Due acknowledgment is also accorded to Dr. C.E. Cairnes for his kind permission to use material uncovered in the 1937 field season, and for his comments on the geology in general.

All geological boundaries and formational groupings are provisional, as determined in the field, and are subject to revision after office examination of specimens. This essay is in no way connected with the official Canadian Geological Survey report on the area.

THE DISTRICT

Location

The Tyaughton Lake Map Sheet consists of an area approximately 12 miles wide by 16 miles long. It extends from just east of Tyaughton Creek to several miles west of Gun Creek and from Bridge River on the south to just north of Tyaughton Creek (which makes a right-angled turn in the north-east corner of the sheet.) It is approximately 100 miles north of Vancouver and 130 miles east of the Pacific Coast.

Communication

The area is readily reached by motor road from Bridge River which, in turn, is served by the Pacific Great Eastern Railway from Squamish or Lillooet. An alternative approach is by auto-ferry from Lillooet to Shalalth, whence a road connects to Bridge River and the Bridge River valley. A good road connects Lillooet with Lytton which is situated on the Cariboo Highway, in direct contact with Vancouver by automobile, Canadian Pacific Railway or Canadian National Railway.

Auto roads extend along Bridge River, up to the center of Gun Lake, along Gun Creek for several miles, and up Tyaughton Creek to the bend in the N.E. corner of the sheet. From these roads numerous well used pack trails penetrate to all parts of the area.

There is telegraph and telephone connection through to Vancouver from the Bridge River Valley.

TOPOGRAPHY

Drainage

The region is drained by the Bridge River and two of its large tributaries, Gun Creek and Tyaughton Creek.

The Bridge River itself forms the southern boundary of the sheet and drains that portion of the area.

Gun Creek and its tributaries drain the western and most of the south central region. The main tributaries are Slim and Leckie Creeks from the west, Eldorado Creek from the east, and Gun Lake from the south. Gun Creek flows into the Bridge River at Minto, in the south-east corner of the map.

Tyaughton Creek runs along the east and north margins of the map. Tyaughton Lake drains into it from the south; Relay Creek from the north; and Taylor and Bonanza Creeks from the west. Tyaughton Creek itself joins the Bridge River beyond the eastern limit of the map.

Valleys

The valleys are eroded deeply, with valley-bottom elevations averaging from 3000'-3500' above sea-level. The mountains, in contrast, rise to an average elevation well over 7,000', while the highest peak attains a height of 9,400'. The sizes of the streams which now occupy the valleys are far out of proportion to the widths of these valleys. Glacial erosion has widened the valley-bottoms until now, especially in the case of the Bridge River, the stream courses are relatively narrow and of a highly developed meandering nature. Most of the smaller tributaries develop in large, flat basins which suddenly end and force the creeks to cascade steeply into the main creeks.

Mountains

Two main types of mountains occur in this region. In the south-west, the rock formation is part of the great British Columbia Coast Range Batholith. Here are typical rugged, granitic hills. Glaciers are abundant, and consequently the mountains have all glacial features such as cirques and serrated peaks. The remainder of the sheet is covered with mountains which are composed predominantly of sedimentary rocks. These are much less rugged than the granitic mountains, and are characterized by long, rounded, smooth-topped ridges and a lack of glaciers.

GEOLOGY

<u>Psychozoic</u>	[Recent:	Fluvio-glacial and volcanic ash deposits.
	[Post Lower Cretaceous:	Bendor batholith
<u>Mesozoic</u>	[Lower Cretaceous and Upper Jurassic:	Eldorado Series
	[Upper Jurassic:	Augite-diorite
<u>Palaeozoic</u>	[Devonian-Carboniferous:	Bridge River Series

Bridge River Series

This group of rocks is found chiefly in the vicinity of Minto. They extend a little to the west of Gun Lake, about two miles north of Gun Creek, and up the east side of Tyaughton Creek.

The series is composed chiefly of old meta-basalts and ribbon cherts. The meta-basalt, or greenstone, as it is commonly called, varies somewhat in different localities; but, in general, it is dark green in color, relatively soft (being easily marked with a pen-knife), and quite dense. Calcite is invariably associated with this rock. It usually occurs as small veinlets or as large, irregularly shaped pods; but occasionally it is found as amygdules, where the lava has been vesicular. In some few places the greenstone is lighter green in color and is flecked with black specks.

The cherts vary in color through various shades of green, grey, red, and often almost to black. Usually they are translucent, but some are opaque. They occur in narrow ribbons from one-quarter to two inches wide, and frequently have thin beds of argillite between the ribbons.

Some other argillites occur with the chert. These are very massive and blocky, and it is difficult to distinguish them from the greenstone.

Apparently both types of rock were laid down in water. The basalt shows, in several places, good pillow structure, typical of submarine lava flows. Another point in favor of under-water extrusion is the presence of much calcite in the lava as mentioned previously. The cherts probably formed by chemical precipitation of colloidal silica on top of the basalt.

As with most of the other rocks in the vicinity, the beds are greatly disturbed with much folding; and, in many places, they are completely overturned with the chert beneath the meta-basalt.

This group is correlated to the Cache Creek Series which are generally considered to be of Devonian-Carboniferous age.

To the north these rocks are overlain by the younger Eldorado Series of sediments, while to the west they are partially in contact with the Bendor Batholith and partially overlain by more Eldorado sediments.

Augite-diorite

A small body of augite-diorite extends from Gun Lake north-west to Gun Creek. It is a medium-to coarse-grained rock of about equal parts dark and light minerals. The dark mineral is mostly augite, and the light one is feldspar. This is the same type of rock as that in which the Pioneer Mine obtains its phenomenal gold values, but as yet no important discoveries have been reported in this particular body of rock. It has been determined, in other localities, that the age of this augite-diorite is Upper Jurassic.

Eldorado Series

The Eldorado Series is a large group of sedimentary rocks. They extend from the batholithic intrusion near the south-west corner diagonally eastward across the map sheet and northward to the northern limit of the sheet. They cover well over one-half of the total area of the region.

The chief type of rock forming the series is a dark argillite. This rock varies considerably, but is generally dark gray to black in color on the fresh surface and rusty colored when weathered. Quite often it is very finely banded, soft, and has good cleavage planes. Sometimes, on the other hand, it becomes more brittle and breaks in sharp-cornered, angular blocks. Still a third variety is very dense and so hard as to be almost a quartzite. The argillite is frequently quite limey and often very sandy.

A second member of the Eldorado group is the conglomerate formation. The typical conglomerate consists of well rounded boulders, ranging in diameter from one to thirty inches, which are held together by a limey cement. The majority of these boulders are chert, but some few are granitic and argillaceous. The chert evidently comes from the old Bridge River Series. Besides these boulders, throughout the conglomerate there occur large, irregular-shaped, angular blocks of fossiliferous limestone which are up to three or four feet in diameter. Dr. Cairnes believes that these chunks of limestone formed during the cementation of the conglomerate, and that they are not a part of some older limestone bed.

With the conglomerate, there is the usual gradation through grits of various degrees of coarseness to fine sandstone. Occasionally beds of dense, dark quartzite occur next to the sandstone.

In one or two locations, thin beds of limestone were discovered among the other beds.

The whole series is much disturbed throughout the area. Usually the beds dip quite steeply, and in the vicinity of Leckie Creek they are standing vertically. Up Eldorado Creek there is much complex folding. The series has been dated by Dr. Dolmage as partly Lower Cretaceous with some other parts probably late Upper Jurassic.

Peridotite-Serpentine Rock

Throughout the entire area, appreciable amounts of serpentinous rock occur. This rock varies from unaltered peridotite to serpentine and a complex carbonate rock. Often, when the alteration is completely carried over to serpentine, there are numerous small veinlets of good cross-fibre asbestos. These asbestos deposits, however, never attain large enough proportions to be of any commercial interest. Magnetite and chromite are usually present throughout the serpentine.

It is the opinion of Dr. Cairnes that this rock is intrusive, probably altered from some type of volcanic magma. This conclusion is arrived at from the mode of occurrence of the rock. It is most frequently found with the ribbon chert of the Bridge River Series. With this particular formation it looks very much like an intrusion, in that the serpentine appears to cut off and surround large bodies of chert. Often several of these chert bodies are quite near each other, with the serpentine between them having the appearance that it had once been molten and had flowed in around the chert.

A still more convincing illustration in favour of the intrusive idea is to be found in the Taylor Creek basin. Here a body of the carbonate rock, cutting through the Eldorado conglomerate, is exposed. The exposure is on the end of a short ridge, and looks similar to a volcanic plug which has pushed up through the sediments.

Bendor Batholith

The British Columbia Coast Range intrusion is represented in this district by the Bendor Batholith. The main body of the batholith lies to the south and west of the map area, but it does cut across the corner of the sheet. Some smaller bodies of diorite, believed to belong to the same intrusion, are located in the Eldorado-Taylor Creek basins. These are in the form of small stocks.

In general the rock composing this formation is a light gray, medium- to coarse-grained hornblende-biotite-quartz-diorite; but as the portion of the batholith exposed in this area is on the contact, there are many variations in the composition and texture of the rock. In some places the biotite is absent, with hornblende the dark mineral; while in other places the reverse is true. In one relatively large area, near Mount Dixon, the rock is very coarse-grained, and is composed predominantly of dark blue plagioclase and hornblende. In another section, between Slim and Leckie Creeks, the black minerals are nearly completely absent, and the chief mineral is pink orthoclase. Between these extremes are various gradational types of rock.

A few dikes cut the batholith, usually very high on the ridges. These dikes are, almost without exception, composed of Tertiary lavas. They are very narrow, from two to twenty feet across, and are rarely exposed more than a few feet along their strike.

The age of the batholith has been set as post Lower Cretaceous. This dating is based on the fact that in the south-west it cuts up through the Eldorado sediments which, at that vicinity, have been proved to be Lower Cretaceous in age.

Recent Deposits

All recent deposits are superficial. These are of three types, namely: stream deposits, glacial deposits and volcanic ash.

The wide valley bottoms of the main rivers are covered with sands and gravels that are being continually brought down by these rivers. This deposition is particularly heavy during high water in the late spring.

The glacial deposits occur in the large basins at the heads of the creeks.

Finally, the volcanic ash is found overlying most of the southern part of the map area. This deposit consists of a layer of fine, quartzy pumice which varies in thickness from a fraction of an inch to three feet or more. As yet, the source of this ash has not been discovered; but it is believed to lie somewhere to the west, because, as one travels in that direction, the pieces of pumice tend to increase in size.

MINERAL DEPOSITS

There are three important minerals in this area:

Gold

As in most localities, at the present time gold is the most sought-after mineral. In the summer of 1937 work was being carried on at four gold properties:

(a) Minto Mine

This mine is situated on the Bridge River, just to the east of the mouth of Gun Creek. Here the gold is associated chiefly with stibnite. Other minerals present are: galena, sphalerite, tetrahedrite, and calcite. The mineralization occurs near a large dike in the Bridge River Series.

(b) Pilot Gold Mine

The Pilot Mine is located on the western shore of Gun Lake near the center. The mineralization is in the augite-diorite formation.

(c) Jewel Mine

Roxy Creek is the site of the Jewel Mine. The gold is found with arsenopyrite in a body of serpentine.

(d) Goldside Mine

The Goldside Mine is at the head of the Taylor Creek basin. Arsenopyrite is the mineral associated with the gold, and the mineralization is found near dikes in serpentine

and Bridge River chert.

Mercury

Two properties were developing on cinnabar deposits, both of which are located in the Bridge River greenstone.

(a) Manitou Mine

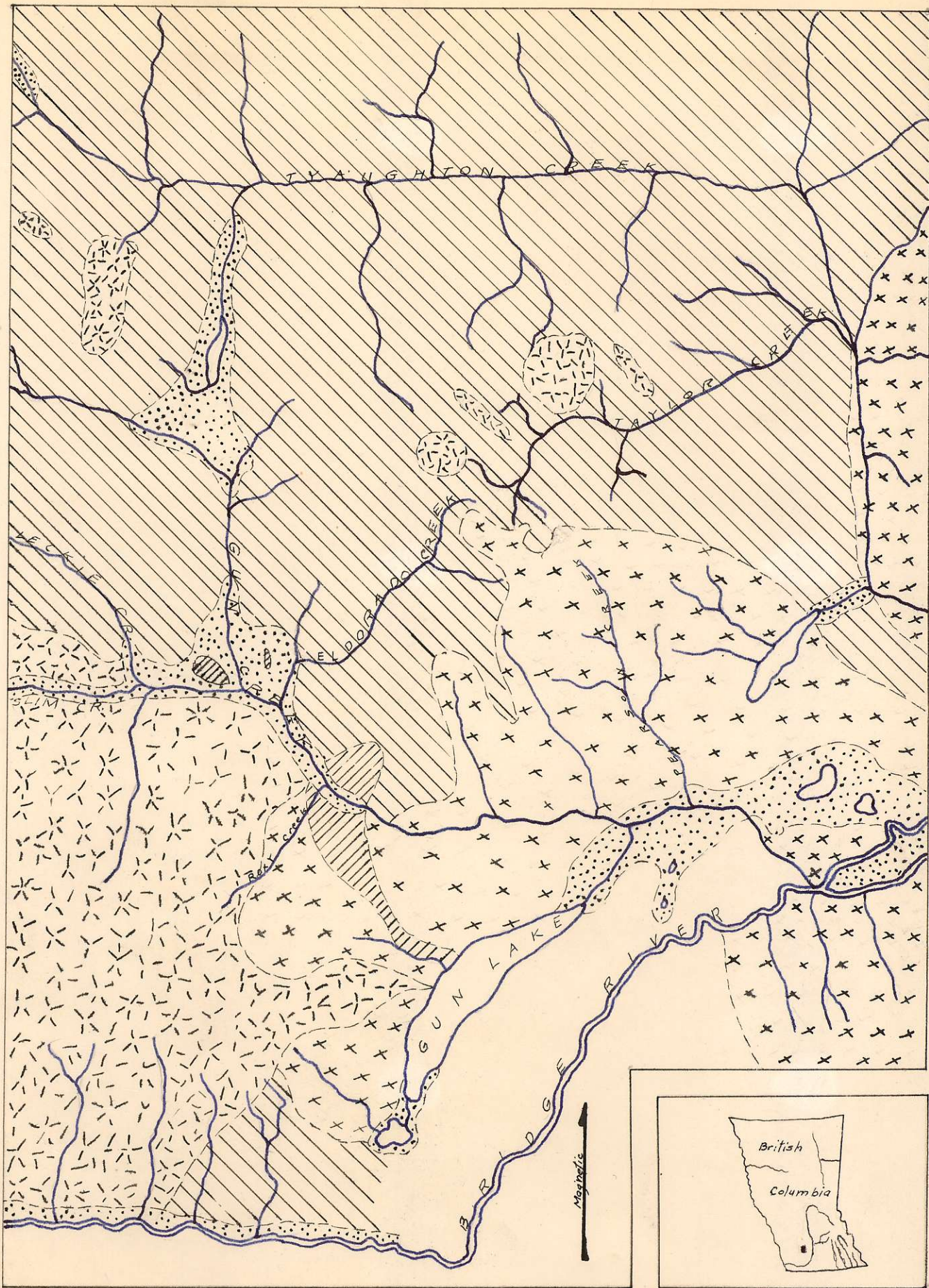
The Manitou property is situated at the Relay-Tyaughton Creek forks. The surface showings are very promising; but as yet not much underground work has been attempted, so the extent of the deposit is not very well known.

(b) Conarden Mine

This prospect is near the head of Pearson Creek. Not much work has been done here yet.

Cobalt

The Gem Mine on Roxy Creek has some cobalt showings. The mineralization is in the Bendor Batholith.



GEOLOGICAL MAP
 of the
TYAUGHTON LAKE DISTRICT
BRIDGE RIVER
BRITISH COLUMBIA
 Scale: 1 inch = 2 miles

LEGEND

- | | | |
|--|---------------------|---------------------|
| | Alluvium. |] <u>Psychozoic</u> |
| | Bender Batholith | |
| | Eldorado Series |] <u>Mesozoic</u> |
| | Augite-Diorite | |
| | Bridge River Series |] <u>Paleozoic</u> |



Meanders in the Bridge River





Pearson Creek basin; typical flat basin as at the head of most of the creeks throughout the area.



Contrast between sedimentary mountains in foreground and granite mountains in background.



Main Workings of Manitou
Mercury Mine



Typical Eldorado Conglomerate