

SUMMER ESSAY

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Fourth Year Applied Science.

(Original)

Keena

Presentation -	25	} 40.
Walter -	15	
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A BRIEF SURVEY OF THE
GEOLOGY AND ECONOMIC MINERALS
OF
LOWER KITSALT AREA
ALICE ARM^o, B.C.

Robert A. Halet.

PLAN .

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Sketch Map
LOWER K. TSAULT AREA
Larose Area



Quartzite Mountain



Kitsault River
Canyon at Camp B.



Kimskueh Lake



Haystack Mountain

Alice Arm is a branch of Observatory Inlet, which is situated on the coast of British Columbia about 600 miles north of Vancouver. The town of Alice Arm is at the head of the inlet, about 90 miles from the Pacific Ocean. It may be reached by the Union Steamship Company boat, which calls once a week, or by motor launch from Anyox. The population is about 200, consisting mostly of miners and prospectors, and all others connected with the mining industry. There are many trails, suitable for pack horses, into various parts of the district and the Dolly Vardon Railway extends from tidewater to mile 17 on the Kitsault river, thus opening up the upper Kitsault Area.

The country has the youthful topography typical of the Coast Range District of British Columbia. All the streams head in glaciers so that the valleys near the sources are broad and "U" shaped, and become deep and narrow canyons further down. The nature of the valley also depends on the country rock; if the river flows through volcanic rocks the sides are precipitous, and if it flows through sedimentary rocks the valley slopes are much gentler. This is strikingly evident in the canyon of the Kitsault River above the Dolly Vardon. Peaks rise to a maximum elevation of 6500 feet over the whole district and all of them have the serrated appearance due to glaciation. Glaciers and permanent snow fields are common throughout the country. The area between the Illiance and the North East fork is mostly a permanent snow field, with small glaciers extending from it to feed the many streams. The snouts of these glaciers are usually between 4000 and 5000 feet elevation. The large glacier at the head of the Kitsault River forms part of a large snow field extending to the tributaries of the Bear River, a distance of about 25 miles.

The climate is generally mild, high summer temperatures being rare, but the rainfall is heavy. For this reason the vegetation is rather dense and quite typical of the coast of British Columbia. The most common trees are the Hemlock, Balsam, Larch, and Spruce; most of the latter, however, have been killed by disease or the fumes from the Anyox smelter. The Douglas fir of British Columbia is conspicuous by its absence. In most localities there are no trees above 3500 feet elevation and all vegetation is lacking above 4500 feet. A great deal of the country near timber line consists of meadows with many small lakes and clumps of more or less stunted trees.

The geology was rather complicated and therefore, all the more interesting. A very little will be said about structure here, as that subject must be handled by one of greater knowledge and experience. However, the rocks consist of a volcanic series overlain by a sedimentary series. These formations were later cut by the intrusion of the Coast Range granite and other minor intrusions of a possibly younger age. No fossils were found within the area that was mapped this season, but specimens were collected from the Upper Kitsault area, which was mapped

by Hanson in 1921, and which in all probability contains the same formation. These fossils were found to be either Jurassic or Cretaceous and as the Coast Range granite is younger than the Sedimentary series they are probably Jurassic. All the formations, therefore, are younger than late Upper Jurassic. There is however, this exception. South of Silver City are found isolated masses of basaltic lavas of Tertiary and recent age. A short description of the various rocks will follow.

The sedimentary rocks range from black, fined grained, rather soft argillites and slates to WHITE QUARTZITE. ARGILLITES are found along the shores of Alice Arm as far as the granite batholith and all along the contact as far as it was explored. Nowhere was the batholith found in contact with the volcanic series. Argillites and arenaceous mudstones are also found in the Kitsault Valley, the North East fork and the Illiance. The area south of Silver City contains interbedded sandstones and slates. A band of quartzite, several hundreds of feet thick, runs through Quartzite Mountain, forming the peak and the Northwest flank. On the south side the rock is, again black, argillite. Around the town of Alice Arm the beds, strike roughly northwest and dip to the south. These rocks are fine grained and sometimes are fractured across the bedding, forming true slates. The beds are folded and fractured by a large number of small arches and minor faults. No really extensive faults were discovered, though several may have been present and certain evidence pointed to their existence. The beds are intruded by numerous quartz or calcite veins, some of which are mineralized, and by narrow dykes, which will be described later. The quartzite of Leroy Mountain is very seldom a true quartzite but generally carries a varying percentage of argillaceous material, giving it a purplish appearance. Like most of the other rocks of the district it has pyrite generously disseminated through it.

No recognizable fossils were found in the map area probably because the rocks are too highly METAMORPHOSED. However, quite a number were found in a band of sandstone near the Kitsault Glacier. These consisted of Trigonias belemnites, grypheas and some brachiopods. Ammonites, which would have definitely determined the age of the beds, were not found.

The volcanic series consists of massive breccias and finer grained lava flows. The rocks of the large canyon of the Kitsault are the purple and green breccias that form part of Hanson's Dolly Varden volcanics. The area between the Illiance and Northeast fork consists also of breccias but these have a different appearance. The Tertiary basalt of Table Mountain is black and fine grained and shows the typical columnar structure.

The most important intrusion is, of course, the Coast Range batholith. The contact of the batholith with the overlying sediments runs generally north and south but as it crosses Alice Arm it makes a sharp turn to the east and reappears on the southern shore about 3 miles east of the contact on the northern shore. Near the granite the sediments are highly altered so as to be almost unrecognizable and show some very interesting examples of contact metamorphism. The rock of this body "Ranges from granodiorite to quartzdiorite" (Hanson) with certain more basic inclusions, probably due to magnetic segregation.

Narrow lamprophyre dykes are common through^{out} the area, cutting all the other formations, therefore younger than the sedimentary series. Quartz porphyry and diabase dykes are also present, but far less numerous. Most of these dykes have a general north east strike.

There are two large and distinctive intrusions not previously mentioned. These occur as very wide dykes or narrow stocks and consist of augite porphyrite. The first of these bodies starts on the north bank of the Illiance at the foot of McGrath Mountain, crosses the top of the mountain, crosses the northeast fork at Washout Creek, ~~and~~ then narrows down to two hundred feet or less as it appears along the south flank of Quartzite Mountain and finally widens out to form a high ridge which runs parallel to the Kitsault River. The other body starts at No. 4 Peak of Theophilus Mountain and skirts the rim of the Northeast Fork valley, finally losing itself under the glacier at the head of the river. The rock is massive and consists of a greenish gray ground mass of fine grain, with phenocrysts of ferromagnesian mineral, principally augite. The texture is not uniform but shows an infinite number of phases. In some specimens the phenocrysts are large and in others they are almost lacking. The color of the ground mass varies from a greenish gray to black. Some striking differences in texture are shown on weathered surfaces, while they do not appear on a fresh break.

The chief metal mined in the district is silver though some of the properties have copper. Lead and zinc are also fairly common. Most of the veins are small and contain high grade ores, generally secondary sulfides are native metals. In all cases the oxidized zone has been eroded. The valuable secondary minerals are seldom very deep, unfortunately and the primary zone is usually rather poor for economic purposes. The valuable minerals are native silver, argentite, pyr argirite, sphalerite and galena, which are found together with pyrite. In a few properties chalcocite and chalcopyrite are present in limited quantities. The gangue minerals are quartz, calcite and barite. The best silver values occur in quartz veins, while they tend to decrease in barite veins. Most of the leads are badly faulted and fractured and therefore difficult to trace underground. Ore often occurs in lenses or pockets away from the vein. A brief description of some of the more important properties will ~~now~~ follow.

The most important property of the district was the Dolly Varden mine, which produced 1,300,000 ounces of silver from 1919 to 1921. The property is situated sixteen miles up the Kitsault River and is connected to Alice Arm by a narrow gauge railroad. The vein is located in the purple and green breccias formerly known as Dolly Varden Volcanics. It has a maximum width of twenty feet and was traced for fifteen hundred feet. It strikes roughly north east and is faulted three times. The chief minerals are argentite, pyrite and native silver in a quartz gangue, though a certain amount of pyrargirite and galena is also present. Native silver was very plentiful but it is found only in the zone of secondary enrichment, which had little depth. Below these are the primary sulfides, argentite and pyrite but these were too poor to be worked by the wasteful and extravagant methods used by the company.

The Toric Mine is situated on the east bank of the Kitsault River one mile above the Dolly Varden. This property was bonded by the Britannia Company, who were developing it during the year. A small mill had been

erected by the owners and small quantities of concentrates had been shipped from time to time. The vein is nine feet wide and contains low grade silver ore. The minerals are pyrargirite and native silver in a gangue of barite and hematite.

The Larose Mine is situated at 1500 feet above the railway at Mile 7. An excellent trail connects the property with the track and small shipments of high grade ore have been made during the last ten years. The vein strikes north and is about ten inches wide, containing argentite, pyrargirite and native silver with galena, sphalerite, arsenopyrite and pyrite. A cross cut tunnel was driven two hundred feet to the vein, which was followed to the surface, and some promising looking ore bodies were discovered in various parts.

The Sunrise property is situated near the top of McGrath Mountain about seven miles by trail from Alice Arm. The chief minerals this time is sphalerite, together with galena and silver minerals. A cross cut tunnel had been driven one thousand feet at the time of visit and ore was expected very shortly, providing there was no change in the dip of the lead. If ore has been struck on the main vein it would give a depth of five hundred feet, making this a very promising property.

The mineralization in this case probably comes from the large intrusive body which is close to the vein.

In concluding we see that all the properties in the district, though containing valuable minerals, seem to be limited to a rather small tonnage. Possibly the best arrangement would be to have a large company controlling many holdings and which would erect a mill in some central position, thus making possible a profitable exploitation. The Britannia Company has taken the first step in this direction, as it has taken options on the Toric Dolly Varden and Wolf properties and has been developing them. They have also staked a large number of surrounding claims, indicating a possible further expansion.