GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

SHEET 82 N (West Half)

LEGEND

CENOZOIC

QUATERNARY
PLEISTOCENE AND RECENT

- **14** Glacial drift, silt, alluvium; areas of little or no outcrop

PALAEOZOIC

ORDOVICIAN TO DEVONIAN

- **13** FAIRHOLME GROUP: dark grey to black cliff-forming carbonate rocks, quartzite
  Buff dolomite
  MOUNT WILSON FORMATION: quartzite, dolomite

CAMBRIAN AND ORDOVICIAN
UPPER CAMBRIAN AND LOWER ORDOVICIAN

- **11, 12** 11. McKAY GROUP: buff, grey, and green limy slate, limestone; minor limestone conglomerate
  12. MONS AND SARBACH FORMATIONS: green and orange limy slate, oolite limestone, grey, well-bedded limestone and buff dolomite

CAMBRIAN
UPPER CAMBRIAN

- **9** LYELL FORMATION: interbedded dark grey limestone and buff or yellowish brown dolomite, and argillite
  SULLIVAN FORMATION: grey, thin-bedded limestone; dolomite,
  ARCTOMYS FORMATION: orange and pale green slate, dolomite, and limestone

MIDDLE (?) CAMBRIAN

- **8** Grey carbonate rocks; relationship to 7 unknown
- **7** CANYON CREEK FORMATION: limy slate, limestone

MIDDLE AND/OR UPPER CAMBRIAN

- **10** Thin-bedded, grey, argillaceous limestone and dolomite

LOWER CAMBRIAN

- **3** DONALD FORMATION: interbedded sandstone, slate, and limestone; all commonly have a pinkish cast
- **2** Pale brown and grey grit, quartzite, grey, green, and maroon slate; quartz-mica schist and micaceous quartzite; mafic volcanic rock

SELKIRK MOUNTAINS ONLY

PRE-MISSISSIPPIAN

- **6** LARDEAU GROUP
  Very incompetent rocks; 6a, dark grey to black phyllite, graphitic schist, thin-bedded dark grey limestone; 6b, dark grey lustrous phyllite, sericite schist, quartzite, yellowish brown friable crystalline limestone

CAMBRIAN (?)
LOWER CAMBRIAN (?)

- **5** BADSHOT FORMATION: white and grey crystalline limestone
- **4** HAMILL GROUP
  Undivided; 4a, grey, grey-green, rusty weathering slate, quartz-sericite schist, grey and white quartzite; 4b, pale green and white crossbedded quartzite; minor slate, conglomerate; 4c, amygdaloidal greenstone, greenstone breccia, bedded tuff

PROTEROZOIC

WINDERMERE

- **1** HORSETHIEF CREEK GROUP
  Varicoloured slate, quartzite, limestone, feldspathic quartzite, and pebble conglomerate; coarse breccia and conglomerate

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- **A // Aa** Grey, silvery, and golden brown quartz-mica schist, mica schist, micaceous quartzite, gneiss, pegmatite, amphibolite
  Aa; crystalline limestone

POST LOWER CAMBRIAN

- **B** Granitic rocks undivided; Ba, hornblende-biotite granodiorite; Bb, monzonite,

MID-PALAEOZOIC (?)

- **C** Nepheline syenite

Geological boundary (defined, approximate or assumed)
Limit of geological mapping
Bedding (inclined, vertical, overturned, tops unknown)
Schistosity and gneissosity (inclined, vertical)
Slaty cleavage (inclined, vertical)
Fault (defined, approximate, assumed)
Anticline (defined, approximate, arrow indicates direction of plunge)
Syncline (defined, approximate, arrow indicates direction of plunge)
Anticline, syncline (overturned)
Fossil locality
Area of metamorphic rocks
Mineral property

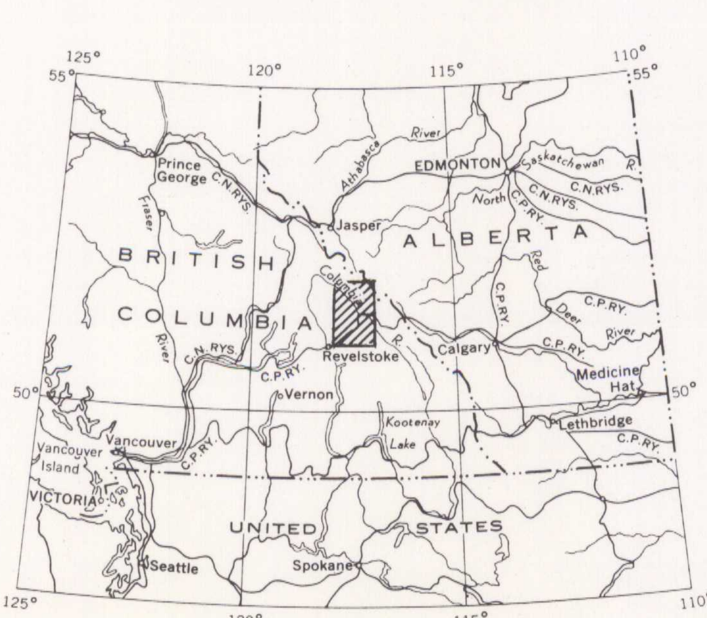
Geology compiled by J.O. Wheeler from published reports and and from field work by J.O. Wheeler, 1959 and 1960

Main highway
Other roads
Trail
Railway
Park boundary
Intermittent stream
Marsh
Glacier
Contours (interval 1,000 feet)

Cartography by the Geological Survey of Canada, 1961

Approximate magnetic declination, 23° 27' East

In response to public demand for earlier publication, Preliminary Series maps are issued in this simplified form and will be clearer to read if all or some of the map-units are hand-coloured



INDEX MAP

PUBLISHED, 1961
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MAP 4-1961

GEOLOGY
ROGERS PASS
GOLDEN, (WEST HALF)
BRITISH COLUMBIA - ALBERTA

Scale: One Inch to Four Miles = $\frac{1}{253,440}$

Miles 4 2 0 4 8 12

Geographical names subject to revision

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa

DESCRIPTIVE NOTES

Travel within the map-area is arduous away from the railway and roads. Below an elevation of about 7,500 feet the valleys are heavily timbered or thickly matted with underbrush. Trails are generally heavily overgrown except for those in Glacier National Park. Above timber-line rock exposures are good, but serrated ridges, cliffs, and crevassed snowfields and glaciers locally require the use of ropes and mountaineering techniques.

The Horsethief Creek group (1) is probably more than 5,000 feet thick in Dogtooth Mountains. There, Evans[1] subdivided the group into four members. Feldspathic quartzite and pebble-conglomerate at the base is succeeded by a lower slate member. The slate is in turn overlain by a limestone member with an upper slate member at the top. Small outcrops of sheared, orange- and brown-weathering breccia and conglomerate, similar to the Toby formation in areas to the southeast, occur close to the fault west of the head of Canyon Creek.

Map-unit 2 in Dogtooth Mountains comprises two quartzite members separated by varicoloured slates. The unit is more than 5,000 feet thick between Lang and Cirque Creeks but thins to about 1,500 feet just east of the map-area. The uppermost quartzites contain the Lower Cambrian trilobite Callavia.

Quartzites and slates similar to those in Dogtooth Mountains can be traced along strike into the Rocky Mountain Trench between Beavermouth and Bush Lakes. Interbedded quartzite and slate, locally metamorphosed to micaceous quartzite and garnet- and kyanite-bearing quartz-mica schists, are exposed in the Rockies mainly northwest of Bush River[2].

An amygdaloidal mafic flow, 20 feet thick, occurs at the head of Oldman Creek between map-unit 2 and the overlying Donald formation.

The Donald formation (3) has a maximum thickness of about 1,500 feet near Canyon Creek. Lower Cambrian trilobites and archeocyathids have been found in several parts of the formation.

The Hamill group (4) is divisible into two members. The lower member (4b) is predominantly a thick-bedded, commonly cross-bedded quartzite with minor slate and schist. Mafic volcanic rocks (4c), now altered to greenstone, occur within the lower member near the head of Bachelor Creek and west of Tangier Pass. Slate is more abundant in the upper member (4a). A belt of slate extending from the head of Goldstream River to upper Mountain Creek, tentatively mapped as upper Hamill, may be Horsethief Creek group.

The Hamill group is overlain by the Badshot formation (5) which near Déville Névé apparently consists of one bed of limestone. Near Tangier River the Badshot formation comprises three beds of limestone, two of which are probably the same bed repeated by folding. The limestone commonly contains argillaceous partings and lenses, and mud balls.

Slates of the Canyon Creek formation (7) have yielded Middle (?) Cambrian fossils found by H.M. Ami between Beavermouth and Donald. Slates and thin beds of limestone, like those just east of the map-area on the lower part of Canyon Creek, occur on either side of Bush River near the mouth of Chatter Creek.

Grey carbonate rocks (8) are exposed in the cores of two anticlines passing through Bush Mountain. They are overlain by the colourful Arctomys formation, the lowest of three Upper Cambrian formations (9). The Arctomys formation is overlain by the Sullivan formation, which is thinly bedded but appears massive and poorly bedded from a distance. The uppermost formation, the Lyell, is a well-bedded, brightly coloured unit that generally displays spectacular folds.

Map-unit 10 resembles both the Sullivan formation and parts of the Middle Cambrian Chancellor formation that occurs along strikes east of the map-area.

The McKay group (11) is poorly exposed in the Rocky Mountain Trench. The Mons and Sarbach formations (12), on the other hand, are well exposed in the Rockies. North of Bush River the lower formation—the Mons—is principally argillaceous, but to the south, where it is composed of more thickly bedded and more resistant limestone and dolomite, it is more like the overlying Sarbach formation.

Map-unit 13 comprises three formations: the Ordovician Mount Wilson quartzite; overlain by grey and buff, well-bedded dolomite; in turn overlain by cliff-forming, abundantly fossiliferous carbonate rocks of the Fairholme group of Upper Devonian age. Some quartzite occurs at the base of the Devonian rocks on Lyell Creek.

Siliceous metamorphic rocks (A), commonly containing garnet, staurolite, and kyanite and coarsely crystalline limestone (Aa), underlie the northern Selkirk Mountains where they are probably equivalents, in part, of the Horsethief Creek group.

Granitic rocks (B) occur at the head of Battle Brook. The Adamant batholith is predominantly a mafic-rich hornblende-biotite granodiorite (Ba) with an eccentrically located core of monzonite (Bb). The batholith contains numerous pegmatite dykes, some of which carry tourmaline. Small bodies of nepheline syenite (C) are exposed in the Rockies northwest of Bush River.

The structural axis of Selkirk Mountains extends from the head of Battle Brook north-northwestward through Glacier, past Mount McNicoll to Mount Sir Sandford. West of this axis, thrust faults dip northeast as do the axial planes of both asymmetrical and overturned folds. West of Tangier River the folds plunge steeply east to southeast and their axes do not conform to the regional northwest trend. East of the Selkirk Mountain axis, in Selkirk and Dogtooth Mountains, thrust faults and, for the most part, axial planes of folds dip westward.

In the Rockies the character of the structure varies from one fault block to another. Adjacent to the Rocky Mountain Trench northwest of Bush River an overturned fold in the metamorphic rocks of map-unit 2 has a southwest-dipping axial plane.

The structure is variable in map-unit 10 west of the major thrust fault passing northeast of Blackwater Range. Near the Rocky Mountain Trench the axial planes of minor folds, slaty cleavage, and thrust faults dip mainly northeast. Away from the trench, with few exceptions, faults and axial planes of folds are nearly vertical. Between Bluewater Creek and Bush River the rocks are cut by a persistent, almost vertical, northwesterly trending cleavage and by numerous faults parallel with it

Folds in map-unit 2 west of the Chatter Creek fault have steeply dipping to vertical axial planes.

The structure of the remaining area to the northeast is characterized by folds with west-dipping axial planes, by steep normal faults, and by west-dipping thrust faults, one of which, near Lyell Icefield, brings Upper Cambrian rocks onto Devonian rocks.

The Rocky Mountain Trench along Succour Creek and southeast is underlain by the incompetent McKay group and is bounded by faults that dip away from the trench. From Beavermouth to Bush Lakes the trench contains low hills formed of Lower Cambrian rocks (2) faulted against the McKay group. Northwest of Bush Lakes the trench is less than a mile wide and is developed along a fault zone within metamorphic rocks.

Mineralized material on the Crown Point property at the head of McMurdo Creek consists principally of stringers and lenses of galena and less sphalerite in limestone.

The Waverly group[3] exposes oxidized lead-zinc ores in the Badshot limestone. Ore minerals on the nearby Tangier group[3] consist of pyrite, galena, sphalerite, and jamesonite as lenses in a vein. The workings are abandoned and in poor condition.

[1] Evans, C.S.: Brisco-Dogtooth Map-area, B.C.; Geol. Surv., Canada, Sum. Rept. 1932, pt. AII, pp. 106-176 (1933).
[2] Fyles, J.T.: Geological Reconnaissance of the Columbia River between Bluewater Creek and Mica Creek., Ann. Rept., Minister of Mines, B.C., 1959, pp. 90-105 (1960).
[3] Gunning, H.C.: Geology and Mineral Deposits of Big Bend Map-area, British Columbia.; Geol. Surv., Canada, Sum. Rept.1928, pt. A, pp. 136-193 (1929).
[4] Okulitch, V.J.: Geology of Part of the Selkirk Mountains in the Vicinity of the Main Line of the Canadian Pacific Railway, British Columbia; Geol. Surv., Canada, Bull. 14 (1949).

MAP 4-1961
ROGERS PASS
GOLDEN, (WEST HALF)
BRITISH COLUMBIA-ALBERTA
SHEET 82 N (West Half)