Geological Survey of Canada
GEORGE M. DAWSON, CMG, LLD, FRS, DIRECTOR
1898

Sheet

№ 11

LEGEND

- Breccia (Granitic fragment)
- Lzb — Upper Volcanic Group (chiefly basalts) — Miocene
- Lzs — Tranquille Beds &c — Miocene
- Ld — Coldwater Group — Oligocene
- H — Nicola Formation — Triassic
- G — Cache Creek Formation (Marble Canon Limestones?) — Carboniferous
- G — Cache Creek Formation (lower members) — Carboniferous
- C — Adams Lake Series — Cambrian
- C — Nisconlith Series — Cambrian
- A — Shuswap Series (and foliated granites) — Archæan
- Gneissose and Granitic rocks (not differentiated) — Archæan
- Plutonic Rocks (chiefly granites) — Archæan
- Limestone beds in Cache Creek and Shuswap — Archæan

Compiled and drawn by James McEvoy, B.A.Sc.

Roads
Pack-trails
Exploratory routes
Indian Villages
Sites of old Indian Villages (Kekuilee houses)
Depth of water
Height above sea-level

Natural Scale: 1/253,440

Scale 4 Statute Miles to 1 Inch

Geographical Miles

Contours 250 feet vertical interval

Longitude West from Greenwich.

BRITISH COLUMBIA
SHUSWAP SHEET
GEOLOGICALLY COLOURED
by
George M. Dawson, C.M.G., LL.D., F.R.S.
assisted by
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1898

Canada Engraving and Litho Co. Limited, Montreal and Ottawa.

GEOGRAPHICAL AND TOPOGRAPHICAL DATA

Instrumentally surveyed lines as follows:—Line of Canadian Pacific Railway, as measured for Base and surveys within the Railway Belt, by Topographical Surveys Branch. British Columbia Government Land Surveys, chiefly about Okanagan Lake and White Valley.

Observations for latitude, sketches, and surveys of Adams and Shuswap Lakes, by G. M. Dawson.

Apart from the above sources of information, the geographical outlines, with the whole of the topography, depend upon triangulation, track-surveys and sketches by J. McEvoy.

EXPLANATORY NOTES

The south-western half of the area comprised by this map-sheet is, in general, pretty thickly covered with superficial or "drift" deposits due to the Glacial period, but such deposits are much less abundant and often very scanty in its north-eastern part, which is mountainous. Boulder-clay is the most widespread of these deposits, but it seldom exposed in the valleys and lower tracts, which are generally bordered by successive terraces and floored with alluvium. A well characterized deposit, which has been named the "White Silt formation," is found in many places to a height of about 1700 feet above sea-level. It may be seen forming terraces along the South Thompson, and it floors the wide valley followed by the railway east of Notch Hill Station, but does not occur along the borders of Adams, Shuswap and Mabel lakes that run back into the more mountainous country. The valleys of these lakes were probably still occupied by glacier-ice at the time of its deposition. The superficial deposits are not indicated on this map, which relates entirely to the "solid geology."

MIOCENE.

The rocks assigned to this period are almost entirely of volcanic origin. On the Kamloops sheet, adjoining this to the west, it has been possible to distinguish an upper and lower volcanic series, both of which are believed to be Miocene, but no distinct representatives of the lower series have been found on this map-sheet. Basalts and basalt-breccias are the predominant rocks, the first-named often forming wide and nearly horizontal flows. The basalts are seldom distinctly columnar, and more often show a lamination or flow structure. They are frequently vesicular, and then often hold zeolitic minerals or chalcedony. Fine-grained augite-porphyrites also occur and obsidian has been noted on Martin Creek and at the southern end of the small volcanic patch east of Pillar Lake, Boleau Creek. Rough basalt-breccias were particularly noted at the following places:—Upper part of Ta-haet'-kun Mountain, north of Sucker Creek; higher parts of hills south of Sucker Creek; about Pis-o-cor Lake; on the head-waters of Salmon River, especially on Red Canon Creek and at Red Pillars; on Robins Creek, south of Ducks, and on the hills east of Monté Creek.

The upper part of Trinity Hills, west of Mabel Lake, consists of a granite breccia, capping layers of brownish basalt, which is also brecciated in places. The granitic breccia has evidently been brought to the surface by explosive forces connected with the close of the period of vulcanism. A similar breccia, mingled with fine tuff, has been noted on the west side of Okanagan Lake, nearly opposite Mission, some distance south of the area of this map-sheet.

In the area of the Kamloops sheet, stratified tuffs known as the Tranquille beds are often found separating the upper and lower volcanic series, and similar beds probably occur locally at other horizons. On this map-sheet sedimentary rocks of the same character appear in a few places, but it is not certain that they are exactly contemporaneous with the Tranquille beds proper, although they underlie basalts or basalt-breccias. Such beds are found at the west end of Trinity Hills, holding obscure fossil plants; on the north side of the Salmon River valley east of Grande Prairie, and on the north bank of Sucker Creek valley. No lignites or coals have been observed in connection with these beds in the area of this map-sheet.

COLDWATER GROUP.

Rocks referred to this group occur on the North Thompson valley, in the extreme north-west angle of the map-sheet. They antedate the period of Tertiary volcanic eruptions, and are believed to be of Oligocene age. As represented on this map-sheet they consist of ordinary water-formed shales and sandstones, holding seams of bituminous coal, one or more of which may prove to be of workable dimensions.

NICOLA FORMATION.

These rocks are referred to the Triassic period, although it is not certain that their lower limit corresponds exactly with the base of that system. No fossils have been found in them within the boundaries of this map-sheet, and their reference is here based on stratigraphical evidence and on lithological resemblance to rocks of this formation on the adjacent Kamloops sheet, with which those in the south east corner of the present map-sheet are continuous. No evidence of an upward passage to Jurassic beds has been found on this map-sheet, where, it is probable, the higher beds of the Nicola series are wholly wanting. The rocks are almost entirely of volcanic origin, and may in general terms be described as "greenstones." Diabases and diabase-porphyrites are abundant and are occasionally still amygdaloidal. Agglomerates composed of similar materials and passing into tuffs also occur. The colours are generally greenish, grey or purplish. In the area on the South Thompson, the rocks are less altered in appearance than usual, and green and purple colours are prevalent. They closely resemble the beds next with near the east end of Nicola Lake (Kamloops Report, p. 13 B). A calcareous grit or conglomerate occurs at the base of the volcanic beds, resting unconformably on the Cache Creek limestones.

CACHE CREEK FORMATION.

Fossils of Carboniferous age have been found, sparingly, in limestones of this formation, in a number of places on this map-sheet, more particularly near the South Thompson, at Grande Prairie, near Vernon, and on the south branch of Cherry Creek. It is possible, however, that rocks of greater age than the Carboniferous may be included under the formation-colour, and the limits bounding this colour, particularly on the side of the Cambrian, are often fixed with difficulty and open to considerable doubt. The Marble Canon Limestone or upper member of the series, important in the Kamloops sheet, has not been clearly differentiated on this map-sheet, but it is probably represented, in a reduced form, by the areas coloured with vertical blue lining. The massive and highly altered limestones indicated on Adams and Shuswap Lakes by the same colour, are classed with doubt as Cache Creek. If correctly referred, it is probable that the beds immediately underlying them at these places also belong to the Cache Creek rather than to the Adams Lake series, from which, however, it is now impossible to separate them on account of the great metamorphism they have suffered.

The mass of the Cache Creek formation within the limits of this map-sheet, consists of dark argillites, greywackes, quartzites (sometimes cherty) intercalated beds of limestone and materials of volcanic origin, the latter being chiefly much decomposed diabases or diabase-porphyrites and amphibolites. All these rocks locally become schistose where they have been subjected to pressure and other agents of metamorphism.

The small area north of Barrière River is referred to the Cache Creek with doubt and has been very imperfectly defined.

The limestones of the Cache Creek are often pure and well adapted for the manufacture of lime. Gypsum is known to occur at one place in considerable mass, in the Salmon River valley near Grande Prairie. Quartz veins are often abundant, particularly in the vicinity of Okanagan Lake, where these have been found in several places to hold gold and silver in promising amount. Gold is also found in quartz veins on Monashee Mountain, just south of the border of the map-sheet.

ADAMS LAKE SERIES.

This and the underlying Nisconlith series are classed as Cambrian. Their stratigraphical relations are well seen within the limits of this map-sheet, but they have yielded no fossils, the age assigned depending upon the fossiliferous series in the Rocky Mountains, with which sections in the Selkirk Range form an intermediate and connecting link. (Kamloops Report, p. 20 B). The Adams Lake series consists almost entirely of altered volcanic materials. Where best displayed, on Adams and Shuswap Lakes, it comprises a great thickness of chlorite, felspathic, sericitic, and sometimes nacreous schists, with occasional argillites. In the lower part of the series the schists are generally grey, in the upper usually green. The northern edge of the grey schists, crossing Adams Lake north of Skwa-am Bay, runs to the forks of Scotch Creek and reappears in the east part of Shuswap Lake nearly opposite Quartzite Point; but it is not everywhere well defined. Irregular beds of limestone occur in the upper part of the series, but no attempt has been made to define these on the map. These schists have resulted from the dynamic metamorphism of more massive volcanic rocks, into which they can be traced. The same rocks are seen in a partially altered condition, as schistose diabases and schistose diabase-agglomerates, in the belt which follows Louis Creek and reaches the South Thompson. The grey schists appear to be derived chiefly from the agglomerates. The rocks near Adams River are notably massive and show little evidence of pressure. Between Seymour and Anstey Arms of Shuswap Lake, the rocks assigned to this series (not without doubt) are very greatly altered and consist largely of micaceous, hornblendic and gneissic schists.

Silver and copper ores occur in these rocks near Adams Lake. Copper ore has been found on Copper Island, and veins of a similar character have been noted at several places in the vicinity of Shuswap Lake. Placer deposits of gold have been worked near Barrière River, on Louis, and on Scotch Creeks.

NISCONLITH SERIES.

This series lies conformably beneath the last, but contains little, if any, contemporaneous volcanic material, consisting essentially of dark-grey to black argillite-schists or phyllites, sometimes graphitic, and passing into mica-schists where highly altered, as near Seymour Narrows. These schists are usually calcareous, and in places, as in the vicinity of Shuswap Lake, are largely represented by flaggy or schistose dark-coloured limestones. Grey and blackish quartzites also occur and become notably abundant and characteristic in the area east of Okanagan Lake and that north of Cherry Creek.

This series appears to have been deposited upon a very irregular surface, and although often of great thickness, varies much in that respect.

The limestones are often sufficiently pure to yield good lime. Rich silver ore and argentiferous galena have been found on Cherry Creek where gold placers of some importance have also long been worked.

SHUSWAP SERIES.

This series, where typically developed, consists of greyish gneisses, occasionally hornblendic or garnetiferous glittering mica-schists, and some hornblende schists, with beds of crystalline limestone and quartzite. The gneisses, when in association with the last-mentioned beds, are often highly calcareous or siliceous and generally rusty on weathering, and graphite is often present in these gneisses as well as in the quartzites and limestones. The rocks described undoubtedly represent parts of a bedded series, but are associated with a much greater mass of mica-schists, gneisses and granitoid gneisses, many parts of which are evidently foliated granites, from which it is impossible to separate them. The frequent recurrence of quartzites among these latter rocks, however, appears to show that they are at least in part the result of a foliation of the same bedded series. On the other hand, these gneisses often pass gradually into unfoliated granites from which they are also inseparable on the map. The actually observed outcrops of limestone are noted on the map, as well as the general direction of foliation or bedding wherever this has been determined with approximate accuracy. Elsewhere, the gneissic and associated granitic rocks are merely indicated by a general tint.

The Shuswap series proper is evidently referable to the Archæan, and is much like the Grenville series of the Laurentian of Eastern Canada. This resemblance extends to its manner of association with the foliated rocks that resemble the 'Fundamental Gneiss' of the same region.

PLUTONIC ROCKS.

The rocks classed together under this name are chiefly granites, but are somewhat varied both in lithological character and age. Those forming extensive areas in close association with the Shuswap series have already been noticed. They are probably for the most part of great antiquity and often contain masses and veins of pegmatite which also penetrate the gneissic rocks. The granite areas on the west edge of the map, with those south of Little Shuswap Lake, on Scotch Creek, and others, are distinctly intrusive in character and somewhat different in aspect. They probably date, like those on the Kamloops sheet, from a period subsequent to the Triassic. In the vicinity of Okanagan Lake, some pink granitic rocks, largely composed of orthoclase felspar, are probably still more recent. Diorites and syenites also occur locally, and in a mass of the last-named rock near Edward Creek and Lolo Mountain, traces of gold are found.