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DEZADEASH MAP-AREA, YUKON
(Preliminary Account)

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C O N T E N T S

Illustration

DEZADEASH MAP-AREA, YUKON

INTRODUCTION

Summary

Dezadeash map-area occupies an area of about 4,200 square miles in southwest Yukon between latitudes 60 and 61 degrees and longitudes 136 and 138 degrees. It is named after Dezadeash Lake, a body of water 12 miles long that lies at the centre of the map-area.

The present report is based on field work by the writer in 1946, when the greater part of the north half of the area was examined. The geology of that part is shown on the accompanying map. Messrs. L. O. Gouin, A. K. Roberts, and D. H. Tait assisted capably with the geological field work.

Many of the streams in Dezadeash map-area were tested for placer gold some 50 years ago by miners en route to the Klondike, and small placer operations have been carried out from time to time since then on many of the original discoveries.

Little prospecting for lode deposits has been attempted in Dezadeash area, and no metallic mineral deposits have yet been discovered.

Access

The Alaska Highway extends in a westerly direction across the north half of Dezadeash map-area. Mile-post 956 marks the east edge of the area, and mile-post 1039 is near the western boundary. The Aishihik airport road extends north from mile-post 995, giving access to Aishihik Valley and the lake district to the north of the area, whereas the Haines road, southeast of mile-post 1016 (Alaska Highway), gives access to the south and central parts, and connects the Alaska Highway with the seaport town of Haines, Alaska.

Whitehorse, largest town in, and principal supply centre for, the Yukon, is at mile 919 Alaska Highway, that is 919 miles northwest from one end of the road at Dawson Creek, British Columbia and 39 miles by road east of the eastern side of Dezadeash map-area. The town is strategically situated at the northern terminal of the White Pass and Yukon Route Railway, which connects with ocean steamships at Skagway, Alaska, and is at the head of river navigation to the mining districts farther north. Provisions may also be purchased in the Dezadeash area at trading posts located at Champagne, Bear Creek, and at mile 125 Haines road. Horses are available for hire at Champagne.

Kusawa Lake offers a ready base for prospecting the southeast sector of the area. The lake is 45 miles long and has an average width of about 1 mile. A truck road 15 miles long runs south from near mile-post 959 Alaska Highway to the north end of Kusawa Lake. The lake may also be reached from Whitehorse by descending Lewes River and ascending the Takhini, as the latter is navigable for small steamers and river boats to about 4 miles

above Mendenhall Landing. There, progress is impeded by a short rapid obstructed by numerous boulders, but small boats may be lined up or down. From there to the lake the river is swift, with many fast riffles.

Dezadeash River is navigable for shallow draft river boats and canoes powered by outboard motors, but care must be taken to avoid large boulders that occur at intervals in the stream bed. West of the Haines road the Dezadeash splits into several channels, and even the main channel may be difficult to navigate. About 2 miles upstream from where it leaves Shakwak Valley the river spreads into four or five channels, and only 12 to 14 inches of water overlay some of the bars in the main channel in July 1946.

Boating conditions are difficult on Alsek River for 6 miles below the mouth of the Dezadeash, due to the maze of channels within a wide gravel plain and to the fact that where the water is deep enough for boats it is quite fast. Farther south the Alsek is confined to a comparatively narrow channel by steep rock bluffs, and has not yet been investigated by the writer.

Canoes may be used on Dezadeash and Kathleen Lakes but at some risk, as these waters are lashed by frequent and sudden wind storms. The stream channel connecting Louise and Kathleen Lakes is navigable by boats equipped with outboard motors except for a 150-foot stretch where the stream splits into two channels and where the main channel is only 12 to 18 inches deep.

A tractor and truck road that extends west from mile 125, Haines road, gives access to Mush and Bates Lakes, and a branch tractor road at Alder Creek, 3 miles west of mile 125, extends 4 miles north to the Shorty Creek placer property.

The old Dalton trail, used 50 years ago by placer miners en route to the Klondike, crosses the map-area, and is followed for much of the distance between Klukshu and Haines by the present Haines road. From Klukshu the trail leads northeasterly on the east side of Dezadeash Lake and along Dezadeash River to Champagne. The trail continues due north from Champagne to Hutshi, then northeasterly to Nordenskiöld River Valley, which it descends and connects with the present road to Dawson, 27 miles south of Carmacks, near Montague.

An old pack-horse trail from Champagne to the south end of Taye Lake is in good condition. It continues along the northeast side of the lake, but is obstructed in places by fallen timber as a result of a bush fire in 1946.

A good trail runs south from Bear Creek to the confluence of Alsek and Dezadeash Rivers, then west to Sugden Creek. The Dezadeash may be forded near its mouth, and from there an old trail leads south for 6 miles along the beaches of Recent Lake Alsek on the east bank of Alsek River. From there the route is southeasterly up the valley of Trout Lake to Cottonwood Creek, then east over the divide to the headwaters of Victoria Creek. The trail continues southeasterly and connects with the Mush Lake tractor road 10 miles west of the south end of Dezadeash Lake. Farther southeast it ascends the valley of Fraser Creek, and then extends easterly and finally south again to connect with the old Dalton trail at Tatshenshini River.

In general the entire area is fairly open, and is well suited for the use of pack-horses in exploration work back from the roads.

Natural Resources

All of the valleys in Dezadeash map-area are clothed with abundant forest growth, and the mountain slopes are forested to an elevation of 4,500 feet. White spruce is the most plentiful and most valuable tree. It attains a diameter of 2 feet in favourable localities such as the river flats where water is plentiful. Other native trees include the lodge-pole pine, alpine fir (balsam), paper birch, balsam poplar, and trembling aspen. It is a district of comparatively light snow and rainfall except for the higher mountains where precipitation is heavy. Because of the light snow horses are able to reach food with little effort and subsist through the winters in Dezadeash and Aishihik River Valleys in spite of low winter temperatures.

The agricultural possibilities in this area are being investigated by the Dominion Experimental Farm. Several acres were cleared at Pine Creek, at mile 1019 Alaska Highway, and field crops were successfully grown there during 1945 and 1946. Garden produce such as peas, beans, carrots, and cabbage have been grown for many years at Bear Creek trading post, the long summer days being responsible for very rapid growth.

Many moose, black bear, grizzly bear, wolves, sheep, and mountain goats were seen during the 1946 field season, and according to Mr. Davis at Champagne the area yields substantial numbers of the smaller fur-bearing animals to Indian trappers. A list of the animals and birds found in Dezadeash and neighbouring areas has been published by Clarke (1946)[1], and persons

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[1] Dates, in brackets, refer to those under author's name in Bibliography at end of this report.

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interested in the wild life of the district should consult his paper. In addition, Rand (1945) has listed all of the mammals known to occur in Yukon, and his report gives considerable detailed information on this subject.

Previous Explorations

In 1882, Arthur Krause made explorations, on behalf of the Bremen Geographical Society, of Chilkoot and Chilkat Passes, at which time he reached nearly to the south end of Kusawa Lake, which he named "west Kussowa Lake". In 1890, Messrs. S. J. Wells, A. B. Schanz, E. J. Glave, and Jack Dalton ascended Chilkat River, crossed the Coast Mountains, and explored the length of Kusawa Lake.[2]

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[2] Report on the population and Resources of Alaska, 1891, Eleventh Census, p. 9.

In 1892, E. J. Glave (1892) and Jack Dalton made an overland trip from Chilkat River to Kluane Lake with four pack-horses, this being heralded as the first time that horses had been used in the district. The Chilkat River Indians had for ages used a footpath by which they travelled between the coast and the interior in order to trade with the more remote tribes living inland. This trail was made use of by Dalton, who established trading posts at Pleasant Camp on Klehini River and at Dalton House on the Tatshenshini. During the next few years Jack Dalton cut out and improved the old trail, and by 1896 it had been established as far north as the mouth of Nordenskiold River and had become known as "The Dalton Trail". J. J. McArthur made a survey of this trail in 1897, and the following year J. B. Tyrrell (1898) made a rapid geological reconnaissance along this route in addition to exploratory work north of the map-area.

Large numbers of prospectors made their way to the Klondike placer fields over the Dalton trail between 1896 and 1899, and some prospecting for placer gold was undertaken in the Dezadeash area at this time, as Tyrrell (1898) states that "Specimens of coarse gold were shown to the writer as having been taken from Alder Creek". During the summer of 1899, W. J. Peters and Alfred H. Brooks (1900) made an overland trip from Pyramid Harbour, on Lynn Canal, to Eagle City in Alaska for the United States Geological Survey. The route followed was via the Dalton trail to Dalton Post and then northwesterly to Kluane Lake by way of the valleys of Fraser and Cottonwood Creeks.

Brooks' map (1900) of the region records the occurrence of placer gold on Shorty Creek. R. G. McConnell (1905) visited the Kluane Lake area in 1904 to report on the geology and placer deposits of the district for the Canadian Geological Survey. His geological map, No. 894, covers the northwest corner of Dezadeash map-area, and his report mentions the existence of a wagon road between Whitehorse and Kluane Lake to serve the newly discovered Kluane and Ruby placer camps. Ten years later Cairnes (1915) made a traverse along the road from Whitehorse to Kluane and reported on placer mining developments in the Kluane, Ruby, and Nansen districts. His explorations are recorded on Maps 152A and 154A of the Geological Survey.

W. E. Cockfield carried out geological exploration in the Aishihik Lake area in 1926. His report (1927) and map (No. 192A, Geol. Surv., Canada) cover the area between Aishihik Lake on the north and Dezadeash River on the south, and from Canyon on the west to Mendenhall River and Sifton Mountains on the east. The following year Cockfield (1928) mapped the rocks along the Dalton trail from Champagne to the British Columbia boundary and explored the shores of Kusawa Lake (See Map 205A, Geol. Surv., Canada).

Claims were first staked on copper deposits along the valley of Lewes River near Whitehorse in 1899, and about the same time quartz veins carrying gold, silver, and antimony were discovered in the Wheaton district some 25 miles east of Kusawa Lake. The latter deposits have been described by Cairnes (1912 and 1915).

R. G. McConnell examined the copper deposits near Whitehorse in 1907 and his report (1909) includes geological maps of the larger mines. The Whitehorse map-area was covered by Cockfield and Bell between 1922 and 1924, and their report (1926) includes a compilation of the work of the earlier investigators. A revision of the geology of the Whitehorse map-area is currently under way by W. E. Cockfield and J. Fyles.

Some work was done by H. S. Bostock of the Geological Survey in 1945 along the Alaska Highway, mostly in the vicinity of Kluane Lake and westerly to the Alaskan boundary.

PHYSICAL FEATURES

Dezadeash map-area is characterized by high, rugged mountains and low, broad valleys. Shakwak Valley, which runs northwesterly from Dezadeash Lake to Kluane Lake and beyond, is the largest valley in the district. A much narrower valley extends farther southeastward from Dezadeash Lake to Kusawa Lake along the course of Kluhini River and Frederick Lake. All of the country to the northeast of this valley is part of the Yukon Plateau. It is an upland area of interlocking valleys enclosing mountain groups and ridges that seldom rise more than 3,500 feet above the valley bottoms. Dezadeash Valley, which runs east from Shakwak Valley at Pine Lake, is the second largest valley in the area. Dezadeash River follows it for 40 miles in a westerly direction from Champagne, and after crossing Shakwak Valley turns abruptly south through a narrow gap and joins the Alsek, which drains south to the Pacific. Mendenhall River, which occupies Dezadeash Valley a few miles east of Champagne, flows easterly into Takhini River and so drains northwesterly via Yukon River to the sea.

The divide between Dezadeash and Mendenhall Rivers is a low, sand- and silt-covered plain. Another low divide occurs at the south end of Dezadeash Lake; Klukshu Lake, 2 miles south of the divide, drains southerly by way of Unahini and Tatshenshini Rivers. Alder Creek, 3 miles west of the south end of Dezadeash Lake, drains westerly by way of Mush Lake, Bates Lake, and Bates River to reach the Alsek. Dezadeash River flows northeasterly from Dezadeash Lake for 23 miles to Champagne before turning westerly along the course of Dezadeash Valley. Kusawa Lake, near the east border of the map-area, trends northerly, but is of zigzag shape. It is the largest lake in the area, having a length of 45 miles and an average width of about a mile. The waters of the lake drain north and east via Takhini River to reach the Lewes.

The mountains in the southeast part of the area are typical of the Coast Mountains. The granitic terrain is developed into high, precipitous slopes with jagged, knife-edge ridges and pointed peaks that reach elevations of 7,500 feet. Dezadeash Mountains on the southwest side of Shakwak Valley, although composed largely of folded Mesozoic sedimentary rocks, are equally as high, and carry numerous alpine glaciers on the north sides of all of the higher peaks. St. Elias Mountains, which lie west of the north part of Alsek River, are much higher than the Dezadeash or Coast Mountains, many of their peaks exceeding 10,000 feet above sea-level. The central area of St. Elias Mountains is covered by almost continuous snowfields broken only by occasional projecting points of rock. Farther south, near the mouth of Bates River, these mountains swing southeasterly across the path of Alsek River, which chisels a passage through them to reach the Pacific.

During the Pleistocene or glacial period great quantities of ice accumulated in St. Elias Mountains and moved westerly towards the Pacific Ocean on the Pacific slope and towards the north and east on the interior side of the range. In Dezadeash

map-area, glacial polishing, striae, and grooving trend north to northeasterly, and together with quantities of boulder clay in all of the valleys are evidence that the ice flowed down from St. Elias Mountains and moved up all of the northerly trending valleys, over-riding the lower mountains. Many of the mountains in the plateau area north of Dezadeash Lake show evidence of glaciation up to elevations of about 5,000 feet. All of the larger valleys are floored with abundant deposits of stratified sand, gravel, and silt that overlie boulder clay, the latter being exposed in the deep cuts along the rivers. The stratified silts may well have been deposited in lakes that formed along the receding ice-front towards the close of the glacial period. In this connection it is to be noted that all eskers found in the area occur near elevations of 2,500 feet, those that formed in lower ground having been covered subsequently by the younger blanket of silts.

In comparatively recent time, possibly 175 years ago, Alsek River was dammed by the extension of the Lowell Glacier across its path. This glacier forms the west bank of the Alsek for 3 or 4 miles, commencing about 25 miles south of the mouth of Dezadeash River, and originates some 40 miles to the west near 14,500-foot Mount Alverstone. Freshly cut lake beaches are exposed all along Alsek River above the big glacier, and they extend some distance up both Kaskawulsh and Dezadeash River Valleys. The beaches are comparatively devoid of forest growth, though a few scattered spruce up to 6 inches in diameter grow there. About 210 feet above the present river level, normal, heavy forest growth marks the upper limit of the recent lake. The level of the lake appears to have receded very gradually judging from the numerous beach levels. One beach, 50 feet above the river, is lined in places with accumulations of drift-wood that have not been disturbed since the recession of the water. The driftwood is fairly well rotted, but as deadwood lasts a long time in the frigid Yukon climate it seems probable that it has lain there 100 years or more.

GENERAL GEOLOGY

Summary

The east half of Dezadeash map-area is underlain by part of the northern end of the Coast Range batholith. In the north half of the area intrusive granitic stocks are numerous as far west as Shakwak Valley. Large areas of older metamorphic rocks of the Yukon group are also found in these parts of the map-area. They include a variety of schists and gneisses of sedimentary origin, and crystalline limestone, slate, and quartzite. Dezadeash Mountains on the southwest side of Shakwak Valley are largely composed of sedimentary rocks that range from Palaeozoic to Cretaceous in age. The succession includes some bedded volcanic tuffs. These rocks are cut by stocks and dykes of peridotite and serpentine in the mountains west and southwest of Bear Creek. Sifton Mountains, northeast of Taye Lake, consist in large part of dacite, latite, and rhyolite flows and flow breccias, with some tuff and andesite. These volcanic rocks much resemble the "Hutshi volcanics" of the Laberge map-area. The Coast Range intrusions invade both the volcanic and Cretaceous sedimentary rocks, so that they may be in part of early Tertiary age. The youngest rocks in the area are comparatively flat-lying volcanic flows and flow breccias of Tertiary age that blanket several mountains and fill the valley bottoms along Alsek River near the mouth of the Kaskawulsh and southerly from the mouth of Dezadeash River.

Table of Formations

Age	Name	Lithology
Pleistocene and Recent		Silt, sand, clay, gravel, boulder clay
	Unconformity	
Tertiary		Andesite, dacite, volcanic breccia; tuff
	Unconformity	
Cretaceous and ? later		Granite porphyry, quartz porphyry
	Coast Range intrusions	Granite, granodiorite, diorite, and gabbro
Cretaceous		Dacite, latite, rhyolite, andesite, flow breccia, tuff
	Unconformity	
Cretaceous		Peridotite, serpentine, dunite, andesite
Lower Cretaceous to Jurassic		Sandstone, slate, greywacke, argillite, quartzite, chert, tuff, conglomerate
Palaeozoic (?)		Crystalline limestone, slate, quartzite
	Unconformity	
Precambrian or later	Yukon group	Quartz-mica schists, gneiss, slate, quartzite, crystalline limestone, chlorite schist

Yukon Group

The rocks mapped as Yukon group consist largely of quartz-mica schists, quartz-biotite-feldspar gneisses, crystalline limestone, and quartzite, with minor areas of quartz-sericite-andalusite schist,

garnetiferous schist and gneiss, and some chlorite schist and andesite. Great thicknesses of these rocks are exposed on the northeast side of Shakwak Valley and north from Dezadeash Lake, where they are widely invaded by granitic rocks and in many places form roof pendants surrounded by granite. The schists and gneisses are commonly interbanded with limestone and quartzite, and are obviously derived from the intense alteration of sedimentary rocks. As they are not known to carry fossil remains they are thought to be of Precambrian age. The group may, however, include some areas of highly altered Palaeozoic strata.

Some andesite is interbedded with quartz-mica schists at the north end of Kusawa Lake on the west side, and a mountain top consisting largely of andesite and chlorite schist lies 2 miles east of the north end of the lake. A few stringers containing copper minerals were noted in the latter, which is a roof pendant enclosed in granite.

Crystalline limestone exposed on the east slope of the mountain 8 miles northwest of Champagne has a thickness of well over 1,000 feet. It is a white, coarsely crystalline rock, greatly silicified at its contacts with the granite, near which also garnetiferous zones are plentiful. Crystalline limestone outcrops on the mountain 2 miles east of the north end of Sixmile Lake as bands up to 20 feet wide interbedded with wider zones of quartz-biotite and quartz-biotite-garnet gneiss, the whole about 600 feet thick. The beds are severely contorted. Cockfield (1928) reports that crystalline limestone is fairly common on the hills east of Frederick Creek.

The schists and gneisses are cut in many places by small quartz veins and by granite and pegmatite dykes. Small quartz veins containing tourmaline were noted in several places on the ridge 2 miles northwest of Canyon (intersection of highway and Aishihik River), and several small shear zones impregnated with finely crystalline pyrite were seen a mile west of Aishihik River and a mile south of the north edge of the map-area in quartz-biotite-plagioclase gneiss.

Palaeozoic (?) Limestone

Thick beds of crystalline limestone thought to be of Palaeozoic age form rugged mountain slopes 2 miles north of the mouth of Kaskawulsh River. The limestone, which ranges from grey to white and from finely crystalline to coarse, is interbedded with brown and black slates. This formation strikes northwesterly, dips from 60 to 90 degrees northeasterly, and probably underlies Mesozoic strata that form, with intrusive rocks, the mountains immediately to the northeast. The limestone is concealed in places by a surface plaster of brown amygdaloidal andesite and yellowish brown volcanic breccia of Tertiary age.

Beds of crystalline limestone more than 1,000 feet in aggregate thickness are exposed along the east bank of the Alsek commencing 7 miles south of the mouth of Dezadeash River. Here also, the limestone is interbedded with slates, and as it has much the same attitude as in the beds referred to above, and appears to be in line with them, it probably belongs to the same formation. Further evidence on the age of the limestone will probably be found when field mapping is continued.

Mesozoic Sedimentary and Volcanic Rocks

The mountain front on the southwest side of Shakwak Valley, from Dezadeash Lake northwest to the edge of the map-area, is composed largely of sedimentary rocks, with minor bodies of peridotite, granite, and serpentine. The sedimentary rocks comprise slate, greywacke, argillite, quartzite, chert, impure limestone, grit, conglomerate, tuffaceous sandstone, and volcanic tuffs. These rocks have been closely folded along northwesterly trending axes and are intersected in the same direction by many faults so that the succession and true thickness of the series are not readily apparent, but the latter probably exceeds 10,000 feet.

Fossils are sparsely distributed in areas of these rocks so far examined. A few specimens collected on the steep slope at the northwest end of Louise Lake about 11 miles west of Haines road were identified by F. H. McLearn of the Geological Survey as a species of Astarte?, of probable Jurassic or Cretaceous age. Others collected from concretions in tuffaceous sandstones on the north shore of Lake Kathleen were identified by McLearn as Aucella? sp. of probable late Jurassic or early Cretaceous age.

The passage of the Mesozoic rocks into the underlying limestone and slate formation has not yet been studied, owing to the lack of well exposed sections in the area mapped. The contact of the Mesozoic and Yukon group rocks along the course of Shakwak Valley is undoubtedly marked by major faulting, indicated in part by strong shearing of the peridotite along a northwesterly course near Jarvis River on the lower northern mountain slopes. Elsewhere the faults underlying Shakwak Valley are concealed by a heavy drift cover. A parallel fault extends up Alder Creek and is exposed for some distance on the east side of this stream near the mouth of Shorty Creek.

According to H. S. Bostock[1] of the Geological Survey, these Mesozoic sedimentary rocks are also present in the adjoining Kluane Lake region to the northwest, and some lavas are associated with them there.

[1] Personal communication.

Peridotite, Serpentine, and Dunite

Peridotite and serpentine intrude sedimentary strata of Lower Cretaceous age along the mountain front on the southwest side of Shakwak Valley between Jarvis and Dezadeash Rivers. The intrusive mass ranges from 1 to 2 miles in width and has been traced northwesterly for 12 miles to Jarvis River and may continue farther. They are generally finely crystalline rocks, and all gradations between dark peridotite and green serpentine are to be seen. In many places the serpentine has been sheared to form both talc schist and green serpentine schist, the lines of schistosity striking northwesterly and dipping about 75 degrees southwest. Near Jarvis River shearing appears to have affected the greater part of the peridotite body, but the

central core of the intrusion for a width of about 800 feet is massive and somewhat coarsely crystalline. Several small dykes of pyroxenite cut the serpentine on the mountain slope south of Summit Creek. These are partly altered to carbonate. The peridotite is traversed by numerous small calcite veins and by quartz veins.

A second body of peridotite and serpentine a mile wide lies 3 miles farther south on the west side of Dezadeash River. It trends northwesterly parallel with the peridotite belt described above, and is known to be more than 4 miles long. It forms the backbone of mountain peaks that exceed 7,000 feet in elevation.

A third peridotite intrusion, on the west side of Alsek River 6 miles south of the mouth of the Dezadeash, is about 3 miles in diameter and forms a mountain that rises about 5,600 feet above sea-level.

Dunite, peridotite, and serpentine outcrop over an area 2 miles in diameter on the west side of Kathleen River 3 miles south of its confluence with the Dezadeash. The dunite is light greenish grey on fresh surfaces, but weathers in dark reddish tones. It contains considerable magnetite. Wherever the intrusion is massive the magnetite occurs as small grains scattered throughout the rock, but where the rock is sheared the magnetite occurs as thin, filmy plates that follow the lines of flow cleavage, giving a somewhat bedded appearance. A specimen of typical iron-rich dunite was tested for chromium and titanium with negative results.

Cretaceous Volcanic Rocks

Sifton Mountains are composed mainly of hard, massive, brittle volcanic rocks that stand high above the surrounding country because they can withstand normal weathering processes. They are largely light grey, pale green, and pale purple, and much resemble both the Hutshi volcanic rocks of Laberge map-area to the northeast, described by Bostock and Lees (1938) and the Older Volcanic rocks of Aishihik Lake district described by Cockfield (1927). They are mainly finely crystalline, porphyritic rocks containing quartz, orthoclase, and albite, or orthoclase and oligoclase phenocrysts, about one-eighth inch in diameter enclosed in a groundmass that ranges from very finely crystalline quartz and feldspar to one consisting mostly of glass. Microscopic study of thin sections also disclosed the presence of small biotite flakes in some of the flows. The lavas include rhyolite, latite, and dacite, the latter two being most abundant. Small areas of volcanic breccia and tuff also occur interbedded with the flows.

On the east and west flanks of Sifton Mountains these volcanic rocks are intruded by porphyritic granite of probable Tertiary age, whereas on the south slope of these mountains the lavas are in faulted contact with Yukon group gneisses and schists. Large areas of volcanic rocks mapped as Hutshi group by Bostock and Lees (1938) about 8 miles northeast of Sifton Mountains in the Miners Range (See Laberge Sheet, Geol. Surv., Canada, Map 372A) are thought to be of the same age. There the rocks are reported to be mainly andesites, with some basalts,

but include minor light green and purple flows that probably correspond with the Sifton Mountain lavas. The lavas of Miners Range are mapped as members of the Hutshi group, a name first applied by Cairnes (1910) in describing the volcanic rocks developed along the valleys of Nordenskiold and Lewes Rivers. In Laberge area the Hutshi volcanic rocks overlie the Tantalus conglomerate, which is of Upper Jurassic or Lower Cretaceous age, so that the Hutshi group is probably of Cretaceous age.

In Laberge map-area the Hutshi volcanic rocks rest on both the Jurassic Laberge series and on Triassic Lewes River limestones, indicating an interval of folding and erosion between the time of deposition of the Tantalus beds and the extrusion of the Hutshi lavas.

Granitic Intrusions

Most of the mountains in the east half of Dezadeash map-area are composed wholly or in part of granitic intrusive rocks, which form the great Coast Range batholith that extends south along the entire length of the Coast Mountains of British Columbia. The west contact of the batholith runs approximately north and south from Dezadeash Lake. North of the map-area it swings northwest to Kluane Lake via the west fork of Aishihik River. The east boundary of the batholith extends northwesterly from Lake Bennett towards the south end of Aishihik Lake. The whitehorse copper deposits, and the gold-silver, antimony-silver, and silver-lead veins in wheaton area lie near its eastern contact. Copper deposits also occur near the north border of the batholith north of Hutshi, at Giltana Lake, and on the west side of Kluane Lake. South of the map-area copper and lead ores occur at Rainy Hollow near the west side of the batholith. Gold in the placer deposits in Dezadeash area and in the Kluane and Kloo Lake placer camps is thought to be genetically related to the batholith or offshoots from it.

As mineral occurrences are known in or close to granitic rocks in neighbouring areas, it is reasonable to suppose that lode deposits may also occur either in the granitic rocks and their associated roof pendants or in the strata along the borders of the batholith in Dezadeash map-area, and the fact that no lode deposits have yet been found may be due to lack of prospecting.

The granitic areas include rocks of several different varieties, the most common being grey, biotite granodiorite and a grey to pink, porphyritic granite. Grey, coarsely crystalline, biotite granodiorite forms the bulk of the intrusive areas in the north part of the map-area. This rock is of variable composition but usually contains from 5 to 10 per cent of both biotite and hornblende, 10 to 20 per cent quartz, 60 to 70 per cent andesine, and from 5 to 15 per cent orthoclase. The rock is mottled by glistening black faces of biotite flakes. Outcrops are generally massive, but in places near its contacts with older rocks the granodiorite has a gneissic structure. Near intruded bodies of limestone the granodiorite approaches a quartz diorite in composition.

The granite body lying between the Aishihik road and Moraine Lake consists largely of grey to pink, porphyritic granite. The principal characteristic of the rock is the presence of plentiful orthoclase phenocrysts up to 1 inch or more in diameter. Miscroscopic examination of a thin section of a specimen obtained 3 miles northeast of the junction of the Alaska Highway and the Aishihik road disclosed about 35 per cent quartz, 5 per cent biotite, 50 per cent orthoclase, and 10 per cent oligoclase. The intrusive rocks in the mountains to the northeast of Taye Lake are of very similar porphyritic granite, but the ferromagnesian mineral in the one section examined is hornblende.

A stock of light-coloured, coarsely crystalline, acidic granite intrudes the granodiorite mountain on the west side of Kusawa Lake about 4 miles south of the north end of the lake. The stock is about ½ mile wide and extends westerly for 4 miles between Kusawa and Jo-Jo Lakes. This granite is more susceptible to frost action than other igneous rocks in the district, and is generally deeply weathered, forming thick deposits of coarse, light-coloured sand. The granite consists roughly of 35 per cent quartz, 50 per cent orthoclase, and 10 per cent oligoclase, with about 2 per cent each of hornblende and biotite, and as much as 1 per cent of magnetite.

As the Cretaceous volcanic rocks northeast of Taye Lake are intruded by porphyritic granite it follows that this is probably of post-Lower Cretaceous age. It cuts the biotite granodiorite in places, but otherwise it is uncertain how great their difference in age may be.

Several dykes and stocks of quartz porphyry and granite porphyry intrude the Cretaceous sedimentary strata south and southwest of Kathleen and Louise Lakes and northwest of Louise Lake. These porphyry intrusions are of light colour and weather rusty as a result of oxidation of their small content of magnetite. They contain variable amounts of oligoclase feldspar and quartz phenocrysts in a finely crystalline groundmass of quartz and feldspar, and from 3 to 5 per cent altered biotite. Their economic significance has not yet been ascertained. They are probably younger than the granites, and may be of Tertiary age.

Diorite and Gabbro

A stock of hornblende gabbro about 1,000 feet in diameter intrudes Mesozoic sedimentary rocks on the west side of Dezadeash River, 5 miles above its confluence with the Alsek. Half a mile farther east, on the east bank of the river, quartzite, slate, and conglomerate beds are cut by narrow gabbro dykes. The gabbro in both places contains about 1 per cent magnetite, and its oxidation produces some rust on weathered surfaces.

Small, brown weathering diorite porphyry dykes intrude peridotite and sedimentary rocks in the vicinity of Mount Decoeli on the north side of Summit Creek, and a 20-foot dyke of augite porphyry cuts the peridotite on the mountain south of Summit Creek.

Two small stocks of highly fractured and altered diorite intrude Mesozoic slates and greywacke on Shorty Creek. One stock outcrops on the north bank of the creek three-quarters mile up

river from Alder Creek, a short distance west of a stock of granite porphyry. The second stock is at the forks, a little more than a mile up Shorty Creek. These diorite stocks are impregnated with finely disseminated pyrite that has largely oxidized as a result of deep surface weathering, and outcrops are now covered by thin films of reddish brown limonite.

These intrusions are probably of about the same age as the granitic intrusions previously described. Both bear the same intrusive relationships towards Mesozoic sedimentary rocks, and are generally considered to be of Cretaceous or early Tertiary age.

Tertiary Volcanic Rocks

Tertiary lavas outcrop for several miles along Alsek River south and west from the mouth of Dezadeash River. Four miles southwest of the mouth of the Dezadeash a mountain formed of Tertiary volcanic rocks displays a thickness of 3,100 feet of successive volcanic flows and associated beds of breccia and tuff. The strata strike northerly and dip about 10 degrees east. On the mountains 8 miles farther south, flat-lying Tertiary volcanic rocks overlie older folded rocks and form peaks whose elevations exceed 6,500 feet.

One mile west of the mouth of Dezadeash River the Tertiary flows are finely crystalline, massive, green andesites that weather in bright shades of orange, yellow, red and brown due to the oxidation of contained iron minerals to hematite and limonite. At Sugden Creek, the lowest exposures are of fine-grained massive dacite, and, a little farther north, of amygdaloidal porphyritic andesite containing chalcedony and calcite amygdules an inch or more in diameter. This andesite rests unconformably upon Palaeozoic limestones and slates and upon intrusive peridotite dykes, at the first canyon above the mouth of the creek.

At the first narrows on Alsek River, 6 miles south of the mouth of the Dezadeash, the rock bluffs along the river comprise gently dipping beds of volcanic breccia. About a mile farther south the volcanic breccia unconformably overlies folded beds of Palaeozoic crystalline limestone. A massive flow of medium-grained, dark brown weathering andesite that outcrops half a mile north of the first narrows appears to overlie the volcanic breccias. It displays some columnar jointing, and is well marked by glacial striae and grooves that trend nearly south. It is evident that these Tertiary flows fill a valley that was incised during Late Cretaceous or early Tertiary time. They are probably of about Miocene age, since which time present drainage has been established. The chief interest in these volcanic rocks, from an economic viewpoint, is that they doubtless protected gold-bearing placer gravels from ice erosion during the glacial period.

STRUCTURAL GEOLOGY

The general strike of the Mesozoic and older sedimentary and volcanic rocks is northwest, and the beds generally dip at angles greater than 45 degrees to the southwest or northeast.

The Mesozoic sedimentary rocks in the Dezadeash Mountains west of Dezadeash Lake are overturned in many places as a result of thrusting from the southwest, and they are traversed by many faults that trend north by west. One of these faults is exposed for half a mile along the east side of Alder Creek near the mouth of Shorty Creek. Northwest of Kathleen Lake the beds are less severely folded, but at Quill Creek several thrust faults were observed. Strong shearing of the peridotite in a northwesterly direction at Jarvis River suggests major faulting along the mountain front on the southwest side of Shakwak Valley. The evidence indicates a probable early uplift of the area underlain by Yukon group rocks and Coast Range intrusions on the northeast side of Shakwak Valley, followed at a much later period by folding, faulting, and overthrusting of the softer Mesozoic beds on the southwest side of this valley.

Several northeasterly trending faults traverse granodiorite west of Dezadeash River and north of Sixmile Lake, and the narrow, drift-filled Dezadeash River Valley may itself follow such a fault zone between Dezadeash Lake and Mount Bratnober.

Faults that traverse granitic intrusive rocks east of Moraine Lake near the north edge of the map-area strike only a few degrees west of north. These have not yet been examined, but are clearly defined in aerial photographs.

ECONOMIC GEOLOGY

Placer Deposits

Intermittent placer mining for gold has been carried out in Dezadeash area since 1896 when the Dalton trail was first used by miners en route to the Klondike. Small-scale placer operations are known to have been carried out to date on the following streams: Kimberley Creek, Sugden Creek, Shorty Creek, Goat Creek, Alder Creek, Victoria Creek, Bates River, Wolverine Creek, Iron Creek, Squaw Creek, Tatshenshini River, Marshal Creek, and Primrose River. Placer mining by Barker and Ray on Shorty Creek in 1945 and 1946 marks the most extensive mining done in the area. Production at Shorty Creek was 738 ounces of gold during 1945 and 1,336 ounces of gold during 1946.

During the glacial period all of the main valleys in Dezadeash area were choked with ice that moved northerly away from the gathering grounds of the high St. Elias Mountains. These valley glaciers scoured away what may have been workable gold placer deposits and scattered them widely. Those placer deposits that remain owe their survival to local physical features that protected the gravel beds from erosion. Thus, short streams that headed in high mountains on the south and flowed northerly were protected from the valley glaciers, which flowed around such obstructions. Gravel deposits along such streams in Dezadeash area are probably all worth testing for placer gold.

Some of the Tertiary gravels along stream beds adjacent to Alsek River were protected from ice scouring by a covering of Tertiary lava flows. Where recent streams have cut through shallow coverings of these flows to reach the older gravels they may have revealed workable grades of placer ground.

Sugden Creek, which joins the Alsek 4 miles west of the mouth of Dezadeash River, is such a stream below the first rock canyon, where considerable placer mining was done some 40 or 50 years ago. The production is not known.

Shorty Creek is a short, easterly flowing stream that rises in a high basin in the mountains 5 miles west of Dezadeash Lake. It empties into Alder Creek, which occupies a very narrow and deeply cut valley that trends northwesterly. Stagnant ice probably occupied Shorty Creek basin during the glacial period, and as a result its gold-bearing placer gravels were not subjected to scouring action. Alder Creek Valley was undoubtedly choked with ice at that time due to the pressure of ice from the south, but there could have been little or no movement of ice up Alder Creek owing to its steep gradient and very narrow profile. Two small diorite stocks that intrude the Mesozoic sedimentary rocks on Shorty Creek are thought to have provided some of the placer gold. These stocks are highly fractured and contain numerous small quartz stringers. Both altered diorite and quartz stringers are impregnated with a little pyrite.

Lode Deposits

Few attempts have been made to prospect for lode deposits in Dezadeash map-area, and no such deposits have yet been found. The early prospectors were interested only in placer mining, and the few who visited the area since the building of the military roads have been discouraged by the physical hardships of prospecting in an area of such high and rugged mountains. As mineral occurrences are found associated with the Coast Range granitic intrusions, or with the rocks that they invade, in areas neighbouring the Dezadeash area, it is reasonable to assume that mineral occurrences should be found under similar conditions in this area.

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