GEOLOGY AND MINERAL OCCURRENCES OF THE TATLAYOKO LAKE MAP AREA (92N/8, 9 and 10)

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INTRODUCTION

The Tatlayoko project, funded by the 1991-1995 Canada - British Columbia Mineral Development Agreement, was initiated in 1992 with geological mapping of the Mount Tatlow map area (Riddell *et al.*, 1993a,b). No fieldwork was done in 1993, but the project was continued in 1994 with geological mapping of the Tatlayoko Lake map area, reported on here. The project's objectives are to update the geological database for the eastern Coast Belt in portions of the Mount Waddington and Taseko Lakes map areas, and to integrate the structural and stratigraphic relationships established within this area with rapidly evolving concepts regarding the tectonic and stratigraphic framework of the region. This will provide an improved geological framework for understanding the settings and controls of known mineral occurrences in the area (*e.g.*, Fish Lake, Skinner) and for evaluating the potential for additional discoveries. The project was designed to tie in with earlier mapping by the Geological Survey Branch to the southeast, and with concurrent MDA-funded mapping directed by P. van der Heyden and P. Mustard of the Geological Survey of Canada to the northwest, thus completing a continuous belt of recent 1:50 000-scale mapping that extends for 300 kilometres along the northeast margin of the Coast Belt (Figure 1).

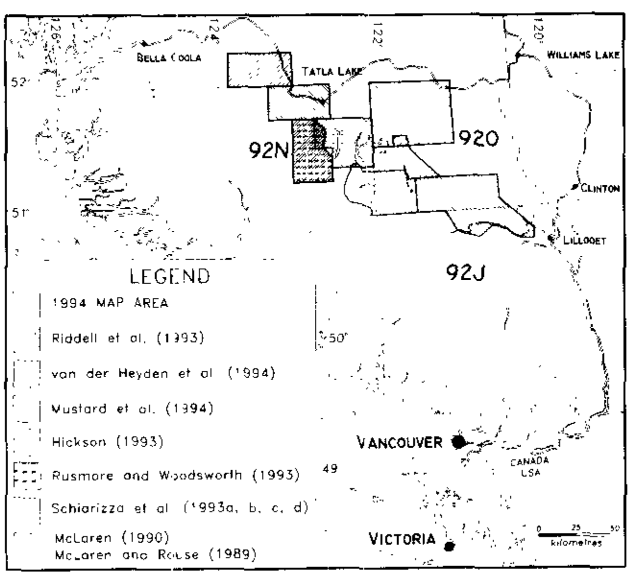

Figure 1. Location of the Tatlayoko project area and index to recent geological mapping by the GSB and GSC in adjacent parts of the southeastern Coast Belt.

The Tatlayoko Lake map area is centred about 270 kilometres north-northwest of Vancouver, and 160 kilometres west-southwest of Williams Lake. It covers the transition from the rugged Coast Mountains in the southwest, to gently rolling topography of the Fraser Plateau to the northeast. Tatlayoko Lake is accessed by an all-season road that extends south from Highway 20 at Tatla Lake. Another road branches eastward to the north end of Chilko Lake, and a seasonal road crosses the Chilko River to extend southward to Tsuniah Lake and the Nemaia valley (Figure 2).

REGIONAL GEOLOGIC SETTING

The geologic setting of the Tatlayoko project area is summarized in Figure 3. It encompasses the boundary between the Coast and Intermontane morphogeologic belts. Within the Tatlayoko project area this boundary corresponds to the Yalakom fault, a major linear feature that extends for about 300 kilometres and was the locus of more than 100 kilometres of Late Cretaceous(?) to early Tertiary dextral displacement (Riddell *et al.*, 1993a).

The eastern Coast Belt in the region of the Tatlayoko project area can be subdivided into the south Chilcotin, Methow and Niut domains of contrasting stratigraphy and structural style (Figure 3). The south Chilcotin domain includes Mississippian to Jurassic oceanic rocks of the Bridge River accretion-subduction complex, Upper Triassic to Middle Jurassic arc-derived clastic sedimentary rocks of Cadwallader Terrane, Permian ophiolitic rocks of the Shulaps and Bralorne - East Liza complexes, Upper Jurassic to mid-Cretaceous clastic sedimentary rocks of Tyaughton Basin, and Upper Cretaceous subaerial volcanic rocks of the Powell Creek formation. These partially coeval lithotectonic assemblages are juxtaposed across a complex network of

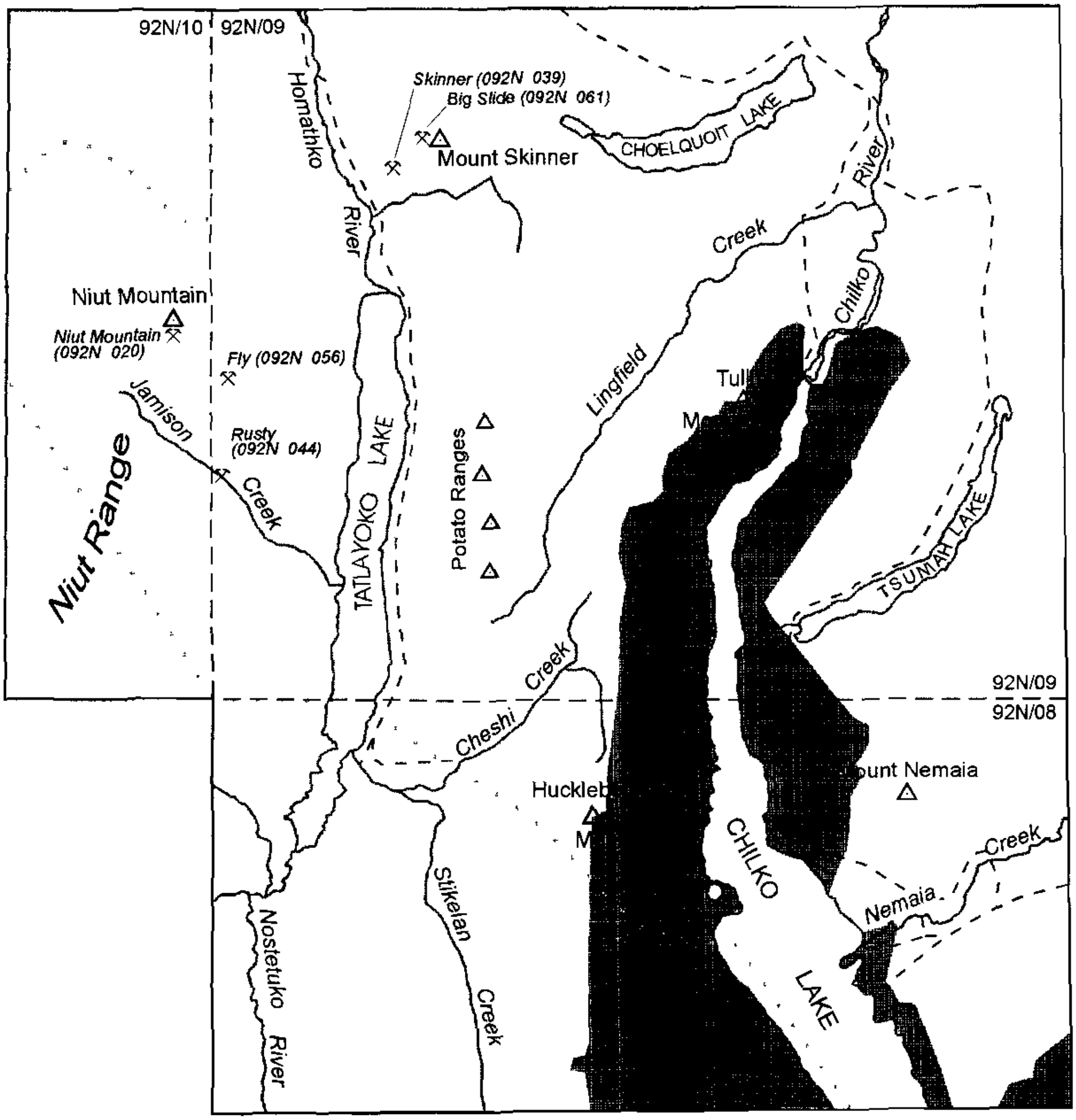

Figure 2. Main physiographic features of the Tatlayoko Lake map area. Locations of main mineral occurrences are also shown, and the shaded area indicates the location of Ts'yl-os Provincial Park.

structures that are dominated by Middle to Late Cretaceous southwest-directed contractional faults, and Late Cretaceous to Early Tertiary dextral strike-slip faults.

Methow domain occurs to the north and northeast of the south Chilcotin domain, from which it is separated in part by the Yalakom fault, and in part by an earlier structure that is offset by the Yalakom fault. This earlier structure is referred to as the Camelsfoot fault in the south (Schiarizza *et al.*, 1993b) and the Konni Lake fault in the north (Riddell *et al.*, 1993a). Methow domain is underlain by rocks assigned to Methow Terrane, which throughout most of the region comprises an unamed interval of Lower to Middle Jurassic sedimentary and volcanic rocks together with overlying Lower Cretaceous clastic sedimentary rocks of the Jackass Mountain Group. These strata are lithologically distinct from age-equivalent rocks found within the Cadwallader Terrane and the upper Tyaughton Basin of the south Chilcotin domain. They are also distinguished by a less complex structural style, as they are commonly disposed as broad homoclines between widely spaced faults and fold hinges. Within the western part of the Tatlayoko Lake map area, however, Methow Terrane also includes a succession of Upper Jurassic to Lower Cretaceous clastic sedimentary rocks assigned to the Relay Mountain Group. This blurs the stratigraphic distinctiveness of the Methow Terrane, as the Relay Mountain Group also comprises the lower Tyaughton Basin of the south Chilcotin domain.

The Niut domain is underlain largely by Upper Triassic volcanic and sedimentary rocks of the Mount Moore and Mosley formations, associated Late Triassic plutons, and Lower Cretaceous volcanic and sedimentary rocks assigned to the Ottarasko and Cloud Drifter formations (Rusmore and Woodsworth, 1991a; Mustard and van der Heyden, 1994). Both the Triassic rocks, which

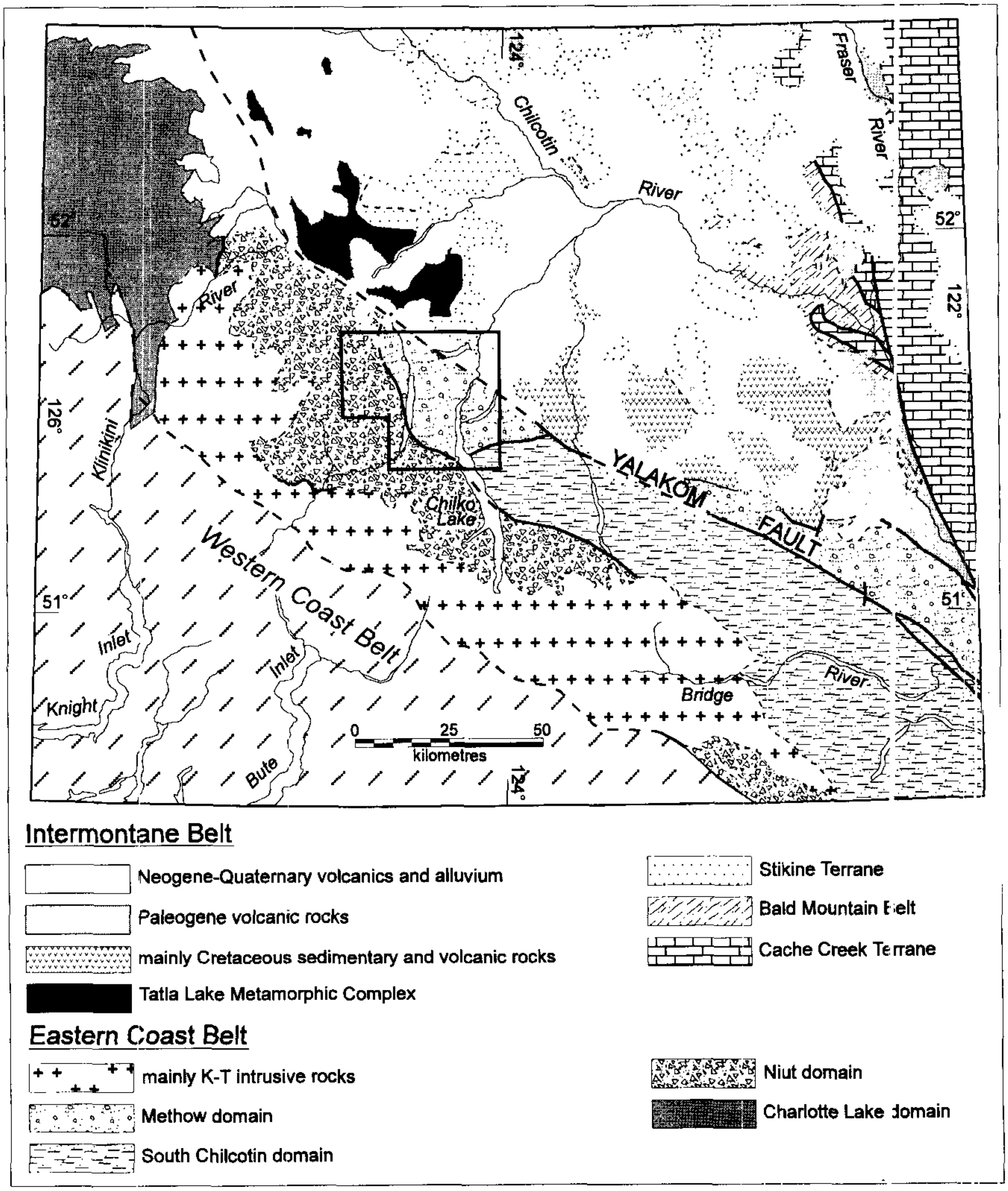

Figure 3. Geologic setting of the Tatlayoko project area.

have been correlated with those of the Stikine Terrane, and the Lower Cretaceous rocks are distinct from age-equivalent rocks to the east, but the Niut domain also includes Middle to Upper Cretaceous rocks that correlate with the upper Tyaughton Basin and Powell Creek formation of the south Chilcotin domain. The stratigraphic elements of the Niut domain are deformed by early Late Cretaceous faults of the northeast-vergent Eastern Waddington thrustbelt (Rusmore and Woodsworth, 1991b; van der Heyden *et al.*, 1994a). The northeast boundary of the domain is a system of faults that juxtaposes it against the south Chilcotin domain in the area east of Chilko

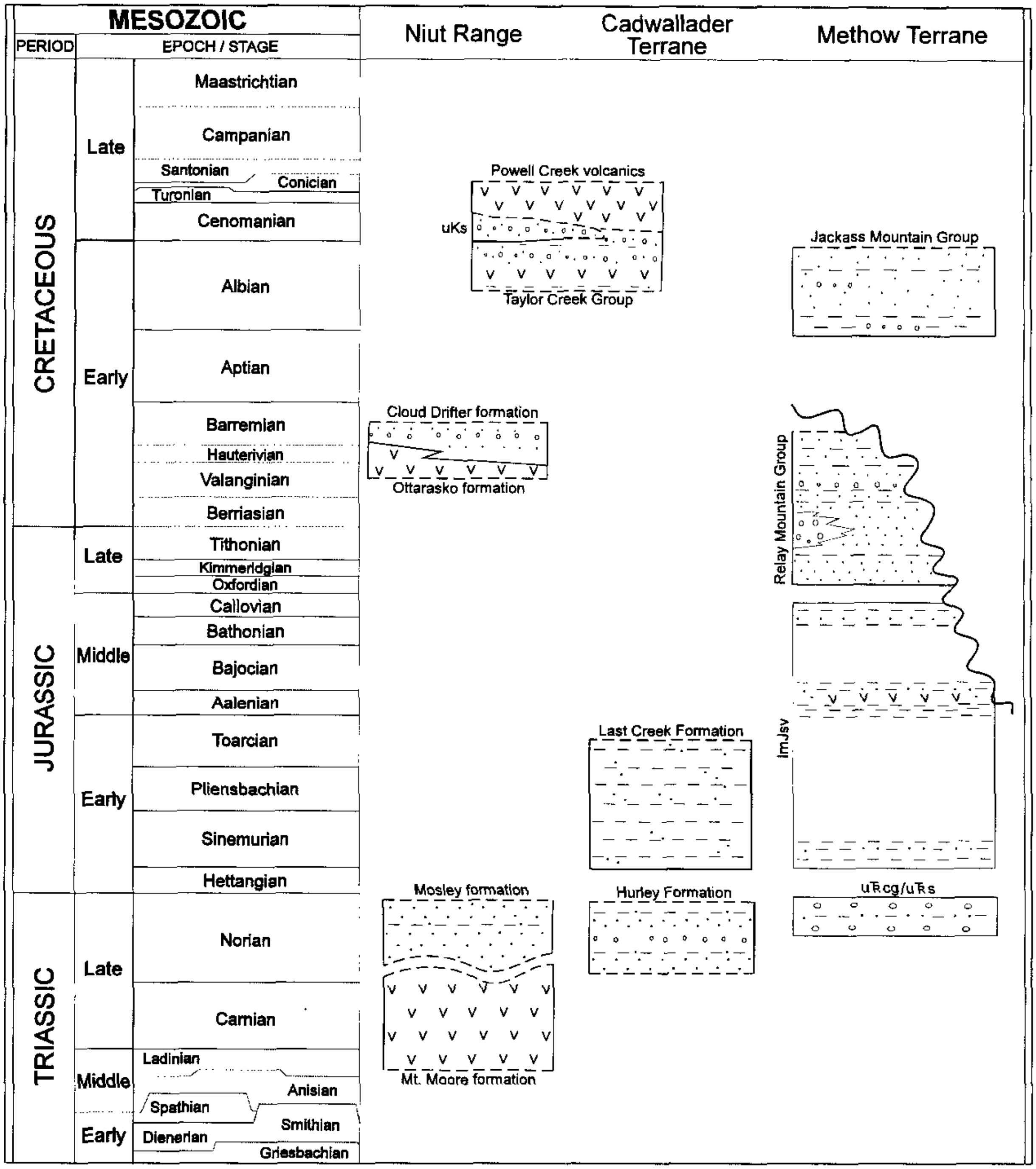

Figure 4. Main tectonostratigraphic assemblages of the eastern Coast Belt in the vicinity of the map area.

Lake, and against the Methow domain to the west of the lake (Figure 3).

The Intermontane Belt is characterized by subdued topography and sparse bedrock exposure. Pre-Neogene strata within and north of the Tatlayoko Lake map area comprise volcanic and volcaniclastic rocks that have been correlated with the Lower to Middle Jurassic Hazelton Group of the Stikine Terrane (Tipper, 1969a,b). To the west these rocks are juxtaposed against penetratively deformed metasedimentary, metavolcanic and metaplutonic rocks of the Tatla Lake Metamorphic Complex across an east to northeast-dipping normal fault. This fault formed late in the structural history of the complex, which was ductilely sheared and exhumed in Eocene time, possibly in a structural regime linked to dextral movement along the Yalakom fault (Friedman and Armstrong, 1988).

To the southeast is a belt of mainly Cretaceous sedimentary and volcanic rocks that extends from the Taseko River to the Fraser River. Near the Fraser River this belt comprises Lower Cretaceous volcanic rocks of the Spences Bridge Group and an overlying succession of Middle to Upper Cretaceous sedimentary and volcanic rocks (Green, 1990; Hickson, 1992). At the west end of the belt, Riddell *et al.* (1993a) correlated the sedimentary rocks along the Taseko River with the Lower Cretaceous Jackass Mountain Group, but did not speculate on the age or correlation of associated volcanic rocks, which in part host the Fish Lake porphyry copper-gold deposit. Fossils collected by Riddell *et al.* from a part of the sedimentary succession, and also from argillite apparently intercalated with the volcanic rocks near the Fish Lake deposit, have subsequently been assigned Hauterivian ages (J.W. Haggart, written communication 1992). This does not support correlation of this part of the sedimentary succession with the Jackass Mountain Group (mainly Aptian-Albian), but suggests that the volcanic-sedimentary succession in the Fish Lake area may be an offset equivalent of the Ottarasko and Cloud Drifter formations which occur in the Niut domain of the Coast Belt. This correlation suggests that a structure corresponding to the boundary between the Niut and Methow domains of the Coast Belt may also be present in the Intermontane Belt, within the area of extensive Neogene and Quaternary cover east of the Taseko River. The implied offset of the two corresponding boundaries would be consistent with the known offset along the Yalakom fault.

LITHOLOGIC UNITS

INTRODUCTION

Most of the Tatlayoko Lake map area is underlain by a tripart succession of mainly sedimentary rocks comprising Lower to Middle Jurassic rocks of unit lmJs, Upper Jurassic to Lower Cretaceous rocks of the Relay Mountain Group, and Lower Cretaceous rocks of the Jackass Mountain Group. The Relay Mountain Group is not present in the eastern part of the area, where it is inferred to have been eroded beneath a major sub-Jackass Mountain Group unconformity (Figure 4). This succession is assigned to the Methow Terrane based on the lithologic attributes of the Middle Jurassic and upper Lower Cretaceous rocks. Triassic sandstones and calcarenites of unit uTrs apparently underlie the succession along Tatlayoko Lake and are also tentatively included in Methow Terrane, as are conglomerates of probable Triassic age (unit uTrcg) that outcrop in the northwest corner of Methow domain.

West of Tatlayoko Lake, Methow Terrane is juxtaposed against volcanic, sedimentary and plutonic rocks of the Niut domain (units Nvs and Nqd) by a system of north to northwest-striking faults (Figure 5). The volcanic and sedimentary rocks in this area were assigned to the Lower Cretaceous by Tipper (1969a), but none of the rocks are dated and alternatively may correlate with the Triassic volcanic, sedimentary and plutonic rocks recently recognized by Mustard and van der Heyden (1994) a short distance to the northwest.

A belt of rocks assigned to the Cadwallader Terrane, including the Upper Triassic Hurley Formation and the Lower to Middle Jurassic Last Creek formation, was mapped by Riddell *et al.* (1993a,b) on the slopes south of the Nemaia valley directly east of the southern Tatlayoko Lake map area. Isolated exposures of clastic sedimentary rocks south of Nemaia Creek and along the Chilko Lake shoreline south of the creek's outlet are here assigned to these two formations. This belt of Cadwallader terrane rocks is inferred to be separated from Methow Terrane to the north by the pre-Yalakom Konni Lake fault (Riddell *et al.*, 1993a).

Upper Cretaceous clastic sedimentary rocks and overlying volcanic rocks of the Powell Creek formation outcrop in the mountains south of the Nemaia valley, where they form part of a Cretaceous belt that is separated from Cadwallader Terrane to the north by a prominent system of faults that locally includes a wedge of Bridge River Complex (Riddell *et al.*, 1993a,b). The Powell Creek formation also oucrops in the Niut domain west of Tatlayoko Lake, where it is separated from units Nvs and Nqd to the north by the Tchaikazan fault.

Bedrock exposures northeast of the Yalakom fault are sparse and consist mainly of andesitic breccias, tuffs and flows, together with gabbroic to dioritic intrusive rocks. These rocks are inferred to be Jurassic in age following Tipper (1969a), and are designated as unit Jv. Flat-lying basalt flows of the Neogene Chilcotin Group (unit MPCv) outcrop locally east of the Chilcotin River.

METHOW TERRANE

UPPER TRIASSIC ROCKS ALONG TATLAYOKO LAKE (UNIT uTrs)

An isolated exposure of Upper Triassic sedimentary rocks occurs on a low knoll along the east shore of Tatlayoko Lake, 4.5 kilometres south of the north end of the lake. Small exposures of sandstone on the opposite side of the lake are also tentatively included in this unit. The eastern exposure is dominated by thin to medium-bedded, locally crossbedded calcarenite and fossil hash, intercalated with brownish weathered, fine to coarse-grained green lithic sandstone. Calcarenite units are locally pebbly, with rounded intermediate to felsic volcanic clasts and rare subangular to subrounded granitoid pebbles. Thin beds of grey siltstone are intercalated with the lithic sandstone, and medium beds of dark grey, light grey weathering micritic limestone are intercalated with sandstone and siltstone over several metres in the lower part of the unit. The base of the unit consists of about 10 metres of light grey, coarse-grained quartzofeldspathic sandstone and granule conglomerate passing downwards into pebble conglomerate comprising angular granitoid clasts in an arkosic matrix. This basal interval is underlain by a quartz-pyrite-altered granitoid rock that is exposed along the shoreline in the southwestern part of the outcrop. The contact was observed over only a short interval, where it appeared to be a nonconformity across which the sedimentary interval was deposited on top of the altered intrusive rock.

Tipper (1969a) reports that fossils collected from unit uTrs on the east side of Tatlayoko Lake were examined by E.T. Tozer and assigned a Late Triassic, probably late Norian age. We infer that these Triassic rocks occur stratigraphically beneath the Jurassic rocks of unit lmJs,

Photo 1. Conglomerate of unit uTrcg, north of Skinner Creek.

but as the closest outcrops of the respective units are separated by more than a kilometre of Quaternary cover, such a relationship is not proven.

SKINNER CREEK CONGLOMERATE (UNIT uTrcg)

A distinctive assemblage of maroon conglomerates, with lesser amounts of finer grained sedimentary rocks and rare volcanic rocks, outcrops in an east to southeast-trending belt between the Homathko River and Choelquoit Lake (Figure 5). The main belt is bounded by the Yalakom fault to the northeast, intrusive rocks of the Mount Skinner Complex to the south, and an inferred north-striking fault to the west that separates it from exposures of Jackass Mountain Group in the Homathko River valley. However the conglomerates also occur as a thin sliver west of the Mount Skinner Complex, near the Skinner mine; this sliver is in stratigraphic or fault contact with unit lmJs to the southeast.

The dominant rock type within unit uTrcg is maroon, locally green, poorly stratified pebble to cobble conglomerate containing mainly intermediate to felsic volcanic clasts (Photo 1). These include common porphyritic varieties containing feldspar or feldspar and quartz phenocrysts. Fine to medium-grained granitoid clasts are commonly present, but typically comprise only a few percent or less of the clast population. Clasts of fine-grained clastic sedimentary rock and limestone occur locally. Clasts are typically angular, poorly sorted and either supported by, or gradational into a sandy to gritty matrix containing feldspar, quartz and lithic grains. The conglomerates are generally coarser in the northern part of the belt, where clasts locally range up to 40 centimetres across.

Sandstone and siltstone are intercalated with conglomerate throughout the belt, but are most common in the southeast. Green, brown or purple sandstones to pebbly sandstones occur mainly as poorly stratified lenses or layers that grade into conglomerate, whereas grey to purple siltststone and argillite commonly occur as distinct thin-bedded intervals, up to several metres thick, between conglomerate units. Locally, fine-grained sandstone to siltstone occurs as thin graded beds with argillite tops. Dark grey to purplish brown micritic limestone is seen rarely as medium to thick beds intercalated with argillite, or as lenses to a few metres thick within conglomerate.

Volcanic rocks are not common within unit uTrcg, but purple tuff, comprising feldspar crystals and angular volcanic fragments in a fine-grained matrix, was observed in one outcrop at the west end of the belt. Purple welded tuff occurring as an embayment or screen within the Mount Skinner Igneous Complex 2.8 kilometres west-northwest of Mount Skinner is also thought to be part ofthe unit.

Unit uTrcg is not dated, but is provisionally assigned to the Triassic following Tipper (1969a), as it is lithologically more similar to Upper Triassic rocks of the region than to younger rocks. Samples of limestone collected from the unit will be processed for conodonts in an attempt to confirm this inferred Triassic age.

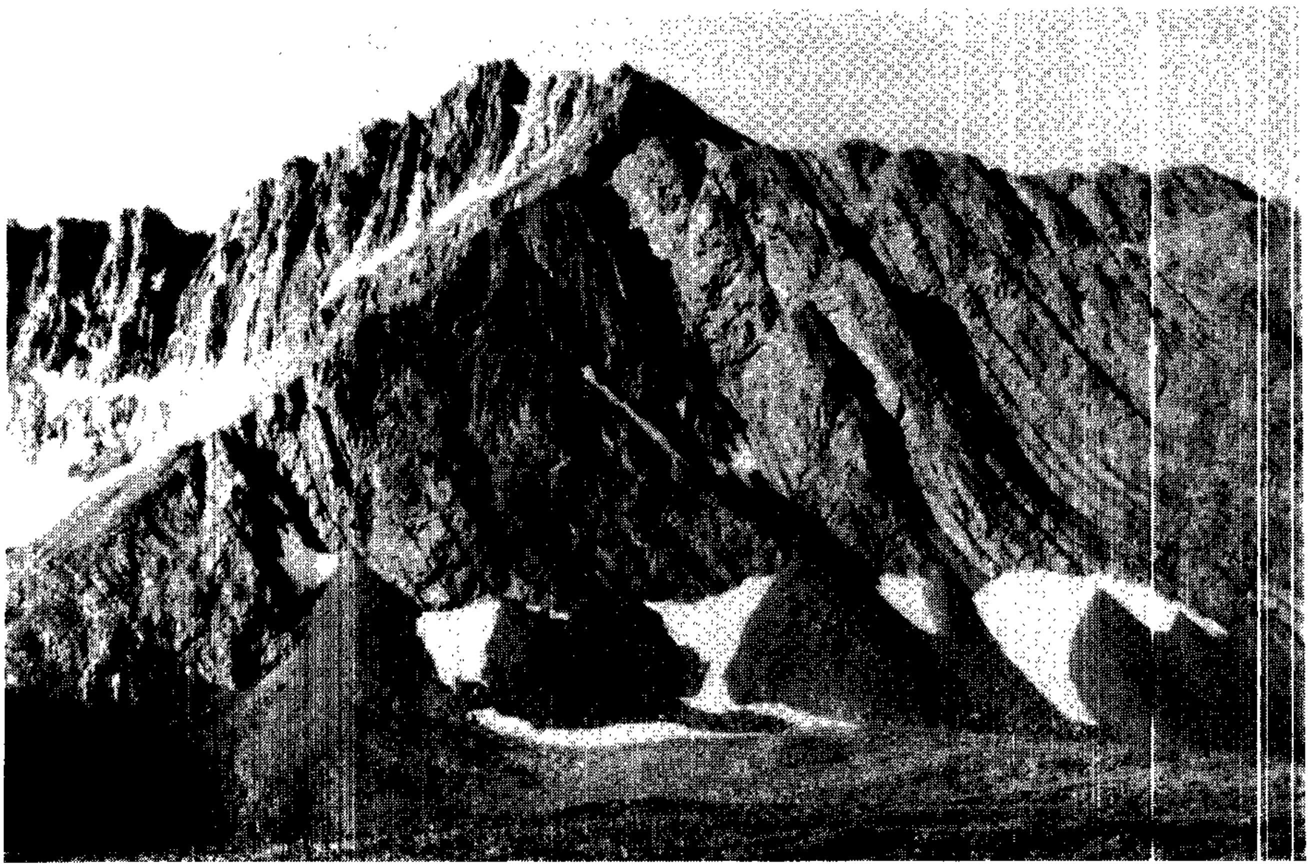

Photo 2. Looking southwest at well stratified sandstones and shales of unit lmJs, west of Mount Nemaia.

LOWER TO MIDDLE JURASSIC ROCKS (Unit lmJs)

Lower to Middle Jurassic clastic sedimentary and local volcanic rocks assigned to unit lmJs comprise the most widely distributed map unit in the Tatlayoko Lake area (Figure 5). These rocks correspond to unit 8 of Tipper (1969a) who reported fossils of Early Jurassic, Aalenian, Bajocian and Callovian age. The Lower Jurassic to Bajocian part of the assemblage was briefly described and designated the Huckleberry formation by Umhoefer and Tipper (1991), who inferred that it was a conformable sequence of early Sinemurian to early Bajocian age. Overlying Callovian rocks were not included in the formation, as they were inferred to be separated from underlying Bajocian strata by a major disconformity. The Callovian strata are presently being studied by B. Jennings as the basis for a B.Sc. thesis at the University of Victoria. They are included within unit lmJs on Figure 5 as they are lithologically very similar and cannot be confidently separated out in areas where fossil control is lacking.

Unit lmJs is characteristically a very well stratified succession that includes fine-grained clastic rocks intercalated with varying proportions of well indurated coarse-grained sandstone, gritty to pebbly sandstone, and granule to small-pebble conglomerate (Photo 2). Finer grained intervals are typically thin-bedded, laminated to crosslaminated siltstone and fine-grained sandstone, with scattered thin to thick beds of grey shale and fine to medium-grained lithic sandstone. Medium beds of laminated to crosslaminated calcareous siltstone or silty limestone occur locally. Coarser grained units are dominated by well indurated coarse-grained sandstones to gritty sandstones that occur as medium to very thick, locally graded beds. The coarse sandstones consist mainly of volcanic lithic fragments and feldspar, although quartz is locally an important component. Granule to small-pebble conglomerates occur locally as very thick, massive or weakly graded beds that are most commonly associated with intervals of coarse-grained sandstone, but also occur as isolated layers within siltstone-dominated sections. Conglomerate beds are typically dominated by intermediate to felsic volcanic clasts, and commonly include abundant shaly rip-up clasts. Limestone clasts and belemnite fragments are important constituents of some conglomerates, and rarely are the dominant clast types.

Volcanic rocks are not common in unit lmJs, but were observed in several widely scattered localities. The most extensive exposures are within the isolated set of outcrops along the west side of the north end of Tsuniah Lake (Figure 5). There, several tens of metres of volcaniclastic and volcanic rock occur within an interval dominated by massive to thick-bedded sandstones and gritty sandstones typical of the unit. The base of the volcanic section is marked by about 10 metres of poorly sorted breccia or conglomerate containing angular to subrounded clasts up to 40 centimetres in size. The clasts are almost exclusively intermediate to felsic volcanic rocks; some with irregular jagged shapes indicating very little transport, and some with red cores and green rims. This

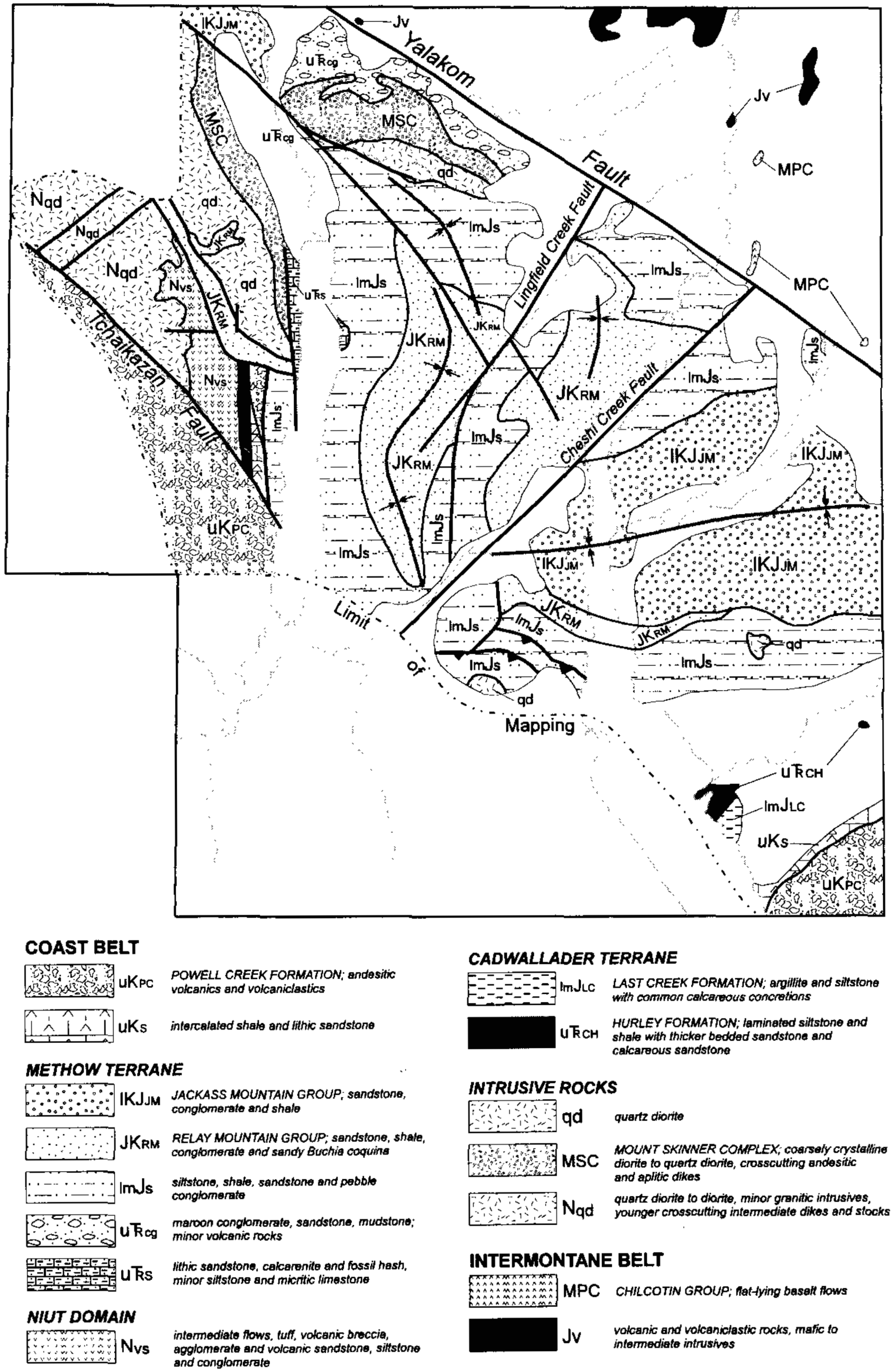

Figure 5. Generalized geology of the Tatlayoko Lake map area.

coarse-grained unit is overlain by a thicker section of poorly stratified tuffs consisting of intermediate, commonly feldspar-phyric volcanic fragments up to 3 centimetres across, together with feldspar and mafic crystals. Near the top of the tuff unit is a flow or sill consisting of feldspar and mafic phenocrysts, 1 to 2 millimetres in size, within a medium green aphanitic groundmass. The lower part of the tuff unit is a distinctive muddy tuff that consists of feldspar crystals with or without volcanic rock fragments floating in a fine-grained matrix. Similar matrix-supported tuff occurs as a layer 2 to 3 metres thick within intercalated sandstone and siltstone on the opposite side of the Tsuniah Lake syncline, directly south of Mount Nemaia. Farther east within this same belt, but apparently higher in the section, Riddell *et al.* (1993a) report an interval, less than 10 metres thick, of blue-green andesitic lapilli tuff and breccia. An interval of similar tuffs and breccias was mapped about 1.5 kilometres east of the north end of Tatlayoko Lake, and again 8.5 kilometres farther to the east, west of Lingfield Creek. These occurrences may be at about the same stratigraphic level, on opposite limbs of the Potato Range syncline.

A number of fossil collections were made from unit lmJs during the 1994 field season, but have not yet been identified. Lower Jurassic rocks are presently known to occur only in the northwestern corner of the belt, east of the Homathko River. There, early Pliensbachian fossils were collected from an interval of siltstones, sandstones and granule conglomerates (Umhoefer and Tipper, 1991). The base of the unit is not exposed, but the occurrence of these oldest-known rocks in the same area where known and inferred Triassic rocks of units uTrcg and uTrs occur suggests that the Triassic rocks may be stratigraphically beneath the Jurassic section. Most of the dated rocks included in unit lmJs are of Middle Jurassic age. An Aalenian fossil collection came from the vicinity of Huckleberry Mountain, and Bajocian fossils are known from several locations east of Tatlayoko Lake and on the south limb of the Tsuniah Lake syncline (Tipper, 1969a; Umhoefer and Tipper, 1991; Riddell *et al.*, 1993a).

Fossiliferous Callovian rocks were identified on the south limb of the Tsuniah Lake syncline by Tipper (1969a); correlative rocks may occur elsewhere at the top of unit lmJs, but have not been dated. The best exposures of known Callovian strata occur on the ridge system west of Mount Nemaia. A section measured by B. Jennings in the western part of this belt comprises 430 metres of strata that disconformably overlie rocks of Bajocian age, and are in turn disconformably(?) overlain by Upper Jurassic rocks of the Relay Mountain Group. The base of this section is marked by a prominant pebble conglomerate unit containing subangular to subrounded felsic volcanic clasts. The first 220 metres are mostly massive to graded beds of medium to coarse-grained volcanic sandstone with interbeds of laminated mudstone and siltstone. The sequence then changes to one of dominantly siltstones and very fine grained sandstones interbedded on the scale of 0.5 to 1 metre. The upper part of the unit includes 70 metres of medium to coarse-grained volcanic sandstone beds that grade into laminated siltstones and shales, overlain by 25 metres of fine to very fine grained sandstone and laminated shale at the top of the section.

RELAY MOUNTAIN GROUP

Upper Jurassic to Lower Cretaceous marine and nonmarine clastic sedimentary rocks in the Tatlayoko Lake map area were assigned to the Relay Mountain Group by Tipper (1969a). They are best exposed in the core of a syncline in the Potato Range, but also outcrop along northern Chilko Lake and Tullin Mountain, and as a narrow belt that extends from the western Nemaia Range westward across Chilko Lake to Cheshi Creek (Figure 5). Upper Jurassic conglomerate and associated finer grained clastic rocks that outcrop west of Tatlayoko Lake were assigned to a separate unit by Tipper (his units 11 and 12) but are here also included in the Relay Mountain Group.

The Relay Mountain Group ranges in age from late Oxfordian - early Kimmeridgian (Late Jurassic) to late Hauterivian - Barremian (Early Cretaceous) based on locally abundant *Buchia* and inoceramid pelecypods and uncommon ammonites. It overlies unit lmJs across an inferred disconformity that, where observed at the south end of the Potato Range and on the ridge system west of Mount Nemaia, is marked by a thin layer of belemnite coquina. The upper part of the group is missing in the western part of the southern limb of the Tsuniah Lake syncline, where Upper Jurassic Relay Mountain Group is overlain by the upper Lower Cretaceous Jackass Mountain Group. Farther east, and on the north limb of the syncline, the entire Relay Mountain Group is missing and the Jackass Mountain Group rests directly on unit lmJs. Presumably the Jackass Mountain Group once overlay the Lower Cretaceous Relay Mountain Group farther west, but nowhere are strata exposed above the youngest Relay Mountain Group in the Potato Range.

The Relay Mountain Group is on the order of 2400 metres thick in the Potato Range. The Upper Jurassic part of the group consists of about 900 metres of brown to green lithic sandstone and brown to black siltstone and mudstone with locally common marine fossils. Arkoses are present in the upper part of this sequence, which is interpreted to be off-shore marine and generally becomes shallower marine upward. It is gradationally overlain by 150 to 200 metres of interlayered lithic and arkosic sandstones that are unfossiliferous and were deposited in near-shore to marginal marine environments. The Jurassic-Cretaceous boundary is confined to this interval.

The Lower Cretaceous part of the Relay Mountain Group, about 1300 metres thick, consists mainly of dark green to black volcanic-lithic sandstones up to a few hundred metres thick with local planar laminae and low-angle cross-laminae. These sandstones are intercalated with sandy *Buchia* coquina sequences up to 140 metres thick. The coquinas are shell supported and consist of subequal amounts of fragmented, disarticulated, and whole articulated *Buchia*, with local beds of shell hash and fine-cobble volcanic and plutonic conglomerate. Both the volcanic-lithic sandstones and coquinas have rare belemnites, ammonites, and inoceramid fossils and are

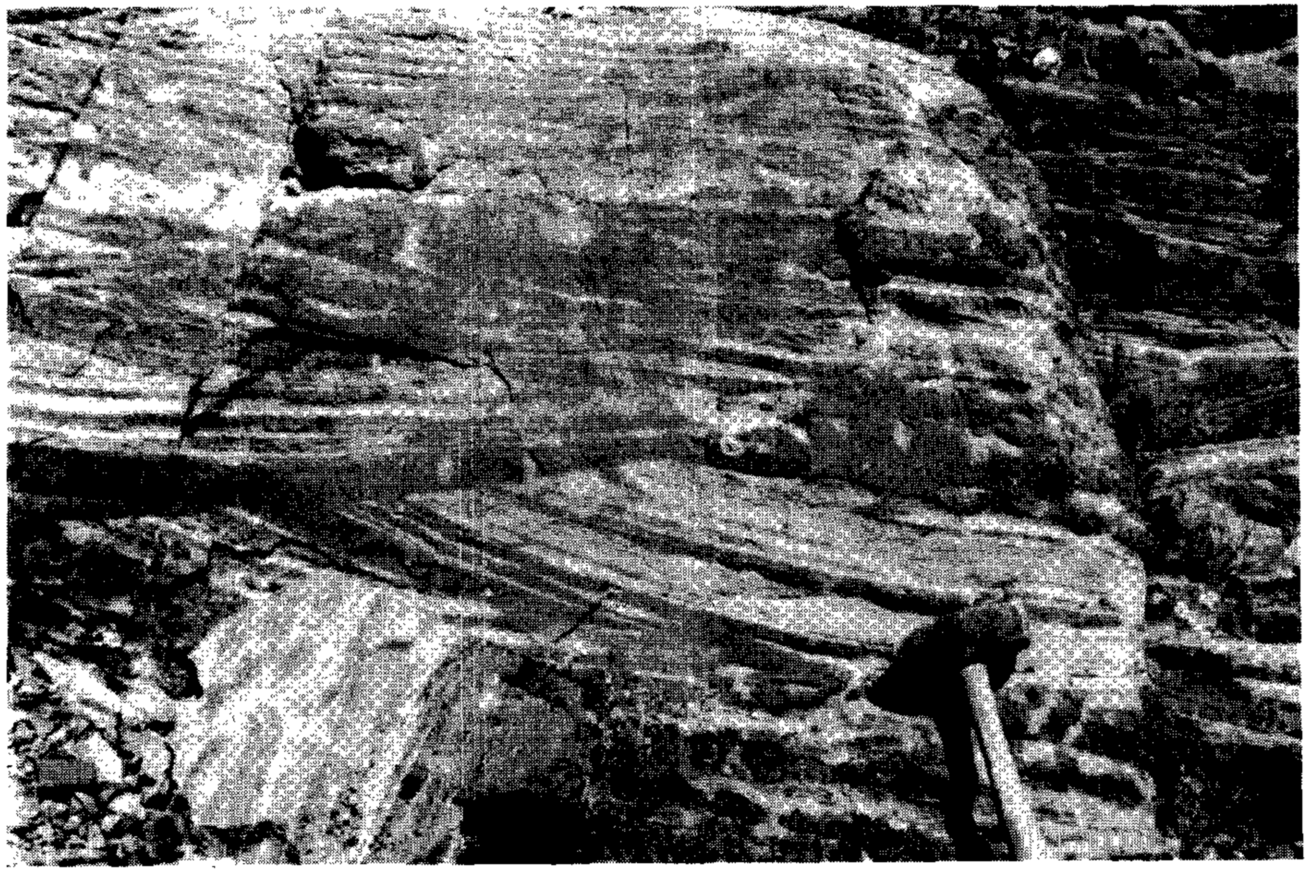

Photo 3. Crossbedded Hauterivian or Barremian lithic arkoses, upper Relay Mountain Group, northwest Potato Range.

interpreted to be shallow marine. Another common lithofacies in the Lower Cretaceous section is beige to green (commonly alternating) arkosic sandstone, tens of metres thick, most of which is interpreted to be fluvial deposits. The arkose locally has moderate to high-angle crossbeds and trough crossbeds (Photo 3), is commonly plant rich and has rare root casts. Arkoses are commonly interbedded with fissile black siltstones 1 to 5 metres thick, with plant fossils and wavy laminae. There are sparse 5 to 20-metre beds of clast-supported, mostly massive pebble to cobble conglomerate with rare plant fossils and local imbrication, that are interpreted to be fluvial channel deposits. The lower half of the Lower Cretaceous Relay Mountain Group in the Potato Range has been dated with *Buchia* and mixed inoceramid and ammonite assemblages to be Berriasian to late Hauterivian, with early to middle Hauterivian strata missing across a disconformity (Tipper, 1969a). The upper half of the Lower Cretaceous consists of unfossiliferous shallow marine and nonmarine strata, which are inferred to be mainly Barremian, because they lie conformably over the latest Hauterivian marine section.

The rocks mapped as Relay Mountain Group west of Tatlayoko Lake occur as a narrow northwest-trending belt that is in fault contact with volcanic and sedimentary rocks of Niut domain to the southwest, and with a large mass of undated quartz diorite to the northeast. A pendant of hornfelsed siltstone and sandstone within the quartz dorite body is also tentatively assigned to the group. The main belt of rocks includes conglomerates, sandstones and shales that are cut by numerous faults and intruded by abundant sills and plugs of quartz diorite. An intact section along the northeast margin of the belt, 3.5 kilometres west of Tatlayoko Lake, includes about 300 metres of conglomerate and arkosic lithic sandstone, abruptly overlain by a dark grey shale unit containing *Inoceramus* and belemnite fragments. This passes up-section into about 100 metres of thin to medium-bedded, locally crossbedded arkosic sandstone intercalated with siltstone and friable shale. Conglomerate dominates about 100 metres within the lower unit (Photo 4), and contains rounded pebbles and cobbles of felsic to mafic volcanic rocks together with a smaller proportion of granitoid rock. *Buchia* fossils are scattered throughout this lower unit, and have been identified as Upper Jurassic forms (Tipper, 1969a). The upper unit is not dated, but these rocks are lithologically very similar to the Hauterivian and(?) Barremian portion of the upper Relay Mountain Group in the adjacent Potato Range. In particular, the fossiliferous shale at the base of the interval is almost identical to the rocks directly above the Hauterivian disconformity in the Potato Range. The apparent absence of Berriasian and Valanginian rocks in the Niut Range belt suggests that here the disconformity represents much more missing section. This, in combination with the coarse-grained nature of the Jurassic rocks, suggests that the Niut Range section originated near the margin of the Relay Mountain basin, as proposed by Jeletzky and Tipper (1968).

Photo 4. Upper Jurassic conglomerate, Relay Mountain Group, northeastern Niut Range.

JACKASS MOUNTAIN GROUP

Clastic sedimentary rocks of the Lower Cretaceous Jackass Mountain Group are well exposed in the core of the Tsuniah Lake syncline, in the eastern part of the map area (Tipper, 1969a; Kleinspehn, 1985). Rocks provisionally included in the group also outcrop in the northwestern corner of the map area, within and adjacent to the Homathko River valley. Stratigraphic relationships are well displayed only in the former area, where the group is stratigraphically above unit lmJs and, locally, an intervening sliver of Relay Mountain Group.

The Jackass Mountain Group in the Tsuniah Lake syncline (Photo 5) comprises a thick succession of sandstones, with subordinate finer and coarser grained rocks. The sandstones are medium green to bluish green in colour, and typically weather light brown to brownish grey. They are predominantly medium to coarse grained, rich in feldspar, and commonly include scattered granules and small pebbles of volcanic, sedimentary and less common granitoid rock fragments. The sandstones form massive intervals many tens of metres thick, or medium to very thick beds that are in part defined by intercalations of thin-bedded siltstone or fine-grained sandstone-shale couplets. Individual sandstone beds within the well bedded intervals are locally graded, with laminated tops and thin shaly caps; some beds display rip-ups, scours and load casts at their bases. Finer grained facies typically occur as relatively minor interbeds within coarse sandstone, but intervals of thin-bedded, planar to crosslaminated siltstone to fine-grained sandstone are locally more than 100 metres thick.

The basal part of the Jackass Mountain Group in the Tsuniah Lake syncline consists of dark grey, grey to brownish grey weathered splintery siltstone, which was assigned to the Taylor Creek Group by Tipper (1969a). It is underlain by fine to coarse-grained sandstone containing thin layers and lenses of pebble to cobble conglomerate (Photo 6). The siltstone unit is best exposed on the south limb of the syncline, where it is more than 500 metres thick, and has yielded fossils of early and middle Albian age (Jeletzky, 1968). The underlying sandstone-conglomerate unit is only a few tens of metres thick, and comprises massive to thick-bedded sandstones that enclose two or more lenses of conglomerate. The conglomerate units range up to 1 metre in thickness and contain rounded clasts of mainly intermediate volcanic rocks and massive to foliated granitoid rocks. This same two-fold division occurs on the north limb of the syncline, but there the siltstone unit is less than 200 metres thick and may pinch out to the east. The underlying sandstone-conglomerate unit is correpondingly much thicker than to the south; individual conglomerate units are rarely more than one metre thick, but they occur through more than 500 metres of section. The actual contact with underlying rocks of unit lmJs was observed at one place and is tightly constrained at three others over a 6-kilometre strike length on the north limb of the syncline. Although mapped as a fault by Tipper (1969a), it appears to be a stratigraphic contact throughout this length. There is no angular discordance with underlying Jurassic rocks in the western part of this belt, but to the east the Jurassic rocks are locally folded

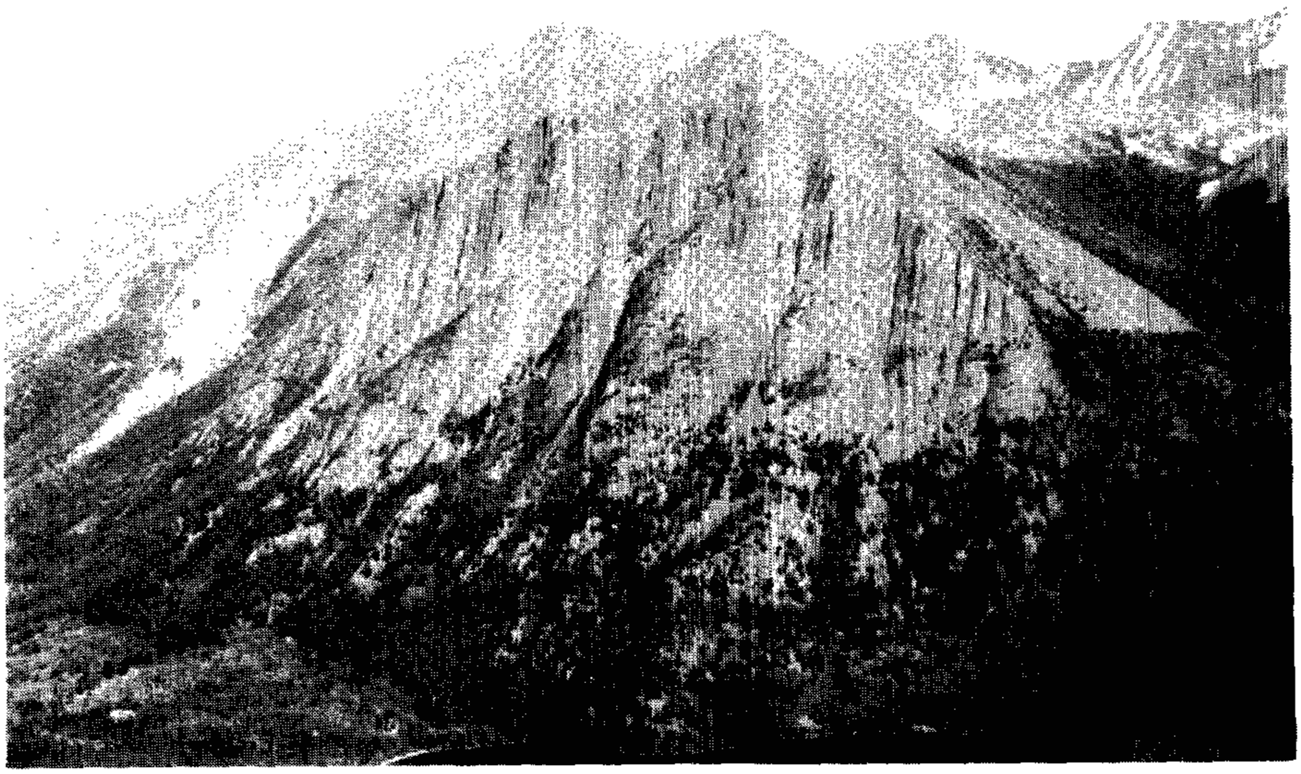

Photo 5. Looking east at Lower Cretaceous Jackass Mountain Group, south limb of Tsuniah Lake syncline, east of Chilko Lake.

and very gently dipping directly beneath the contact, whereas the overlying Cretaceous rocks maintain their moderate southward dips. The basal contact of the Jackass Mountain Group was not observed on the south limb of the syncline, but is constrained to within a few metres on the ridge system to the north-northwest of Mount Nemaia. Although this contact was mapped as a fault by Tipper (1969a), we saw no evidence for a fault along it, nor any angular discordance between the Cretaceous rocks and underlying rocks of unit lmJs. It was also mapped as a stratigraphic contact by Riddell *et al.* (1993a,b) to the east. The Jackass Mountain Group apparently rests above Upper Jurassic rocks of the Relay Mountain Group in the western part of the south limb of the Tsuniah Lake syncline. This contact was not observed, but as the Relay Mountain Group rests stratigraphically above the same Lower to Middle Jurassic basement as does the Jackass Mountain Group to the east, it is inferred to be stratigraphic, and to reflect eastward bevelling of the Relay Mountain Group beneath a sub-Jackass Mountain unconformity.

The fossiliferous shale unit that we include in the basal part of the Jackass Mountain Group was assigned to the Taylor Creek Group by Tipper (1969a), in part because he considered the Jackass Mountain Group to be predominantly nonmarine, and the Taylor Creek Group to be predominantly marine. Subsequent work, however, has established that the Jackass Mountain Group is predominantly marine (Jeletzky, 1971; Kleinspehn, 1985), and that the Jackass Mountain Group in the Camelsfoot Range includes a lithologically similar unit that is correlated with fossiliferous rocks of the Tsuniah Lake syncline because it contains the same early lower Albian *Brewericeras (Leconteites) lecontei* fauna (grey siltstone - shale division of Jeletzky, 1971). The Tsuniah Lake and Camelsfoot sections are inferred to have been continuous prior to offset along the Yalakom fault (Kleinspehn, 1985; Riddell *et al.*, 1993a). A major difference, however, is that the distinctive Albian rocks of the Jackass Mountain Group in the Camelsfoot Range are underlain by an interval of Barremian-Aptian rocks that are also included in the Jackass Mountain Group (Jeletzky, 1971; Schiarizza *et al.*, 1993b), but are not apparently represented in the Tsuniah Lake area.

The rocks tentatively assigned to the Jackass Mountain Group in the northwest corner of the map area comprise a poorly stratified succession of quartz and feldspar-rich sandstones, together with granule to cobble conglomerates. The conglomerates contain rounded clasts of intermediate to felsic volcanic and granitoid rocks, together with a smaller proportion of sedimentary and metamorphic rocks. This spectrum of clast types is similar to that found in conglomerates and conglomeratic sandstones of the Jackass Mountain Group in the Tsuniah Lake syncline. Two collections of macrosfossils from the northwestern outcrop belt may either confirm or refute their correlation.

NIUT DOMAIN

Volcanic and sedimentary rocks that are exposed in the eastern part of Niut domain are assigned to unit Nvs

Photo 6. Conglomerate, basal Jackass Mountain Group, western Nemaia Range.

(Figure 5). This assemblage is dominated by intermediate flows, tuffs and breccias with local occurrences of agglomerate and felsic tuff. Sedimentary rocks include conglomerates, sandstones and shales that are at least in part intercalated with the volcanic rocks. Volcanic and sedimentary rocks throughout Niut domain are commonly altered to an assemblage dominated by quartz and epidote, with less common carbonate, chlorite and pyrite.

An east to northeast-striking succession of generally unknown dip and facing direction that is exposed on the ridge east of lower Jamison Creek provides a partial section that includes many of the rocks characteristic of unit Nvs. The southern part of the ridge, between 1430 and 1980 metres elevation, comprises massive green, greenish brown to rusty brown weathered andesitic flows and flow(?) breccias. The andesites commonly contain hornblende and feldspar phenocrysts, 1 to 2 millimetres in size, and locally are pyroxene phyric. They pass gradationally up-slope into a succession of andesitic breccias and tuffs intercalated with a relatively minor proportion of massive flows and/or sills. The fragmental rocks typically comprise angular clasts of green to purple hornblende-feldspar and pyroxene-feldspar-phyric andesite within a matrix of smaller lithic grains and feldspar, hornblende and pyroxene crystals. Volcanic rock fragments are typically 1 to 3 centimetres or less in size, but range up to 10 centimetres in some coarse-grained units. Stratification is generally not apparent, but bedding is locally defined by thin interbeds of shale, epiclastic sandstone or fine-grained crystal-lithic tuff.

The fragmental volcanic rocks pass up-slope into an assemblage of more heterolithic sedimentary conglomerates and breccias that are well exposed between 2050 and 2150 metres elevation. The conglomerates contain a wide variety of felsic to mafic volcanic rock fragments, including abundant quartz and quartz feldspar porphyries. They also include recessive weathering fine-grained sedimentary(?) clasts and uncommon medium-grained granitoid fragments. The conglomerates are not conspicuously stratified and the poorly sorted angular clasts, which range up to 12 centimetres in size, grade into a gritty sandstone matrix that includes quartz, feldspar and volcanic-lithic grains. Light green, fine to coarse-grained lithic sandstone and grey shale form local intercalations within the coarser grained rock.

The rocks higher up on the ridge are strongly altered, but seem to include both clastic sedimentary rocks (sandstones and conglomerates) as well as volcanic breccias and andesitic flows. However, the stratigraphic relationships of these rock units to each other, or to the apparently intact section lower down on the ridge, is uncertain due to the masking effects of the alteration, and the presence of east-striking faults of uncertain displacement.

Elsewhere in the Niut domain, rocks assigned to unit Nvs consist mainly of andesitic flows, tuffs and breccias similar to those exposed along the lower part of the ridge east of Jamison Creek. In the northern part of the belt, these volcanic rocks enclose an apparently conformable succession of conglomerates and volcanic breccias, up to 300 metres thick, that has been traced for about 4 kilometres in a north-northwest direction. The conglomerates are generally purple in colour and contain poorly sorted, rounded to subrounded clasts that range from less than a centimetre to more than 20 centimetres across. The clasts include a variety of volcanic, plutonic and sedimentary rock types, and grade into a coarse sandstone matrix of similar composition. This conglomerate interval may correlate with the conglomerates exposed east of lower Jamison Creek, but the clasts are larger and more rounded.

CADWALLADER TERRANE

Rocks provisionally assigned to the Hurley Formation (unit uTrCH) in the Nemaia valley include thin-bedded, light and dark grey laminated siltstones and shales, together with thin to thick, locally graded beds of fine to coarse-grained sandstone and calcareous sandstone. They resemble much of the Hurley Formation to the east, but do not include the limestone and limestone-bearing conglomerate lenses that are most diagnostic of the formation. Dark grey argillite and siltstone with common calcareous concretions make up the southern part of the outcrop belt along the Chilko Lake shoreline. These rocks are assigned to the Last Creek formation (unit lmJLC), as the transition to predominantly argillaceous rocks with few coarser interbeds is characteristic of the Hurley - Last Creek contact directly to the east (Riddell *et al.*, 1993a,b), and in the correlative Camelsfoot belt (Schiarizza *et al.*, 1993b). Ammonites collected from this unit may provide additional constraints on its age.

UPPER CRETACEOUS SEDIMENTARY AND VOLCANIC ROCKS

UPPER CRETACEOUS SEDIMENTARY ROCKS (UNIT uKs)

Clastic sedimentary rocks of probable Middle to Late Cretaceous age underlie volcanic rocks of the Powell Creek formation on the south side of the Nemaia valley. The sedimentary section is dominated by intercalated dark grey to purple shale and brownish weathered, grey to green lithic sandstone. The sandstone is fine to coarse grained, and occurs as thin to very thick beds that are locally laminated or crosslaminated; woody debris is common in some beds. The interval also includes medium beds of light grey, commonly crossbedded arkosic sandstone, and medium to thick beds of chert-rich pebble conglomerate. The abrupt transition to overlying volcanic breccias of the Powell Creek formation occurs over a 30-metre interval of green sandstone intercalated with friable dark grey silty shale. Sandstone at the base of this unit is predominantly feldspar-lithic wacke, and encloses an interval of chert pebble conglomerate 2 metres thick. Higher in the section, sandstone beds also contain conspicuous hornblende and pyroxene crystals and are intercalated with beds of pebbly sandstone and pebble conglomerate that include clasts of pyroxene-feldspar and hornblende-feldspar-phyric volcanic rocks typical of those found in the overlying volcanic breccias of the Powell Creek formation.

Unit uKs is probably equivalent to an interval of nonmarine sedimentary rocks identified by Maxson (1992; written communication 1994) a short distance to the east in the Mount Tatlow map area. This interval was not mapped as a separate unit by Riddell *et al.* (1993a,b) who included it in the Taylor Creek Group which underlies it. Maxson assigns these rocks to the Silverquick formation, which, in its type area 90 kilometres to the southeast, comprises a thick succession of chert-rich conglomerates that in its upper part is gradational into overlying Powell Creek volcanic rocks (Garver, 1989, 1992). Although we follow Maxson's lithologic subdivisions for the area, we do not at present adopt the term Silverquick for these rocks, as we suspect that the underlying Taylor Creek Group (equivalent to the Beece Creek succession of Schiarizza *et al.*, 1993c,d) is largely a marine eqivalent of the Silverquick formation in its type area.

POWELL CREEK FORMATION

The Powell Creek formation (informal, Glover *et al.*, 1988) is a thick succession of Upper Cretaceous andesitic volcanic and volcaniclastic rocks. It overlies unit uKs across a gradational stratigraphic contact in the mountains south of the Nemaia valley, and also outcrops south of the Tchaikazan fault in the area west of Tatlayoko Lake. The formation was not examined in any detail in either of these two areas, but the exposures east of Chilko Lake are at the west end of an extensive outcrop belt that was described by Riddell *et al.* (1993a) in the Mount Tatlow map area to the east. Here it comprises two mappable divisions. The lower part of the formation consists of well stratified coarse volcanic breccias and conglomerates in beds ranging from a few metres to many tens of metres thick, that are in part separated by thin interbeds of purplish siltstone or epiclastic sandstone. This unit was tentatively assigned to the Silverquick formation by Riddell *et al.* (1993a), but was subsequently included in the Powell Creek formation (Riddell *et al.*, 1993b). Overlying rocks, which make up most of the formation, comprise a heterogeneous succession of andesitic flow breccias, crystal and ash tuffs, laharic breccias, flows and volcaniclastic sandstones and conglomerates.

INTRUSIVE ROCKS

Large, mappable plutonic bodies are restricted to the western part of the Tatlayoko Lake map area (Figure 5). They include the heterogeneous Mount Skinner Igneous Complex (unit MSC) and associated quartz diorite (unit qd) that occur within the Methow domain on either side of the Homathko River valley, as well as a large quartz diorite to diorite pluton (unit Nqd) exposed within Niut domain to the southwest. The only other intrusive bodies sufficiently large to be shown on Figure 5 are two small stocks of undated quartz diorite that intrude unit lmJs, one to the south of Huckleberry Mountain and one on the ridge directly west of Mount Nemaia. Dikes and sills are common throughout most of the area, however, and are particularly abundant in the vicinity of Huckleberry Mountain and to the southwest of Tullin Mountain, between the Lingfield Creek and Cheshi Creek faults. The dikes and sills are of a variety of compositions, the most common being fine-grained diorite, hornblende feldspar porphyry, and light grey felsite with or without quartz and feldspar phenocrysts.

The Mount Skinner Igneous Complex is an assemblage of intermediate plutonic rocks and associated mafic to felsic dikes that outcrops in an east-west belt centred near Mount Skinner, east of the Homathko River valley. It is dominated by medium to coarse-grained diorites and quartz diorites that seem to comprise at least two distinct phases. The apparently older component is a coarse-grained diorite to quartz diorite containing zero to 15% quartz, and characterized by strongly chlorite-epidote-altered mafic clots, and epidote-altered feldspars which give the rock a distinctive motttled appearance. The younger phase is a medium to coarse-grained hornblende quartz diorite that contains 20 to 35% quartz and is less altered. Associated with the diorites and quartz diorites are abundant finer grained mafic rocks that include discrete dikes and dike swarms of aphanitic basaltic rock, diabase and hornblende±feldspar porphyry, as well as irregular masses, to many tens of metres thick, of fine-grained dark greenstone that may be dike complexes or screens of older volcanic or dike rock within the plutonic rock. These mafic rocks are most common within the older dioritic rock, but also occur as relatively rare planar dikes, 10 to 100 centimetres wide, within the younger quartz diorite phase. Aplite dikes cut all of the aforementioned rock types and seem to be spatially associated with the younger quartz diorite. They range from 1 to 60 centimetres wide and contain tiny rounded quartz phenocrysts in a pinkish white, very fine grained sugary groundmass. Quartz feldspar porphyry, comprising 1 to 3-millimetre phenocrysts in a grey siliceous aphanitic matrix, was noted at one place within the complex, where it occurs as a number of metre-scale patches that are apparently intrusive into a surrounding zone of greenstone.

A preliminary U-Pb date on zircons from the older diorite to quartz diorite unit of the Mount Skinner Igneous Complex is Late Triassic (R. Friedman, personal communication 1994). The other components of the complex are undated, but a sample from the younger quartz diorite phase has also been submitted for U-Pb dating of zircons. This might be a slightly younger Late Triassic phase, or it might be considerably younger and related to Cretaceous and Tertiary plutonism that is documented in the region (van der Heyden *et al.*, 1994a). Along its northern margin, parts of the igneous complex are apparently intrusive into unit uTrcg, although the contact is not well exposed and only mafic and aplite dikes were actually seen to intrude this unit. The southern margin of the complex is in part a northwest-striking fault, and in part a body of biotite-hornblende quartz diorite to granodiorite that is mapped as a separate unit, although it may correlate with the younger quartz diorite phase of the complex. The contacts between this igneous body and adjacent map units were not observed, although it is presumed to intrude unit lmJs to the south.

An assemblage of igneous rocks similar to those of the Mount Skinner complex, with which they are tentatively correlated, outcrops on the slopes west of the north end of Tatlayoko Lake and the adjoining Homathko River valley (Figure 5). These rocks are in apparent fault contact with sedimentary rocks of unit uTrs to the east, and are bounded by a more homogeneous body of massive, coarse-grained hornblende quartz diorite to the west. This quartz diorite unit is in contact with Jura-Cretaceous sedimentary rocks of the Relay Mountain Group to the southwest, across a contact that, wherever observed, is a fault. However, as similar quartz diorite occurs as small plugs and sills intruding sedimentary rocks within the adjacent Relay Mountain belt, it is suspected that the large quartz diorite pluton is Cretaceous or younger in age.

An apparently separate quartz diorite to diorite pluton (unit Nqd) crops out farther to the southwest, within the fault-bounded Niut domain. It is in large part compositionally similar to the large intrusive body to the east and northeast, but locally grades into a quartz-poor hornblende diorite. This pluton intrudes volcanic and sedimentary rocks of unit Nvs which, together with the pluton, are also intruded by a suite of dikes and small plugs that includes fine-grained diorite, hornblende feldspar porphyry and pyroxene feldspar porphyry. Dike orientations are variable, but east or northeast strikes are most common. Small bodies of mafic-poor medium-grained granitic rock also occur locally within unit Nqd.

None of the intrusive rocks within Niut domain are presently dated. A sample of quartz diorite from the eastern part of unit Nqd has been submitted for U-Pb dating of zircons, and a hornblende feldspar porphyry plug within unit Nvs was sampled for K-Ar dating of hornblende. These dates will provide some control on the timing of plutonic activity in this area, and will also help constrain the age of the volcanic and sedimentary rocks within this part of the Niut domain. The possibility that unit Nqd is, at least in part, Late Triassic in age is suggested by a 215 Ma U-Pb zircon date from what is apparently the same pluton, just 4 kilometres northwest of the limit of our mapping (Mustard *et al.*, 1994).

LITHOLOGIC UNITS NORTHEAST OF THE YALAKOM FAULT

JURASSIC VOLCANIC ROCKS AND ASSOCIATED INTRUSIVE ROCKS

Rocks mapped as unit Jv on Figure 4 include volcanic and volcaniclastic rocks of probable Jurassic age, as well as a variety of mafic to intermediate intrusive rocks, some of which may be coeval with the volcanics and some of which are younger. The volcanic rocks include tuffs, breccias and volcanic conglomerates as well as andesitic flows. Fragmental volcanic rocks are poorly stratified and include angular green, red and purple aphyric and feldpar-phyric volcanic fragments, generally less than 5 centimetres across, in a silty to sandy matrix that commonly includes feldspar and mafic crystals as well as volcanic-lithic grains. Less common epiclastic rocks include compositionally similar volcanic conglomerates that are better stratified and include rounded clasts, as well as thin beds of feldspathic sandstone. Andesitic flow rocks are medium to dark green or mottled green and purple. They are fine to very fine grained, and locally contain small feldspar and less common mafic phenocrysts, as well as quartz-epidote amygdules.

Medium-grained, equigranular diorite and gabbro occur locally as poorly defined masses within andesitic volcanics and may be of broadly the same age. Medium-grained hornblende quartz diorite that outcrops at the southeast end of the western outcrop belt north of Choelquoit Lake is probably younger, as is a small stock of coarse feldspar porphyry exposed in the belt east of the Chilko River. Northeast and northwest-striking dikes of feldspar porphyry, hornblende feldspar porphyry and very fine grained mafic rock are common north of Choelquoit Lake, where they cut the volcanic rocks as well as a gabbroic intrusion.

CHILCOTIN GROUP

Flat-lying basalt flows of the Chilcotin Group (Tipper, 1978; Bevier, 1983) crop out locally on the slopes east of the Chilko River and on a low hill east of the north end of Tsuniah Lake. The basalts are dark to medium grey, orange-brown weathering, dense to highly vesicular, and locally contain olivine and plagioclase phenocrysts. Individual flows are typically a few metres thick and are commonly columnar jointed. These basalts are part of the southwestern margin of an extensive belt of Early Miocene to early Pleistocene plateau lavas that covers 25 000 square kilometres of the Interior Plateau of south-central British Columbia (Mathews, 1989).

STRUCTURE

THE YALAKOM FAULT

Leech (1953) first used the name Yalakom fault for a system of steeply dipping faults bounding the northeast margin of the Shulaps Ultramafic Complex along the Yalakom River, more than 100 kilometres southeast of the Tatlayoko Lake map area. The fault was subsequently traced northwestward through the Taseko Lakes and Mount Waddington map areas (Tipper, 1969a, 1978), and southeastward to the Fraser River (Duffell and McTaggart, 1952; Roddick and Hutchison, 1973; Monger and McMillan, 1989), for a total strike length of almost 300 kilometres. Within the Tatlayoko Lake map area, the Yalakom fault separates volcanic rocks of unit Jv on its northeast side from Triassic(?) and Jurassic sedimentary rocks of units uTrcg and lmJs to the southwest. The fault is not exposed, and its position is well constrained only along the northern edge of the map area, where it is inferred to separate outcrops of unit uTrcg from those of unit Jv north of Skinner Creek. This constraint, combined with the fault's established location to the southeast (Riddell *et al.*, 1993b) and northwest (Tipper, 1969; Friedman and Armstrong, 1988), indicates that it probably follows a linear west-northwest trace through the area, as indicated on Figure 5.

Tipper (1969a) postulated that the Yalakom fault system was the locus of 80 to 190 kilometres of right-lateral displacement, based on the regional distribution of volcanic *versus* sedimentary facies in Middle Jurassic rocks. A similar estimate of 150±25 kilometres was made by Kleinspehn (1985), who matched the Lower Cretaceous Jackass Mountain Group exposed on the southwest side of the fault at Tsuniah Lake with exposures on the northeast side of the fault in the Camelsfoot Range along Nine Mile Ridge. This estimate was revised by Riddell *et al.* (1993a), who postulated about 115 kilometres of dextral displacement based on the offset of a structural succession comprising Bridge River, Cadwallader and Methow terranes, the latter including the same belts of Jackass Mountain Group on which Kleinspehn's calculation was based.

The Yalakom fault displaces mid-Cretaceous and older rocks, and is overlapped by Neogene plateau lavas of the Chilcotin Group (Schiarizza *et al.*, 1993b,c,d; Riddell *et al.*, 1993b). Coleman and Parrish (1991) relate dextral shear within Bridge River schists and associated 46.5-48.5 Ma intrusions in the southern Shulaps Range to movement on the adjacent Yalakom fault, suggesting that at least some of the displacement was Eocene in age. Eocene movement is also indicated by relationships just to the north and northwest of the Tatlayoko Lake map area, where the Yalakom fault defines the southwestern boundary of the Tatla Lake Metamorphic Complex (Figure 3). Friedman and Armstrong (1988) document 55 to 47.5 Ma extensional shear along subhorizontal west-northwest-trending mineral lineations within the mylonite zone comprising the upper part of the complex, followed by folding and brittle faulting during the final stages of uplift. Although they implicate the Yalakom fault only in the post-ductile deformation phase of folding and brittle faulting, the earlier ductile strain is also kinematically compatible with dextral slip along the Yalakom system. The Yalakom fault has not been mapped beyond the Tatla Lake Complex but we infer that it, or a kinematically linked extensional fault segment, extends north-northwestward from there, along the Dean River, to mark the western limit of a belt of metamorphic tectonites that are locally exposed beneath an extensive cover of Quaternary alluvium and Late Tertiary volcanics (Figure 3; Tipper, 1969b). The right-stepping, extensional geometry of the system is consistent with the regional pattern of Eocene dextral strike-slip and associated extension that has been documented by numerous workers in the province, including Price (1979), Ewing (1980), Price and Carmichael (1986), Coleman and Parrish (1991) and Struik (1993).

STRUCTURE SOUTHWEST OF THE YALAKOM FAULT

METHOW DOMAIN EAST OF TATLAYOKO LAKE

The rocks of Methow Terrane between Tatlayoko Lake and the Nemaia valley are separated into three structural blocks by the northeast-striking Lingfield Creek and Cheshi Creek faults. The western block encompasses the Potato Range and adjacent mountains between Tatlayoko Lake and Lingfield Creek. The structure of this area is dominated by an open syncline cored by the Relay Mountain Group. The trace of the fold's axial surface is broadly Z-shaped, as it plunges north-northwest and south-southeast at its south and north ends, respectively, but trends north-northeasterly in the central part of the range. The fold is truncated by a prominent northwest-striking fault east of the north end of Tatlayoko Lake. Its probable continuation to the north is a tight syncline within unit lmJs, which shows 2 to 3 kilometres of dextral offset from the southern fold segment. The Potato Range fold deforms Barremian(?) and older rocks, and is cut by a northwest-trending dextral strike-slip fault that may be related to the Yalakom fault system. It is suspected that it is middle to early Late Cretaceous in age, as this was a period of major contractional deformation within the eastern Coast Belt (McGroder, 1989; Journeay and Friedman, 1993; Rusmore and Woodsworth, 1991b). The present sigmoidal trace of the fold may reflect rotation during later dextral strike-slip faulting (Umhoefer and Kleinspehn, 1994).

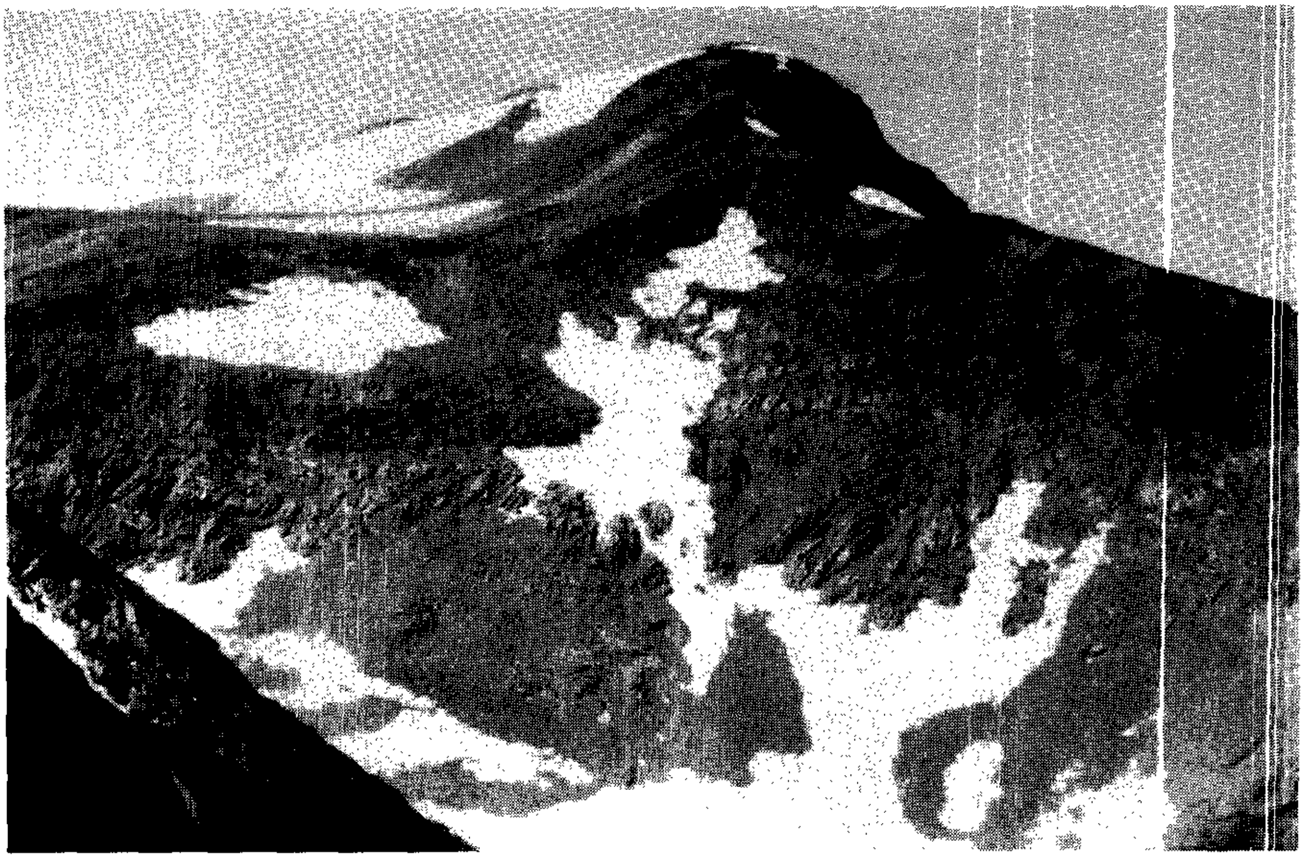

Photo 7. Looking west-southwest at overturned antiform in units lmJs, south limb of Tsuniah Lake syncline, west of Chilko Lake.

The structure of the Tullin Mountain area, between the Lingfield Creek and Cheshi Creek faults, is also generally synclinal in nature, as it includes Relay Mountain Group strata which are underlain by unit lmJs to both the northeast and west. A northerly trending syncline that is well defined by the internal stratigraphy of the Relay Mountain Group 1.5 kilometres southwest of Tullin Mountain, is apparently the dominant structure within this domain. A subsidiary anticline-syncline pair deforms the basal contact of the Relay Mountain Group into a Z-shape north of Tullin Mountain, and an S-shaped fold pair is outlined by the same contact to the southwest, on the opposite side of the main syncline. Just to the north of the latter area the contact is offset several hundred metres to a kilometre across a northwest-trending dextral strike-slip fault. If this fault correlates with the dextral fault north of the Potato Range, then it shows about 1.5 kilometres of apparent sinistral offset across the Lingfield Creek fault. Farther southwest, the Lingfield Creek fault apparently traces into a relatively minor northwest-side-down normal fault in the southern Potato Range, and the main displacement transfers to a south-striking splay that extends from the head of Lingfield Creek southward to the Cheshi Creek valley. This fault separates east-facing rocks of unit lmJs within the Tullin Mountain block from correlative west-facing strata on the east limb of the Potato Range syncline.

The strata southeast of the Cheshi Creek fault are disposed as a large, upright, gently east-plunging, open to closed syncline (the Tsuniah Lake syncline) that is truncated by the Yalakom fault to the east. The fold is cored by the Jackass Mountain Group, which is underlain by unit lmJs throughout most of the block, but by an intervening eastward-tapering sliver of Relay Mountain Group in the western part of its southern limb. West of Chilko Lake, unit lmJs on the southern limb of the fold is deformed by a series of south-dipping thrust faults and associated northerly overturned folds (Photo 7). The Tsuniah Lake syncline deforms the Albian Jackass Mountain Group and so is Late Cretaceous or younger in age. It is discordant to the more northerly trending folds to the west, suggesting that it may have formed in a different structural regime. The orientation of the fold is consistent with it having formed during dextral movement on the adjacent Yalakom fault (Wilcox *et al.*, 1973) this was predominantly an Eocene event, although older movement cannot be ruled out. The thrust faults and overturned folds on the south limb of the syncline may be older structures, but their age is not well constrained.

METHOW DOMAIN WEST OF TATLAYOKO LAKE

On the west side of Tatlayoko Lake, Methow domain is represented by narrow belts of units uTrs and lmJs along the shoreline, and by a northwest-trending belt of Relay Mountain Group that extends to the northwestern limit of our mapping. These strata are associated with abundant plutonic rocks, including a large mass of undated quartz diorite and a more heterogeneous unit that is included in the Mount Skinner Igneous Complex. They are juxtaposed against rocks of Niut domain to the southwest, across a system of north to northwest-striking faults.

Sedimentary rocks of unit uTrs near the shoreline at the north end of Tatlayoko Lake are in contact with plutonic rocks of units MSC and qd to the west. The contact was not observed, but is suspected to be a northerly striking fault or shear zone as easternmost exposures of the Mount Skinner Complex in this area display a steeply east-dipping mylonitic foliation and an associated stretching lineation that plunges 45° to the south-southeast. This fault system is inferred to truncate the belt of Relay Mountain Group to the south and from there extend into Tatlayoko Lake (Figure 5). Its presence there is suggested by a zone of steeply east dipping brittle faults and fractures within unit lmJs along the lake shoreline.

The northeastern contact of the belt of Relay Mountain Group rocks in the eastern Niut Range is a fault, or system of faults, placing the unmetamorphosed sedimentary rocks against quartz diorite and, locally, a pendant of hornfelsed metasedimentary rocks. This fault contact was observed locally; it is vertical to steeply east or northeast dipping, but no movement sense was established along it. The quartz diorite is not dated, but is lithologically identical to several smaller igneous bodies within the Relay Mountain belt, some of which are clearly intrusive into the sedimentary rocks. Furthermore, the hornfelsed metasediments within quartz diorite northeast of the fault are provisionally correlated with the Relay Mountain Group on the basis of their inferred protolith lithology. These relationships suggest that the fault may have juxtaposed relatively deep or internal portions of a pluton against shallower or more distal environs adjacent to the same igneous body. A component of northeast-side-up movement is therefore suspected along this fault, although significant transcurrent motion cannot be ruled out.

A fault that is thought to have accomodated southwest-directed thrust or reverse movement has also been traced for several kilometres within the southern part of the Relay Mountain Group belt. This fault was observed in several places and dips between 35° and 75° to the east-northeast. It is generally parallel to bedding in the footwall rocks, and commonly places them against small bodies of quartz diorite in the immediate hangingwall. In one place this fault places quartz diorite that intrudes upright, northeast dipping *Buchia*-bearing Upper Jurassic conglomerates and sandstones above shales, siltstones and sandstones that are thought to be Lower Cretaceous in age. This older-over-younger relationship suggests reverse movement along the fault, as does a tight syncline within the footwall rocks directly beneath it.

NIUT DOMAIN

The northeastern limit of sedimentary, volcanic and plutonic rocks of the Niut domain is a system of north to northwest-trending faults that separates them from the Relay Mountain Group to the north and from unit lmJs along Tatlayoko Lake to the south (Figure 5). Where exposed, the northern fault strand dips steeply east to east-northeast, and is commonly marked by a metre-wide zone of brittle faults and fractures; Niut domain rocks are typically silicified and quartz veined along the fault whereas the adjacent Relay Mountain Group is not. The fault truncates the northeast-dipping thrust fault within the Relay Mountain Group on its northeast side, as well as east-striking faults within Niut domain to the west. Locally, the rocks on both sides of the main fault are slivered into several parallel fault strands, resulting in a fault zone several hundred metres wide.

Farther south, volcanic rocks at the eastern edge of Niut domain are separated from unit lmJs to the east by an intervening north-striking fault panel about a kilometre wide. Exposure is poor in this area, but outcrop constraints suggest that this panel trends northerly and is truncated by the more northwesterly striking boundary fault to the north and by the Tchaikazan fault to the south (Figure 5). Easternmost exposures within the panel include hornblende-phyric andesitic volcanic rocks that are associated with fine to coarse-grained, locally gritty, quartzofeldspathic sandstone with sparse detrital muscovite flakes. Farther west are exposures of intercalated brown calcareous sandstones, calcarenites, shales and limestone-cobble conglomerates. The andesitic volcanics within this panel are similar to those of the Niut domain, but are also similar to rocks found in the Powell Creek formation. The associated sedimentary rocks are dissimilar to any rocks observed within the Niut domain; the western assemblage is lithologically similar to the Hurley Formation of the Cadwallader Terrane, while the muscovite-bearing arkoses are most readily correlated with Middle to Upper Cretaceous rocks of unit uKs. Although these correlations are speculative due to the limited amount of exposure, this panel is mapped as thin fault slices of Hurley Formation, unit uKs and Powell Creek formation. The presence of fault slivers derived from the south Chilcotin domain along the boundary between Methow and Niut domains is not unreasonable as this same sequential arrangement of belts occurs east of Chilko Lake (Figure 3).

The internal structure of the Niut domain is not well understood. Steeply dipping, east-striking faults are locally prominent in the southern part of the belt, and in part mark the contacts between volcanic and sedimentary rocks. On the ridge east of lower Jamison Creek, faults within the volcanic succession apparently control several narrow east-trending zones of intense quartz-epidote veining containing patchy sulphide mineralization. In the western part of the domain, two northeast-striking faults are mapped within plutonic rocks of unit Nqd. These faults are marked by steeply dipping zones of fracturing and brecciation, several tens of metres wide, that are colinear with prominent topographic lineaments.

TCHAIKAZAN FAULT

The northwest-striking Tchaikazan fault cuts across the southwest corner of the Tatlayoko Lake map area, where it separates the Upper Cretaceous Powell Creek formation from units Nqd, Nvs and lmJs to the north. The fault was not observed, although its location is constrained to within a few tens of metres at the head of

Jamison Creek. Tipper (1969a) interpreted the Tchaikazan fault as a right-lateral transcurrent fault based on speculative correlation of two faults that were offset by about 30 kilometres along it. More recently Mustard and van der Heyden (1994) have postulated 7 to 8 kilometres of apparent dextral displacement based on offset of a distinctive fossiliferous limestone unit within the Mount Moore formation, a short distance to the northwest of the Tatlayoko Lake map aerea.

STRUCTURE NORTHEAST OF THE YALAKOM FAULT

The structure of pre-Neogene rocks northeast of the Yalakom fault is not well known due to sparse exposure. Outcrop-scale brittle faults are common, and most dip at moderate to steep angles to the northeast. Where movement-sense could be determined these faults typically show components of normal and dextral displacement. They may be Eocene in age, and related to the east to northeast-dipping fault system that separates this same package of rocks from the Tatla Lake Metamorphic Complex a short distance to the northwest.

MINERAL OCCURRENCES

SKINNER (MINFILE 92N 039)

The Skinner gold-quartz vein system occurs within quartz diorite and diorite of the Mount Skinner Igneous Complex, 5 kilometres north of the north end of Tatlayoko Lake. The veins were discovered in 1990 by Louis Berniolles of Ottarasko Mines Ltd. The property was optioned to Northair Mines Ltd in 1991, which conducted a diamond drilling program consisting of six holes totalling 250 metres (Visagie, 1992). It was subsequently turned back to the owner, and from 1992 to 1993, Ottarasko Mines Ltd extracted a 172-tonne bulk sample from the Victoria vein. The ore was milled at the Premier gold mine and produced over 11 000 grams of gold (average grade 65.83 g/t) and 8000 grams of silver (Meyers, 1993, 1994; Schroeter, 1994). Cheni Gold Mines Inc. optioned the property in 1994 and drove an adit and vertical raise, but have since terminated the option and turned the property back to the owner (Cheni Gold Mines, News Release, September 30, 1994).

Work to date has been concentrated on the Victoria vein, which strikes between 050° and 060° and dips steeply to the northwest. It, together with veins located 300 and 600 metres to the east-northeast, comprises part of a system of en echelon veins within a presumably structurally controlled lineament that trends 070° (Berniolles, 1991). The vein walls are defined by slickensided faults, and the veins themselves are cut by parallel faults. In the Victoria vein workings at least some of these faults accomodated sinistral movement.

The Victoria vein has been traced for more than 130 metres. It pinches and swells, locally attaining a thickness of 1.4 metres. From drilling data, the vein pinches out to the east and is still open to the west (Visagie, 1992). It consists almost entirely of quartz, with minor amounts of pyrite, chalcopyrite, malachite and rare visible gold. Clay gouge commonly occurs along the vein walls, and sericite and chlorite occur locally along fault surfaces. White mica locally lines vugs and open fractures within the vein quartz; some of this has been collected for K-Ar dating in an attempt to constrain the age of the veining. Gold values are variable, and concentrations as high as 136 g/t gold across 0.65 metre have been recorded (Berniolles, 1991). Copper shows little relationship to gold, and is locally concentrated in the wallrock adjacent to the vein.

BIG SLIDE (MINFILE 92N 061)

The Big Slide occurrence is located on the west-facing slope of Mount Skinner, 1600 metres northeast of the Victoria vein. There, the Mount Skinner Complex hosts a number of subparallel northwest-striking sheeted quartz veins, typically 2 to 15 centimetres wide, that dip 40° to 45° southwest. The veins carry gold and copper mineralization with grades up to 56 g/t Au and 0.72% Cu (Berniolles, 1991).

FLY (MINFILE 92N 056)

The Fly porphyry copper occurrence is located in the Niut Range, about 4 kilometres southeast of Niut Mountain. It was originally staked in 1968 and has seen intermittent exploration since that time. Mineralization is strongest in the Ridge zone, which extends for more than 200 metres within quartz diorite of unit Nqd and an adjacent body of hornblende feldspar porphyry that intrudes along the contact between the quartz diorite and altered volcanic and sedimentary rocks of unit Nvs to the east. Mineralization consists of malachite and azurite, with lesser amounts of pyrite and chalcopyrite, that occur as disseminations and as a minor component of quartz-epidote-carbonate veins and fracture fillings. A pyrite halo is developed mainly within altered volcanic rocks to the east of the intrusions. The intrusive and volcanic rocks display a predominantly vein-controlled propylitic alteration suite of epidote - chlorite - sericite ± silica ± carbonate. The highest copper value reported is 0.68% from a grab sample containing chalcopyrite, pyrite and malachite (Watson, 1988). A malachite-rich quartz diorite sample collected during the 1994 field season contained 0.52% Cu and 0.03% Zn. Mineralized quartz diorite was sampled for U-Pb zircon dating in order to constrain the age of mineralization.

RUSTY (MINFILE 92N 044)

The Rusty occurrence was not visited, but is described as disseminated chalcopyrite in sedimentary rocks along Jamison Creek, 5 kilometres west of Tatlayoko Lake. This location suggests that the occurrence is hosted by rocks of unit Nvs a short distance east of their contact with quartz diorite of unit Nqd.

NIUT MOUNTAIN (MINFILE 92N 020)

The Niut Mountain copper occurrence is within a conspicous red gossanous zone developed within pyritized volcanic(?) rocks of unit Nvs on the southeast flank of Niut Mountain. Small amounts of malachite and chalcopyrite occur locally in the pyrite-rich rocks, and they are reported to contain trace amounts of gold (Tipper, 1969a). These rocks are intruded by quartz diorite of unit Nqd to the north and west. Float of malachite-stained quartz diorite observed in the glacier bowl just below the gossanous zone suggests that the quartz diorite is also mineralized.

OTHER OCCURRENCES

Veins and silicified zones within altered volcanic rocks of unit Nvs to the east of the Fly occurrence carry variable gold values. A sample of a strongly silicified and pyritized rock from approximately 1 kilometre east of the occurrence contained 0.21% Cu and 1.8 g/t Au, and a grab sample from a vein approximately 500 metres northeast of the occurrence returned a gold value of 0.75 g/t (Ashton, 1992). Higher values of gold (2 to 6 g/t) have been reported from veins in the same area (Watson, 1988).

The volcanic and sedimentary rocks of unit Nvs on the ridge northeast of lower Jamison Creek are cut by several easterly trending zones of pyritization, silicification and quartz-epidote veining. One of these, at about 1970 metres elevation, is a malachite-stained zone, three metres wide, of quartz-epidote veins and quartz-epidote-altered andesites. A sample from this zone contained 0.53% Cu with minor zinc (345 ppm). Another zone, at 1850 metres elevation, comprises about 2 metres of quartz veined and intensely silica flooded andesite that has patchy malachite staining and rarely contains visible pyrite, chalcopyrite and sphalerite. A sample from this zone contained 0.46% Cu with minor amounts of silver (300 ppm), zinc (184 ppm) and gold (5 ppb).

Unit Nqd west and northwest of Niut Mountain, includes a number of conspicuous gossanous zones. These include zones of pyritized quartz diorite, as well as pendants of pyrite-altered volcanic or sedimentary rock. Unit Nqd in this area also hosts several small bodies of granitic rock. One of these, located approximately 1.5 kilometres west of Niut Mountain, displays potassic alteration and malachite mineralization; a grab sample from this mineralized intrusive returned a copper value of 0.19%.

North to northwest-striking fault zones within unit Jv near the northeast end of Choelquoit Lake locally control narrow gossanous zones of pyrite-pyrrhotite mineralization, but samples from these zones did not contain anomalous concentrations of base or precious metals. Outcrops of unit Jv on the east side of the Chilko River, 5.5 kilometres to the southeast, are brecciated and veined with quartz, epidote and calcite over a large area. A calcite-rich vein containing malachite and azurite, collected from the north end of this outcrop belt, assayed 0.08 % Cu.

DISCUSSION

The Tatlayoko Lake map area is in large part underlain by a succession of Jurassic and Cretaceous clastic sedimentary rocks that we assign to the Methow Terrane. This assignment is based on the lithologic characteristics of the Lower to Middle Jurassic rocks of unit lmJs, and the upper Lower Cretaceous Jackass Mountain Group. Rocks correlative with these two units are characteristic of Methow Terrane from the present study area southeastward to the international border. Over this distance the Methow Terrane is the easternmost terrane within the southern Coast Belt. The belt of Methow Terrane rocks is offset by the Yalakom fault, which separates rocks within the Tatlayoko Lake map area from the correlative succession in the Camelsfoot Range (Kleinspehn, 1985; Riddell *et al.*, 1993a), as well as by the Fraser fault system, which separates the Camelsfoot Range belt from correlative rocks in the area of Manning Park and the contiguous Pasayten and Methow drainage basins of Washington State (Kleinspehn, 1985; Monger, 1989; Monger and McMillan, 1989; Mahoney, 1993).

The distinctive Jackass Mountain Group has long been recognized within all three segments of the Methow Terrane belt (Duffell and McTaggart, 1952; Jeletzky and Tipper, 1968; Tipper, 1969a; Coates, 1974; Kleinspehn, 1985). In the Manning Park area, underlying Lower to Middle Jurassic rocks comprise the Ladner Group, which in its upper part includes a distinctive assemblage of upper Toarcian to Bajocian volcanic and sedimentary rocks assigned to the Dewdney Creek Formation (O'Brien, 1986, 1987). The Dewdney Creek Formation includes a proximal eastern facies that includes pyroclastic rocks and lava flows together with clastic sedimentary rocks, and a more distal western facies that consists of volcanic-derived coarse-grained sandstones and conglomerates intercalated with thin-bedded sandstone, siltstone and argillite (Mahoney, 1993). Monger and McMillan (1989) recognized that rocks correlative with the Ladner Group are present in the southern Camelsfoot Range, and Schiarizza *et al.* (1990) noted that Lower to Middle Jurassic rocks that underlie the Jackass Mountain Group in the northeastern part of the range are lithologically similar to the Dewdney Creek Formation. These correlations were confirmed by Mahoney (1992), who specifically correlated the Lower to Middle Jurassic rocks of the Camelsfoot Range with the distal western facies of the Dewdney Creek Formation (Mahoney, 1993).

Middle Jurassic rocks that underlie the Jackass Mountain Group on the south limb of the Tsuniah Lake syncline in the Mount Tatlow map area were correlated with the Jurassic rocks of the Camelsfoot Range by Riddell *et al.* (1993a). This correlation is confirmed by our mapping of the adjacent Tatlayoko Lake map area. Unit lmJs consists largely of Aalenian and Bajocian strata that are lithologically very similar to age-equivalent rocks of the Camelsfoot Range, which Mahoney (1993) assigns to the western distal facies of the Dewdney Creek Formation. These strata are characterized by thick beds of volcanic-derived sandstone and granule conglomerate, as well as local occurrences of andesitic breccias, tuffs and flows, within a succession of predominantly siltstones, shales and fine-grained sandstones. These Middle Jurassic rocks are markedly different from age-equivalent strata found within other major tectonostratigraphic assemblages of the southeastern Coast Belt: the Middle Jurassic portion of Cadwallader Terrane is predominantly shale with no coarser clastics and no volcanic rocks (Umhoefer, 1990; Schiarizza *et al.*, 1993b), and the Middle Jurassic of the Bridge River Terrane is mainly chert (Cordey and Schiarizza, 1993).

The Jura-Cretaceous Relay Mountain Group occurs within the Methow Terrane succession in the western part of the Tatlayoko Lake map area, but is missing to the east, where it has apparently been eroded away beneath a major sub-Jackass Mountain Group unconformity. Correlative rocks are also missing in the Camelsfoot Range, but are in part locally preserved in the Manning Park area, where they are represented by Upper Jurassic *Buchia*-bearing sandstones of the Thunder Lake sequence (O'Brien, 1986, 1987). The type area of the Relay Mountain Group is within the south Chilcotin domain, 100 kilometres to the southeast of the Taylayoko Lake map area. There the group is in part structurally interleaved with Lower to Middle Jurassic rocks of the Cadwallader Terrane, but no stratigraphic contact between the two successions is actually preserved (Schiarizza *et al.*, 1993a,c,d). Despite this stratigraphic ambiguity, the presence of Relay Mountain Group strata within the interior part of the eastern Coast Belt, a considerable distance southwest of the belt of Methow Terrane rocks, suggests either that it overlaps more than one terrane in the eastern Coast Belt, or that there was structural shuffling of terranes (*e.g.*, Monger *et al.*, 1994), prior to middle to early Late Cretaceous contractional deformation, at which time the present linear arrangement of terranes and associated synorogenic clastic sedimentary rocks was largely established (Garver, 1989, 1992).

The Upper Triassic rocks of units uTrs and uTrcg, which apparently underlie the Jurassic rocks of unit lmJs, are not recogized within Methow Terrane anywhere to the southeast. These rocks do resemble, in some respects, the Upper Triassic Tyaughton Group of the Cadwallader Terrane, which includes a red bed sequence of conglomerates and sandstones containing volcanic and plutonic clasts, as well as overlying nonmarine to shallow-marine clastic rocks that include a similar *Cassianella* fauna to the one collected from unit uTrs on the east side of Tatlayoko Lake (Tipper, 1969a).

Unit uTrcg also resembles the Upper Triassic Mosley formation of the Niut domain, which includes red conglomerates and sandstones intercalated with carbonate and volcaniclastic rocks (Rusmore and Woodsworth, 1991a; Mustard and van der Heyden, 1994). This correlation is supported by the association of unit uTrcg with Late Triassic diorite to quartz diorite of the Mount Skinner complex. Late Triassic plutons occur within Niut domain, but have not been recognized elsewhere within Methow domain, nor within Cadwallader Terrane of the south Chilcotin domain.

As shown in Figure 3, the Methow domain comprises the easternmost element of the southeastern Coast Belt. Cadwallader Terrane is structurally interleaved with Bridge River Terrane throughout much of the south Chilcotin domain, but from the Bridge River northward comprises the easternmost element of this domain, such that it occurs between Methow Terrane to the east and Bridge River Terrane to the west (Schiarizza *et al.*, 1993a,b; Riddell *et al.*, 1993a,b). In the Manning Park area, the basement to Methow Terrane is a sequence of ocean-floor basalts and associated gabbros referred to as the Spider Peak Formation (Ray, 1986, 1990). These rocks are not dated, but resemble, both lithologically and geochemically, Permian greenstones, gabbros and diorites of the Bralorne - East Liza Complex, which are structurally interleaved with Cadwallader Terrane throughout much of the eastern part of the south Chilcotin domain (Schiarizza *et al.*, 1993a,b). This association, as well as the similarity between the Tyaughton Group and units uTrs and uTrcg, suggests the possibility that the Cadwallader and Methow terranes may represent different parts of the same arc-basin complex that was floored by oceanic crust to the east of the Bridge River accretion-subduction complex. The similarities between Stikine and Cadwallader terranes indicated by Rusmore *et al.*, 1988, Umhoefer, 1990, and Rusmore and Woodsworth 1991a, suggest that this belt may have Stikine Terrane affinities. This is corroborated by the similarity of unit uTrcg and associated Late Triassic plutonic rocks of the Mount Skinner complex to Stikine terrane rocks found within Niut domain.

A separate belt of Upper Triassic volcanic rocks that has been assigned to the Cadwallader Terrane outcrops in the Pemberton area to the west of the Bridge River Complex (Journeay, 1993; Riddell, 1992). The relationship of these rocks to Cadwallader Terrane in its type area to the east is problematical; assuming that the correlation is valid, these rocks may have been offset from the eastern Cadwallader belt by pre mid-Cretaceous sinistral displacements (*e.g.*, Monger *et al.*, 1994).

SUMMARY

The Tatlayoko Lake map area is underlain in large part by Lower Jurassic to Lower Cretaceous clastic sedimentary rocks of Methow Terrane, which comprises the easternmost element of the Coast Belt from the present study area southeastward to the international border. Continuity of this belt is disrupted by dextral offsets along the Yalakom and Fraser faults. Within the Tatlayoko Lake map area the Methow Terrane is represented mainly by Lower to Middle Jurassic clastic sedimentary rocks and local volcanic rocks of unit lmJs, together with overlying clastic sedimentary rocks of the Upper Jurassic to Lower Cretaceous Relay Mountain Group and the Lower Cretaceous Jackass Mountain Group. The Relay Mountain Group is missing in the eastern part of the map area, and in most of the Methow Terrane belt to the southeast. This omission is thought to reflect erosion beneath a sub-Jackass Mountain Group unconformity. Upper Triassic conglomerates and sandstones, locally associated with volcanic rocks and Late Triassic plutonic rocks, are inferred to underlie unit lmJs near the north end of Tatlayoko Lake. Correlative rocks are not recognized elsewhere in the Methow Terrane belt, but these Triassic rocks are lithologically similar to age-equivalent rocks found within Cadwallader

Terrane to the southeast and within Stikine Terrane to the west.

The eastern part of the Niut Range, in the western part of the Tatlayoko Lake map area, is underlain by an assemblage of andesitic volcanic and volcaniclastic rocks, together with intercalated conglomerates and sandstones, assigned to unit Nvs. These rocks are lithologically distinct from the adjacent rocks of Methow Terrane, from which they are separated by a system of north to northwest-striking faults of uncertain age or sense of displacement. They probably correlate with the Lower Cretaceous Ottarasko Formation, as indicated by Tipper (1969a); alternatively, however, they may correlate with Triassic volcanic and sedimentary rocks mapped as Mount Moore Formation just 10 kilometres to the northwest. The latter possibility is suggested by the apparent continuity of an extensive unit of quartz diorite that intrudes unit Nvs with a Late Triassic pluton that intrudes the Mount Moore Formation. A sample of the quartz diorite from the present study area has been submitted for zircon U-Pb dating in an effort to resolve this question.

The most prominent structure in the map area is the west-northwest-striking Yalakom fault, which separates the lithotectonic assemblages of the Coast Belt from a poorly exposed assemblage of Jurassic(?) volcanic and volcaniclastic rocks which underlies the Intermontane Belt in the northeastern part of the map area. Relationships from outsde the map area indicate that the Yalakom fault was the locus of more than 100 kilometres of mainly Eocene dextral strike-slip displacement. Structures within the Coast Belt that may be linked to the Yalakom system include northwest-striking faults with apparent dextral offsets in the northwestern part of the belt, and the east-plunging Tsuniah Lake syncline to the southeast. The volcanic rocks northeast of the Yalakom fault are commonly cut by outcrop-scale northeast-dipping faults with components of normal and dextral displacement that may also be linked to the Yalakom system. Post-Hauterivian northerly trending folds within the Methow Terrane between Tatlayoko and Chilko lakes may be older structures, related to middle to early Late Cretaceous contractional deformation that is well documented elsewhere in the southeastern Coast Belt

Most of the known mineralization in the area is in the Niut Range, where it consists of disseminated copper in quartz diorite of unit Nqd, as well as copper-gold-bearing veins and fracture fillings in younger hornblende feldspar porphyry intrusions and volcanic and sedimentary rocks of unit Nvs. The only production, however, has come from the Skinner occurrence, where fault-controlled northeast-striking gold-quartz veins cut Late Triassic quarz diorite and diorite of the Mount Skinner Complex, a short distance southwest of the Yalakom fault. Bulk samples totalling 172 tonnes taken from the Victoria vein in 1992 and 1993 returned more than 11 000 grams of gold and 8000 grams of silver.

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