LEGEND

ROCKY MOUNTAINS

QUATERNARY
Qa *Till, alluvium*

CAMBRIAN
UPPER CAMBRIAN
€su *Sullivan Formation: shale, calcareous shale, interbedded with limestone*

MIDDLE AND UPPER CAMBRIAN
€wa *Waterfowl Formation: limestone with dolomite partings, partly silty and sandy*

MIDDLE CAMBRIAN
€ar *Arctomys Formation: orange-weathering shale, interbedded with dolomitic siltstone and dolomite.*

€pk *Pika Formation: limestone, mainly dense; dolomite and minor shale*

€el *Eldon Formation: limestone, mainly dense, dolomite-mottled, massive; equivalent to Titkana Formation*

€st *Stephen Formation: shale with interbedded limestone; equivalent to Tatei Formation (Cta)*

€ca *Cathedral Formation: limestone, mainly dense, dolomite-mottled, massive; equivalent to Chetang Formation (Cct)*

€mw *Mount Whyte Formation: shale, calcareous, with interbedded siltstone and limestone*

LOWER CAMBRIAN
€ho *Hota Formation: massive limestone and dolostone, minor sandstone (stratigraphic diagram only)*

GOG GROUP (Cmn- Cma)

€ma *Mahto Formation: fine grained quartz sandstone and siltstone, plane and ripple cross laminated; minor shale; minor limestone at top*

€mu *Mural Formation: interbedded calcareous shale and siltstone and minor quartz sandstone; locally limestone at base; overlain by dark green calcareous shale with limestone or dolostone at top*

€mn *McNaughton Formation: white quartzite at base, ripple cross laminated; overlain by quartz sandstone and siltstone with minor interbedded shale; capped by quartz sandstone, planar and cross laminated; minor shale. North of Wood River may include Jasper Formation.*

UPPER PROTEROZOIC AND LOWER CAMBRIAN
Pє j *Jasper Formation: feldspathic quartz sandstone, planar and trough cross laminated; minor red shale and quartz pebble conglomerate (Note 3)*

PROTEROZOIC
UPPER PROTEROZOIC
WINDERMERE SUPERGROUP
MIETTE GROUP (Pml- Pmu)
Upper Miette Group

Pmu *Brown to grey slate and minor sandstone, thinly graded; contains minor carbonate and massive conglomeratic sandstone (grit) near top.*

Middle Miette Group

Pmm3 *Massive conglomeratic sandstone (grit); sandstone; interbedded with grey-green to grey slate*

Pof *Old Fort Point Formation: bright green to olive green pelite with interbedded siltstone and sandstone; overlain by dolomitic and calcareous siltstone interbedded with limestone; overlain by dark grey to black carbonaceous pelite*

Pmm1 *Massive conglomeratic sandstone (grit); sandstone; interbedded with grey-green to grey slate*

Lower Miette Group

Pml *Black and dark grey phyllite, phyllitic schist, minor quartzite and black limestone units (stratigraphic diagram only)*

u€ *Upper Cambrian; Undivided (cross-sections)*

Pm *Miette Group; Undivided*

MIDDLE CAMBRIAN
CHANCELLOR GROUP (Ctc- Ckb)

€kb *Kinbasket unit: limestone, marble; minor interbedded grey calcareous phyllite; locally brown-weathering calcareous phyllite with minor marble*

€tc *Tsar Creek unit: graphitic schist, dark grey to brown; minor marble and quartzite; locally greenish-grey calcareous phyllite*

CARIBOO MOUNTAINS (All Units In Stratigraphic Diagram Only)

PROTEROZOIC
UPPER PROTEROZOIC
WINDERMERE SUPERGROUP

Cariboo Group

Pi *Isaac Formation: black shale, slate; minor black carbonate, grit*

Kaza Group
Upper Kaza Group

Pku *Massive conglomeratic sandstone (grit); sandstone; minor grey green to grey pelite; intervening grey-green and lesser black pelite map units*

Pof *Old Fort Point Formation Equivalent: pink quartzite; calcareous cross-bedded psammite and green laminated pelite; calcareous psammite, laminated pelite, and buff sandy marble; black graphitic schist*

Middle Kaza Group

Pkm *Massive conglomeratic sandstone (grit); sandstone and conglomeratic sandstone; minor grey-green to grey pelite; intervening grey-green and lesser black pelite map units; minor sulphide-rich graphitic pelite near the base*

Lower Kaza Group

Pkl *Black graphitic phyllite, dark grey to black silty pelite; minor slate, semipelite, biotite schist; grit, and calcareous amphibolite*

SELKIRK AND MONASHEE MOUNTAINS

PROTEROZOIC
UPPER PROTEROZOIC
WINDERMERE SUPERGROUP
MICA CREEK SUCCESSION (Plg - Pmcm)

Pmcm *Middle Marble unit: white to grey marble; minor pelite, calcsilicate;*

Pspa *Semipelite-Amphibolite unit: semipelite, psammite, micaceous psammite, amphibolite,pelitic schist, and grit; local matrix-supported pebble to boulder conglomerate with clasts of quartzite, marble, calcsilicate, and granitoid rocks; minor calcareous psammite, marble, and micaceous quartzite; minor migmatite*

Plc *Lower carbonate unit: marble, calcareous psammite, calcsilicate, pelite; minor semipelite and amphibolite*

Plp *Lower pelite unit: pelitic schist, semipelite; minor local amphibolite and marble*

Plg *Lower grit unit: pelitic schist, conglomerate, minor psammite, grit and amphibolite*

Pmci *Mica Creek succession; Undivided*

MALTON COMPLEX
PROTEROZOIC
UPPER PROTEROZOIC
WINDERMERE SUPERGROUP

Pcs *Cover sequence to Malton Gneiss: pelite, semipelite, minor grit, local quartzite and l or conglomerate at base (equivalent in part to lower pelite unit of Mica Creek succession and lower Miette Group; stratigraphic diagram only)*

Pbc *Basal conglomerate unit: Matrix- to clast-supported pebble to cobble conglomerate with brownish biotite-rich calcareous matrix. Clasts of underlying quartzite, amphibolite, and granitoid units. Abundant boudinaged quartz veins appear as clasts. Pbc unconformably overlies quartzite or gneiss and forms the base to the Windermere Supergroup (stratigraphic diagram only)*

MIDDLE OR UPPER PROTEROZOIC?

Pq *Quartzite unit: fine-grained foliated to mylonitic muscovite-rich quartzite, minor quartz-pebble conglomerate, orthoquartzite (stratigraphic diagram only)*

LOWER PROTEROZOIC

Pmgi *Malton Gneiss Undivided: foliated granitic orthogneiss, foliated biotite, hornblende granodioritic to dioritic orthogneiss, layered quartzose paragneiss, mafic amphibolitic gneiss, and amphibolite (stratigraphic diagram only; other gneiss units of Malton Complex include Pgcg: Gold Creek Gneiss; Pyg: Yellowjacket Gneiss; and Pbg: Bulldog Gneiss)*

Geological boundary: (defined, approximate, assumed, arbitrary boundary between subdivided and non-subdivided units)

Thrust fault: (teeth on hanging wall; defined, approximate, assumed, projection under younger deposits)

Detachment: (teeth on hanging wall; defined, approximate, assumed, projection under younger deposits)

Normal fault: (symbols on hanging wall; defined, approximate, assumed, projection under younger deposits)

Proterozoic normal fault: (symbols on hanging wall; assumed, projection under younger deposits)

Antiform, trace of axial surface: (defined, approximate, projection under younger deposits; upright, overturned)

Synform, trace of axial surface: (defined, approximate, projection under younger deposits; upright, overturned)

D1 fold nappe, trace of axial surface; S, syncline; A, anticline; vergence unknown where unadorned: (approximate, projection under younger deposits)

Bedding: (inclined, vertical, overturned)
First foliation (S1+2): (inclined, vertical)
Layering / foliation in granite: (inclined, vertical)
Second foliation (S3): (inclined, vertical)

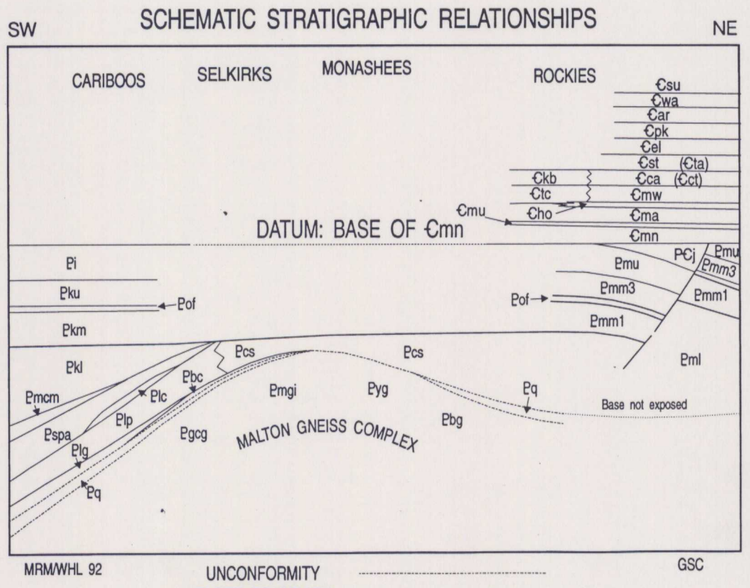
Mesoscopic F2 fold axis: (inclined, horizontal)
Mesoscopic F3 fold axis: (inclined, horizontal)
Stretching lineation (D2): (inclined; horizontal)

Mineral isograds (approximate, projection under younger deposits; ticks on high grade side):

biotite
garnet
staurolite/kyanite
staurolite-out

Line of section (18)

SCHEMATIC STRATIGRAPHIC RELATIONSHIPS



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NOTES

1. Geology of the Monashee Mountains is from Campbell (1968), Robbins (1976), and unpublished mapping by P.S. Simony. Geology of the Rocky Mountains is from Lickorish (in prep.), Craw (1977, 1978), and unpublished mapping by J.O. Wheeler and P.S. Simony. Geology of the northern Selkirks is from Mitchell (1976), Perkins (1983), and unpublished mapping by P.S. Simony. Inferred geology under Kinbasket Lake is from pre-flooding (pre-1973) unpublished mapping by P.S. Simony.

2. Bedding-parallel to -subparallel S_1 foliation of the Rocky Mountains is equivalent to composite foliation S_{1+2} of the Monashee and Cariboo mountains. S_{1+2} is a composite or transposition foliation that developed over 10's of m.y. S_2 crenulation cleavage of the Rockies is equivalent to S_3 crenulation cleavage of the Monashee and Cariboo mountains (see Simony *et al.*, 1980; Morrison, 1982; McDonough and Simony, 1988; McDonough, 1989).

3. The Jasper Formation was included in the McNaughton Formation by Mountjoy (1962) in the Mount Robson area. Charlesworth *et al.*, (1967) used the term Jasper Formation to define the succession of quartz sandstones which occur beneath the unconformity at the base of the Gog Group near Jasper, as defined in the Lake Louise area by Aitken (1969). The deposition of the Jasper Formation is thought to be in fault-bounded basins, producing thick sequences in hanging wall half-grabens, thinning westward, and absent on uplifted footwall blocks (see structure-section 17a and stratigraphic diagram) such as in the Lake Louise area (Aitken, 1969), and in the Solitude Range (Gal, 1990).

4. The stratigraphy of the Mica Creek succession is discussed in detail by Simony *et al.*, (1980) and Pell and Simony (1987), who referred to the package as part of the Horsethief Creek Group (HTCG). However, the type Horsethief Creek Group contains a marker of clear Old Fort Point affinity (Root, 1987; Kubli, 1990), and is correlative to the Miette Group of the Rockies. The type-HTCG is interpreted to overlie the Mica Creek Succession. The geochemistry of SPA amphibolites is discussed by Sevigny (1988). An alternative view of the stratigraphy of the Cariboos (and by inference the Monashees) is presented by Murphy (1991; see also Murphy *et al.*, 1991) in which the Mica Creek succession is separated from the Kaza Group by a southwesterly vergent Jurassic thrust, the Pleasant Valley thrust of Struik (1986).

5. The stratigraphy of the Mica Creek Succession (Windermere Supergroup) is typically separated from basement gneisses of the Malton Complex by thermally annealed pre-metamorphic shear zones that indicate the Windermere cover rocks are detached from the basement (Morrison, 1982; McDonough and Simony, 1988; McDonough and Morrison, 1990; McDonough *et al.*, 1991a, 1991b; 1992a; McDonough and Parrish, 1991). Although the contacts are generally sheared and thermally annealed, the Early Proterozoic gneisses of the Malton Complex are unconformably overlain by a pre-Windermere quartzite unit, which in turn is unconformably overlain by the basal conglomerate of the Windermere Supergroup (Murphy *et al.*, 1991.; McDonough *et al.*, 1991a, 1992a). Inward-facing stratigraphy within exposures of cover rocks that are encased by basement gneisses suggest that the cover is deformed into large infolds. These are interpreted as D_1 structures of possible westerly vergence; no D_1 fold closures have been identified in the Malton Complex. Alternatively, they may represent large-scale sheath folds developed during basement-cover imbrication. Above the Malton décollement, large D_1 structures within Mica Creek Succession metasediments are known to be westerly vergent, and refolded by northeasterly vergent D_2 structures (Simony *et al.*, 1980). The Scrip nappe is the largest of these D_1 nappes, having a limb length of about 50 km (Raeside and Simony, 1983; Digel *et al.*, 1989; Sevigny and Simony, 1989; McDonough *et al.*, 1991a, 1991b, 1992a, 1992b). The Malton décollement was probably active during formation of D_1 nappes. Fabric analysis indicates that it was also active during D_2, (Morrison, 1982), facilitating northeastward translation of the hotter rocks of the cover over the cooler basement of the Malton Complex (Sevigny *et al.*,1989).

6. The time of metamorphism and syn-metamorphic northeasterly vergent oblique-slip D_2 deformation in the Valemount region (McDonough and Simony, 1989) is constrained by U-Pb monazite and zircon data of Currie (1988), Sevigny *et al.*, (1989), Scammell (1991), and Currie *et al.*, (in prep.) to between 135-100 Ma (Early Cretaceous). Sevigny et al., (1989, 1990) and Scammell (1991, 1992) report a 100 Ma metamorphic peak, followed by a 62 Ma metamorphism, based on U-Pb and Ar-Ar data from late- and post-tectonic granites.

7. The Rocky Mountain Trench normal fault system forms a set of en-echelon brittle faults that geometrically require about 1-2 km of west-side-down motion in the Mica Creek area (Simony *et al.*, 1980). Fibre data collected near Valemount Marina are indicative of west-side-down displacement (McDonough and Simony, 1988). Geobarometric considerations suggest that displacement is less than 3 km. Data indicative of dextral oblique-slip extension have been reported for this zone near Canoe Mountain (McDonough *et al.*, 1992a).

8. K-Ar data for micas and hornblende from the Monashee and Cariboo mountains are reported by Currie (1988), Currie *et al.*, (in prep.), Sevigny *et al.*, (1990), Hunt and Roddick (1990; 1992), Wanless *et al.*, (1979), and Stevens *et al.*, (1982). Additional unpublished K-Ar and Rb-Sr data are from the Cordilleran Geochronology file of R.L. Armstrong, University of British Columbia. U-Pb zircon data for Cretaceous granites that intruded the Mica Creek Succession are reported by Sevigny *et al.*, (1989) and Murphy (1991). Apatite fission track ages are given by Sevigny *et al.*, (1990; see comment by Kohn *et al.*, 1991) for Cretaceous granites, and by McDonough *et al.*, (1992) for basement rocks. There are no isotopic data from the Wood Arm map-sheet; see Murphy (in press) for a compilation of ages for the Canoe River map-area.

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Recommended citation: Lickorish, W.H., and McDonough, M.R. (compilers), with contributions from P.S. Simony, D.B. Robbins, D.C. Craw, W. Mitchell, and M. Perkiris. 1992. Geology and structure sections, Wood Arm, British Columbia (83D/1). Geological Survey of Canada, Open File, scale 1:50 000.

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