GEOLOGY
E.& N.E. NIDDERY LAKE
N.T.S. 105O - 7N1/2, 8N1/2, 9, 10, 15, & 16
Scale 1:50,000

Compiled by M.P. Cecile 1981, 1986.

Geology by M.P. Cecile, 1979, 1980, 1984, 1985, and published maps of S.L. Blusson (1974) and J.O. Wheeler (1954).

LEGEND FOR MAP SYMBOLS

- Geological boundary (defined, approximate, assumed, speculative)
- Bedding (horizontal, inclined, vertical overturned)
- Cleavage (inclined, vertical)
- Normal fault (defined, approximate, assumed; symbol on hanging wall)
- Reverse fault (defined, approximate, assumed; teeth on hanging wall)
- Anticline, syncline (arrow in direction of plunge)
- Anticline, syncline (overturned)
- Minor fold (showing fold plunge and dip of axial plane)
- Granitic dyke (Cretaceous)
- Springs: - H (hot); - C (cold)
- F, f - Fossil locality: F - collection taken; f - no collection taken; g - graptolites; p - vascular plants; s - shelly fauna; t - trace fossil
- MF - Microfossil collection taken (for conodont identification)
- C-123456 - I.S.P.G curation number
- Camb. - Cambrian, Ord. - Ordovician, Sil. - Silurian, Dev. - Devonian, Miss. - Mississippian, Penn. - Pennsylvanian, Perm. - Permian; E - Early; M - Middle; L - Late
- Outcrop in an otherwise extensively covered area (usually shown in valley bottoms) and fossil sites

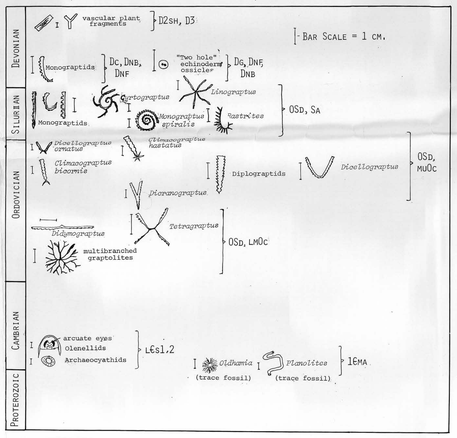
Gr - Arenig, Ca - Caradoc, Ll.and. - Llandovery, Ly. - Ludlow, Pr. - Pridolian, Lech. - Lochkovian, Pra. - Pragian, Zl. - Zlichovian, Eif. - Eifelian, Giv. - Givetian, Frs. - Frasnian, Fam. - Famennian, Tou. - Tournaisian, Vis. - Visean, Sud. - Sudetian

MINERALS

- ZnO-0.28%, 20 m - means assayed 0.28% of ZnO over a 20 m stratigraphic interval
- Zinc, rocks react to zinc nap ..... ZN
- Zinc moss, bright yellow-green sphagnum moss that retains water in droplets at the moss surface ..... ZnMs
- Barite: n - nodular; wgn, veins ..... Ba-n, (Ⓢ), Ba-wgn
- Barite, thick, laminated ..... BA
- Norwegite, $BaMg(CO_3)_2$, occurs as platy, heavy, grey sedimentary rock, reacts with HCl ..... Nrs
- Witherite ..... $BaCO_3$
- Copper, minor chalcocite; malachite, bornite stain ..... Cu
- Idaite (copper iron sulphide) ..... Cu-Id
- Phosphorite, minor occurrences ..... P
- Pyrite, massive ..... Py

ACKNOWLEDGEMENTS – The area was mapped by ground traverses from helicopter supported fly camps. Field assistance was given by Rob Gibeau (1979), Brian Fischer (1980), Craig Hart (1984) and Peter Mustard (1985). Helicopter support was given by Northern Mountain Helicopters (1979, 1984, 1985), Kenting Helicopters and La Verendrye Helicopters (1980). Expediting Services were provided by Stirling Expediting (1979, 1980) and Ross River Services (1984, 1985). S.P. Gordey (GSC Vancouver) and Canadian Nickel provided logistic support in 1980. Many hours of discussion with S.P. Gordey, G. Abbott, W.D. Goodfellow, E. Debicki, B. Robertson and A. Robertson, were invaluable in helping to unravel many complexities in these map areas. Fossil ages shown on the map are from internal reports by B.S. Norford, G.S. Nowland, R.S. Tipnis, A.C. Higgins, T.T. Uyeno, W.C. Fritz, and H. Hofmann.

ILLUSTRATIONS OF SELECTED FOSSILS COMMONLY FOUND IN MAP UNITS INDICATED.



SOURCE OF CHART ILLUSTRATIONS:

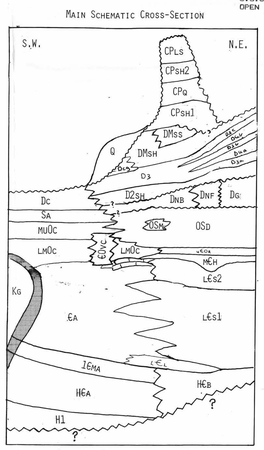
Churkin, M. Jr. and Carter, C., 1972: Graptolite identification chart for determination of geological age; U.S.G.S., Oil and Gas Investigations chart, OG66.

Norford, B.S. and Cecile, M.P., 1981: Occurrence of Oldhamia and other trace fossils in Lower Cambrian(?) argillites, Selwyn Mountains, Yukon (N.E. Niddery Lake, 106 O); G.S.C. Paper 81-1A.

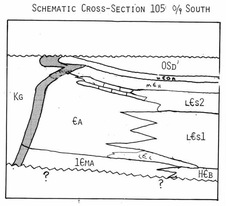
Norford, B.S., 1982: Illustrations of Cambrian fossils Cambrian, Ordovician and Silurian of the western Cordillera; G.S.C. Paper 82-14.

FOR OTHER 105 O MAP-AREA GEOLOGICAL MAPS SEE G.S.C. OPEN FILES 1006, 1119, 1241 AND D.I.A.N.D. OPEN FILE ON THE MACMILLAN FOLD BELT.

MAIN SCHEMATIC CROSS-SECTION

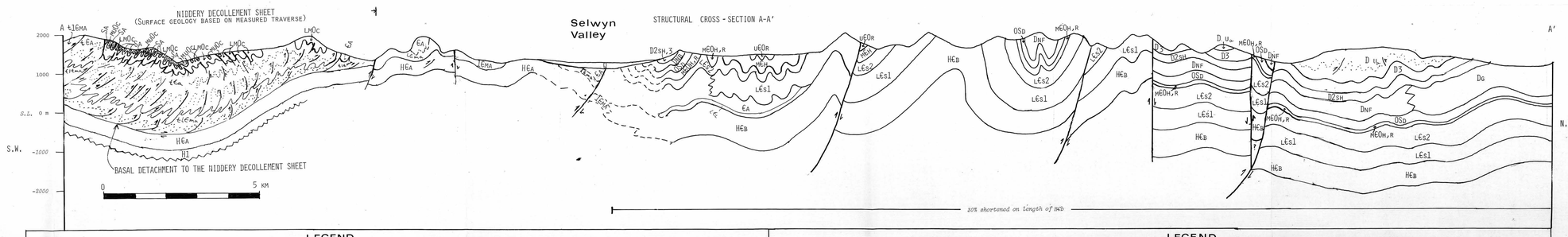


SCHEMATIC CROSS-SECTION 105 O/4 SOUTH



All rock units with the prefix 'H' are Hadrynian and Lower Cambrian. Hadrynian units are distinguished from each other, resulting in a succession of tectonic units which mimic the original stratigraphy. Such units are tightly folded, and faulted and tectonically thickened to 300% by stacking of fault slices, anticlinal fold noses are sheared off and synclinal fold keels are sandwiched between fault slices which contains fault slices of other stratigraphic units.

STRUCTURAL CROSS-SECTION A-A'



LEGEND
SOUTHWEST OF THE SELWYN VALLEY

PLEISTOCENE AND RECENT

- (T) — $Du_{a,v}$: light brown to grey weathering porous, calcareous

PLEISTOCENE AND RECENT

- QRA — Rock avalanche, unconsolidated, huge blocks of chert pebble conglomerate - NO KNOWN OUTCROP SOURCE IN AREA?

CRETACEOUS

- Kg — Quartz monzonite and granite; b - with biotite; bh - with biotite and hornblende

- Alteration halo; contact metamorphic zone around Kg intrusions; crystalline carbonates, well indurated shale, siltstones, schists, phyllites and skarns. Altered map units as shown.

DEVONIAN
LOWER AND MIDDLE DEVONIAN

- Dc — Chert, dark grey to black, medium bedded, massive; with 10-20% shale, whitish black to black weathering; shale occurs as partings between chert beds and as a 5 m thick unit with monograptids at the base of the succession. Measured +80 m thick.

SILURIAN
LOWER TO LATE SILURIAN

- SA — Argillite, very rusty dark green to buff weathering, thin bedded; minor shale, black, graptolitic, shale occurs in thin units or as partings; minor dolostone as a single medium to thick, massive, bright orange bed near the base of the succession. Measured 20 to 30 m thick.

ORDOVICIAN
MIDDLE AND LATE ORDOVICIAN

- MUOC — Chert, black, thin bedded; with 30-50% shale, whitish black to black weathering; shale abundantly graptolitic, especially Diplograptids; minor argillite, green near base of succession. Measured 10 to 25 m thick.

LOWER AND MIDDLE ORDOVICIAN

- LMOC — Chert, white, dark grey and black weathering, drab grey from a diatoms, resistant; thin to medium bedded and argillaceous in lower part; more massive and extensively bioturbated in upper part; minor shale parting, thin units with mainly monad graptolites; very minor limestone, buff to brown weathering (as one to six thin beds near the base of the succession. Measured 60 to 120 m thick.

CAMBRIAN

- EA — Argillite, buff and dark green weathering, thin bedded (pervasively cleaved); locally black shale forms a major part of the succession; minor limestone, buff weathering thin bedded, minor quartzite, thin bedded, fine grained; minor volcaniclastic sandstone, green weathering, blocky partings; a unit of thin bedded limestone can be mapped at the top of the unit in north 105 O-8 map area. Estimated to be 600 m thick.
- Ev — Volcaniclastic sandstone and volcanic tuff.
- Eav — Interstratified succession of EA and volcaniclastic rocks; in some areas volcanics make up 50% of the succession.

LOWER CAMBRIAN

- 1EMA — Argillite maroon and apple green weathering, thin bedded, pervasively cleaved; minor quartzite and quartz pebble conglomerate, green and white weathering; contains trace fossils Planolites and Oldhamia. Measured 50-120 m thick.

HADRYNIAN AND CAMBRIAN
HADRYNIAN AND LOWER CAMBRIAN:

- HEA — Argillite, green, black and buff weathering, thin bedded, pervasively cleaved; with 5 - 10% quartz sandstone and quartz pebble conglomerate, thin to thick bedded, and forming resistant units. Measured 400 m thick.

HADRYNIAN

- H1 — Limestone, arenaceous limestone; upper part grey weathering, blocky parted, massive; middle part dark grey weathering, thin bedded, mainly limestone; basal part buff weathering, thin to medium bedded, very arenaceous and with minor sandstone. Base of unit not exposed. Estimated 200+ m thick.

ORDOVICIAN AND SILURIAN
LOWER ORDOVICIAN TO LOWER(?) SILURIAN

- OSD — DUO LAKE FORMATION: shale, black, recessive, graptolitic; occurs as interstratified thick units of rusty black shale, calcareous black shale and siliceous shale; minor siltstone, buff weathering, thin bedded; minor limestone, brown weathering, arenaceous; minor volcaniclastic sandstone; and includes thin LMOC. Estimated 100-300 m thick.

CAMBRIAN AND ORDOVICIAN
LOWER(?) CAMBRIAN TO (?) ORDOVICIAN

- EOVC — Sandstone, volcaniclastic, brown weathering, green to grey fresh surfaces, medium to very thick bedded, massive; minor basaltic lapilli tuff and welded tuff. Estimated 100 to 200+ m thick.

UPPER CAMBRIAN AND LOWER ORDOVICIAN

- UEOR — RABBITKETTLE FORMATION: limestone, pale yellow and grey weathering, medium to thick bedded; interstratified with 30% argillite and shale. Measured northeast of the Selwyn Valley as 60 - 120 m thick.

CAMBRIAN
MIDDLE CAMBRIAN

- MEH — HESS RIVER FORMATION: shale, black, pyritic, unfossiliferous, occurs as interstratified thick units of rusty black and calcareous black shale in S.E. 105 O/4. Estimated 100 m thick.

MINERAL EXPLORATION NOTE – TUNGSTEN, GOLD - KEELE PEAK AREA

Sedimentary strata flanking the Keele pluton contain two distinct limestone units, several metres to 10's of metres thick, which are structurally repeated numerous times on the northwest side of the pluton and at least once on the east side. These are the same limestone units that host the MacTung ore body. On the northwest there are three small (few hundred metres in diameter) satellite plutons, one of which (westernmost) is partly capped by a rich sulphide skarn and distreme breccia. All three satellites have a strong magnetic anomaly associated with them and there is a fourth anomaly which apparently has no exposed pluton with it. In addition, although there are no satellite plutons exposed on the east side, there is one strong and one weak magnetic anomaly in the area where limestone units are repeated at least once on flat thrusts. There is a very good possibility that these anomalies are due to skarn presence, just below the surface, of satellite plutons. If so, there may be a very well developed skarn capping these plutons.

LEGEND
SELWYN VALLEY AND NORTHEAST OF THE SELWYN VALLEY

PLEISTOCENE AND RECENT

- (T) — $Du_{a,v}$: light brown to light grey weathering, porous, calcareous.

PLEISTOCENE AND RECENT

- Q — Unconsolidated glacial and alluvial deposits.

PLEISTOCENE AND RECENT

- QRA — Rock avalanche, unconsolidated, extensively eroded

MISSISSIPPIAN TO PERMIAN

- CPLs — Calcarenite, siliceous, white to buff weathering in fetid brown and orange, weathering in cuteny, medium to thin bedded, matrix fine to medium crystalline, clasts fine to very coarse grained; minor grey quartzite. Estimated 20+ m thick.
- CPsh2 — Shale, calcareous, black; with 10-20% calcarenite units, siliceous, grey-white weathering, distributed through the shale succession but increase in abundance upwards. Estimated 160-200 m thick.
- CPq — Quartzite, brown to buff weathering, resistant, blocky partings, fine to medium grained; usually well indurated, usually clean and well sorted, locally scour surfaces and shale intraclasts are abundant. Measured 220-300+ m thick.
- CPsh1 — Shale, calcareous, black; with 10-30% limestone, arenaceous, buff weathering, platy partings; limestone units distributed through the succession. Measured 120-280 m thick.

DEVONIAN AND MISSISSIPPIAN
UPPER DEVONIAN AND LOWER MISSISSIPPIAN

- DCG — Conglomerate, chert-pebble, dull brownish grey at a distance; minor beds and units of lithic sandstone, brown weathering black shale, and bluish weathering siliceous black shale; conglomerate usually moderate to poorly sorted, medium to thick bedded; conglomerate framework is generally intact, but can be impacted or suspended in a sandstone matrix; clasts are mainly chert but locally as much as 5 - 10% are argillite, shale and/or quartzite. Thickness measured in the 105 O-4 map area is 750 m, estimated range is 0 to 1000 m. Associated shale beds contain abundant vascular plant fragments and, in northwestern 105 O-3 map area, large metre scale logs-casts are found at the base of thick conglomerate beds.

DEVONIAN
MIDDLE AND UPPER DEVONIAN

- DZSH,3 — Undivided DZSH and D3

DEVONIAN
MIDDLE AND UPPER DEVONIAN

- D3 — Siltstone, siliceous, bluish white to black weathering, platy to slabby; some minor units flasile; some units rich in vascular plant fragments; upper 30-50 m usually includes a thick unit with barite nodules; locally thick successions of laminated barite and/or metre-scale lenses of platy, brown-weathering limestone, that are composed of black acicular calcite crystals. Measured 100-450 m thick.
- DZSH — Shale, siliceous, black, recessive; thin limonitic beds; some units with abundant vascular plant fragments; minor sandstone and/or chert-pebble conglomerate as beds or thick units. Measured 10-400 m thick.

LOWER AND MIDDLE DEVONIAN

- DNB, DNF — NATLA FORMATION: limestone, calcarenite, calcirudite, shale: F - limestone, dusky grey to white weathering, thin bedded; with 10-30% calcarenite and/or calcirudite as massive tongues and lenses; and with 10-30% shale, calcareous, black; contains "two-hole" echinoderm ossicles, monograptids. Measured 200 m thick. B-as in F but with shale at 30-40% and calcarenite and/or calcirudite <10%.

ORDOVICIAN AND SILURIAN
LOWER ORDOVICIAN TO LOWER SILURIAN

- OSD — DUO LAKE FORMATION: shale, black, recessive, abundantly graptolitic; occurs as interstratified thick units of black calcareous shale and rusty black shale; minor chert, black. Measured 120-340 m thick.

CAMBRIAN AND ORDOVICIAN
UPPER CAMBRIAN AND LOWER ORDOVICIAN

- UEOR — RABBITKETTLE FORMATION: limestone, pale yellow weathering, resistant, medium to thick bedded; contains large argyallaine pyrite nodules and ubiquitous fossil trails oriented parallel to bedding but found throughout individual beds on a lamellae scale; interstratified with 30% shale, calcareous, grey-black. Measured 80-150 m thick.

CAMBRIAN
MIDDLE CAMBRIAN

- MEH — HESS RIVER FORMATION: shale, black, pyritic, unfossiliferous; occurs as interstratified thick units of black calcareous shale and rusty black shale; shows marked changes in thickness, and where only a few metres thick, is dominantly chert. Estimated and measured as 10 to 120 m thick.

LOWER CAMBRIAN

- ES-LES2, 1-LES1 — SEKWI FORMATION: 1-limestone, silty limestone, orange and grey weathering, recessive, thin bedded; minor siltstone and black shale; 2-limestone and limestone slope breccia, grey to dark grey, resistant, thin bedded, fine to medium crystalline; locally abundant trilobite fauna and brachiopod coquina. 1 and 2 combined measure approximately 900 m thick, Fritz, 1976, G.S.C. Paper 76-22, Section 6.
- EA — Argillite and shale, buff to dark green and black respectively; occurs as a tongue estimated to be as much as 100 m thick in a small area of N.E. 105 O/5.

HADRYNIAN AND CAMBRIAN
HADRYNIAN AND LOWER CAMBRIAN

- HEB — BACKBONE RANGES FORMATION: quartzite, red-brown and minor grey or green weathering, blocky partings; massive or laminated, fine to medium grained; minor siltstone, maroon weathering. Only upper part exposed. Estimated 200+ m thick.

DEVONIAN
MIDDLE AND UPPER DEVONIAN

- DU a,v — Sandstone, brown weathering, medium to thick bedded; massive, laminated, ripple cross-laminated; fluke casts and mud chips common; interstratified with 20-50% shale or siltstone, grey to black; shale units can be traced for several kilometres. Interfingers with the D3. Total thickness estimated as 400+ m.

DEVONIAN
LOWER AND MIDDLE DEVONIAN

- DG — GRIZZLY HEAD FORMATION: limestone, white grey weathering, cliff forming, blocky partings, massive, fine to medium crystalline; scattered corals, brachiopods, bryozoans and "two-hole" echinoderm ossicles.

ORDOVICIAN AND SILURIAN
MIDDLE ORDOVICIAN TO EARLY SILURIAN

- OSM — MARMOT FORMATION: lapilli tuff to volcanic breccia, altered, calcareous, brown to green weathering; occurs in lens to 0.5 km E-W, 106 O/4. Estimated 0-100+ m thick.

CAMBRIAN TO SILURIAN
MIDDLE CAMBRIAN TO EARLY SILURIAN

- MESH,D — HESS RIVER AND DUO LAKE FORMATIONS: undivided in N.E. 106 O/4 and N.W. 106 O/4 where Rabbitkettle strata are replaced by time equivalent shale.
- MESU — HESS RIVER, RABBITKETTLE AND DUO LAKE FORMATIONS: undivided in areas of poor exposure and tight, small-scale folding.
- MEOH,R — HESS RIVER AND RABBITKETTLE FORMATIONS: undivided.

- €Ou — Undivided Cambrian to Devonian strata

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CANADA

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