DESCRIPTION, U-PB AGE AND TECTONIC SETTING OF THE QUESNEL LAKE GNEISS, EAST-CENTRAL BRITISH COLUMBIA

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KEYWORDS: Quesnel Lake Gneiss, geochemistry, U-Pb age, Kootenay Terrane, Barkerville Subterrane, tectonic setting, volcanogenic massive sulphides.

INTRODUCTION

The name 'Quesnel Lake Gneiss' has been applied to several bodies of Mid-Paleozoic orthogneiss found along the western margin of pericratonic rocks between Cariboo Lake and the southern arm of Quesnel Lake (Campbell, 1978; Figure 1). These represent the northern extent of Mid-Paleozoic intrusive rocks found intermittently along the Kootenay Terrane in the southern Canadian Cordillera (Okulitch, 1985).

The Quesnel Lake Gneiss has been the focus of several studies over the years which have detailed its geochemistry, geochronology and structural relationships with surrounding rocks (Rees and Ferri, 1983; Montgomery, 1985; Fillipone, 1985; Montgomery and Ross, 1989 and Mortensen *et al*., 1987). Although the southern parts of the orthogneiss have been dated by U-Pb analysis of zircons, lead loss, together with inheritance, have produced a bracketed age of 335 to 375 Ma (Late Devonian to Mid-Mississippian; Mortensen *et al*., 1987). Modal mineralogy and chemical analyses indicate compositions ranging from diorite to granite to syenite. The tectonic setting of these bodies based on chemical analysis is ambiguous suggesting arc or possibly within plate signatures, the latter implying an extensional setting (Montgomery and Ross, 1989).

The purpose of this study was to sample the Quesnel Lake Gneiss in areas where it is least metamorphosed in hopes of better constraining its intrusive age and origin. These bodies most likely represent the intrusive equivalents of felsic volcanics associated with important volcanogenic massive sulphide deposits in southern Kootenay Terrane and their study will better constrain the timing and tectonic setting of this important metallogenic event.

REGIONAL GEOLOGY

The Quesnel Lake Gneiss intrudes the western margin of peri-cratonic rocks assigned to the Kootenay Terrane. Stratigraphic evidence has shown that these rocks represent the distal western edge of Ancestral North America. In this area, Kootenay rocks are locally assigned to the Barkerville Subterrane which is separated from more inboard rocks of the Cariboo Subterrane by the west-verging Pleasant Valley thrust fault (Struik, 1988). The oceanic Slide Mountain Terrane has been structurally emplaced along the western margin of the Barkerville Subterrane, carried on the east-verging Eureka thrust fault (Figure 1). It also structurally overlaps the Barkerville and Cariboo terranes along the Pundata thrust fault (Struik, 1988).

Strata in the Barkerville Subterrane have been assigned, almost entirely, to the Proterozoic to Paleozoic Snowshoe Group (Struik, 1986; 1988). This package of rocks is dominated by distal, fine grained siliciclastics with lesser carbonates and volcanics. The Slide Mountain Terrane is represented by the Late Paleozoic Crooked Amphibolite, a sheared and altered unit of mafic to ultramafic composition that probably has an ocean-ridge origin (Struik, 1988; Rees, 1987). It is structurally or stratigraphically succeeded by Middle to Late Triassic black phyllites of the basal Nicola Group ("Black Phyllite"; Panteleyev *et al*., 1996). To the west these stratigraphically interfinger with volcani-

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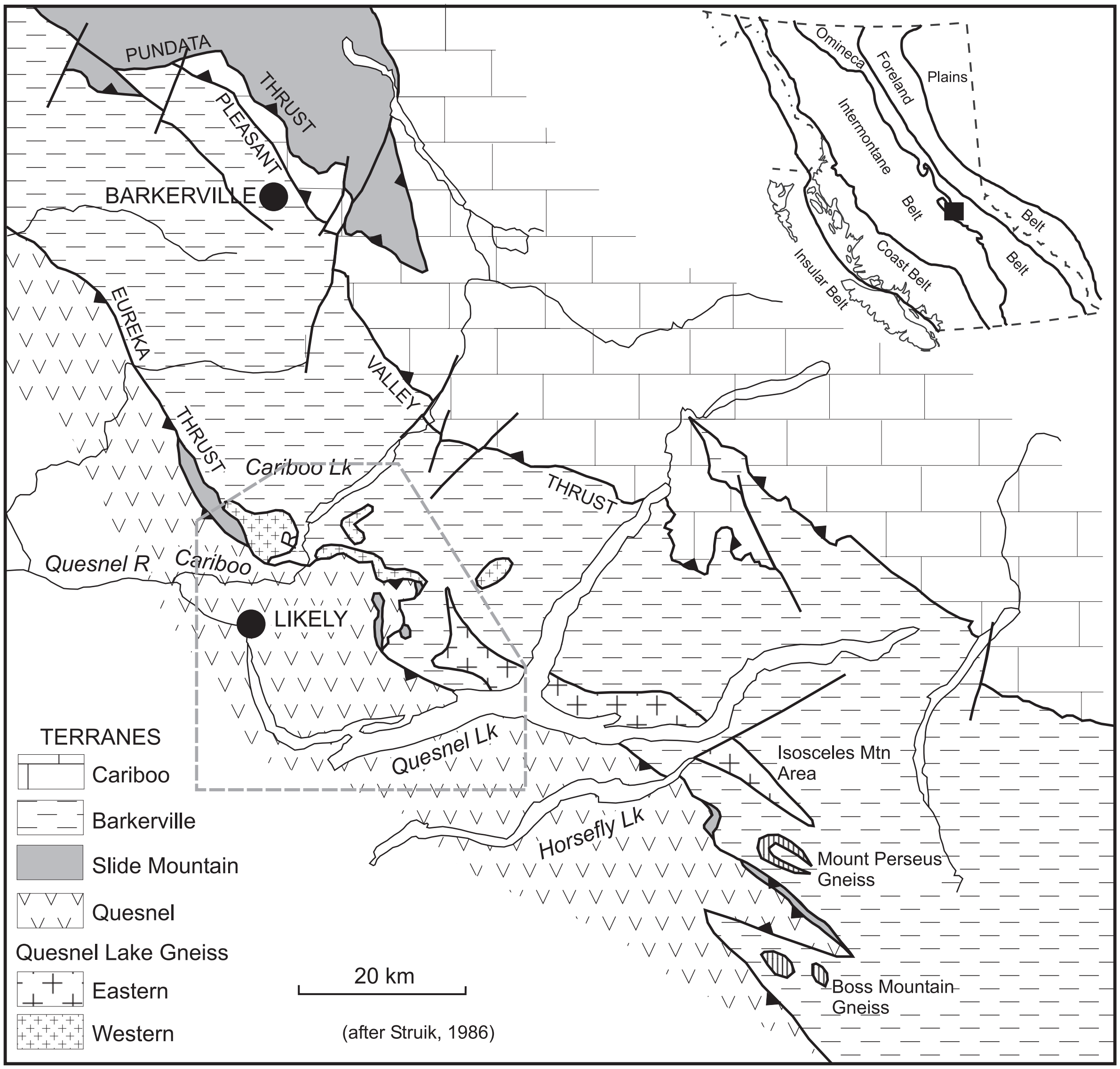


Figure 1. Distribution of Quesnel Lake Gneiss with respect to main geologic terranes. Dashed line shows area covered in Figure 2.

clastics of the Nicola arc which are as young as Early Jurassic.

Rocks in these terranes have been polydeformed and metamorphosed, possibly as early as middle Paleozoic time (Sutherland Brown, 1963) but certainly during the Mesozoic (Struik, 1981, 1988). Mesozoic deformation produced the dominant structures in the area and resulted from emplacement of oceanic and arc rocks of the Slide Mountain and Quesnel terranes against the western margin of the Kootenay Terrane (Eureka Thrust; Struik, 1988; Panteleyev *et al*., 1996). This penetrative deformation was of a polyphase nature and was accompanied by regional metamorphism which reached amphibolite grade within the pericratonic rocks.

Quesnel Lake Gneiss

The Quesnel Lake Gneiss comprises approximately half a dozen separate intrusive bodies found between Cariboo Lake and the southern arm of Quesnel Lake (Figures 1 and 2). Immediately south of its eastern extent, similar bodies, referred to as the Mount Perseus and Boss Mountain gneisses, have been correlated with the Quesnel Lake Gneiss (Figure 1; Mortensen *et al*., 1987; Montgomery and Ross, 1989).

Individual intrusions of the Quesnel Lake Gneiss vary in size from less than 1 to over 100 square kilometres. These are generally elongate and tend to follow the tectonic boundary between the Barkerville and Slide Mountain ter-

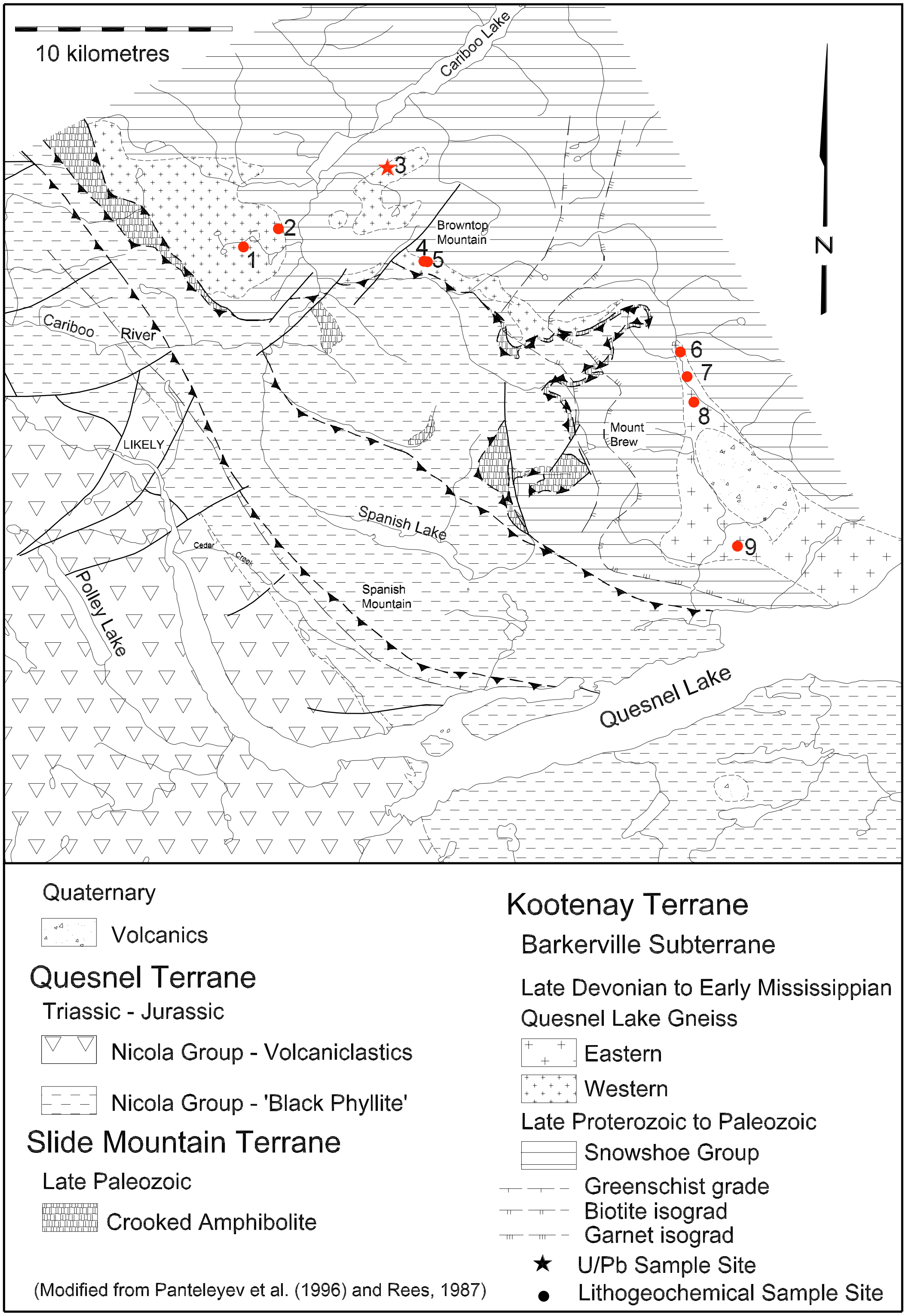


Figure 2. Simplified geology of the area between Cariboo Lake and the eastern part of Quesnel Lake.

ranes. Detailed mapping has shown the more elongate bodies are tabular or sill-like in nature (Mortensen *et al*., 1989; Rees, 1987).

The Quesnel Lake Gneiss can be subdivided into two varieties which are compositionally and texturally distinct. These were noted by Rees (1987) who subdivided the gneiss into eastern and western subunits. Lithogeochemistry from this study re-enforces this distinction and his nomenclature will be used in this report.

The Western Quesnel Lake Gneiss is found northwest of Mount Brew and comprises 4 distinct intrusive bodies (Figure 2). The Eastern Quesnel Lake Gneiss is approximately 70 kilometres long and is dissected by the northern and eastern arms of Quesnel Lake (Figure 2). Both units invariably display a flattening fabric and associated lineation which, in Western Quesnel Lake Gneiss, is amplified by alignment of feldspar megacrysts (Photos 1 and 2). The intensity of deformation displayed by these units is quite variable, ranging from relatively undeformed to ultra-mylonitic at the contact with the Slide Mountain Terrane.

Photo 1. General picture of Western Quesnel Lake Gneiss showing large megacrysts of potassium feldspar. The view here is down the lineation such that the granite looks relatively undeformed.

Lithologically, the Western Quesnel Lake Gneiss is characterized by large megacrysts of potassium feldspar from 1 to over 5 centimetres in length, which can comprise up to 30 per cent of the rock (Photo 1). These are typically broken parallel to lineation with fractures healed by quartz. Quartz can form recrystallized masses up to 0.5 centimetre in diameter, although these are commonly flattened and can form "ribbons" several centimetres long. These porphyroclasts are set in a coarsely crystalline matrix composed of quartz, plagioclase, potassic feldspar, muscovite, biotite (chloritized) and locally garnet. Feldspar is typically altered to muscovite.

Photo 2. Typical outcrop of foliated Eastern Quesnel Lake Gneiss. This gneiss typically lacks phenocrysts or porphyryoclasts and, as shown here, can contain xenoliths.

In contrast, the Eastern Quesnel Lake Gneiss typically lacks megacrysts (Photo 2), although plagioclase(?) feldspar porphyroclasts up to 0.5 centimetres in size and totaling 5 to 15 per cent of the unit were seen at locality 8. This unit is composed of quartz, plagioclase, microcline, muscovite, biotite (chloritized), as well as epidote and clinozoisite. Feldspar is also altered to muscovite, particularly in highly strained localities. This unit is much more homogenous than the Western Quesnel Lake Gneiss and commonly contains sheared, schistose xenoliths of the country rocks. Gneiss in the area of localities 6 to 8 (Figure 2) was not previously recognized. It is tentatively shown connected to the main body, although it is possible that it is a separate body.

Table 1. Major, trace and rare earth element data for 9 samples of Quesnel Lake Gneiss. See Figure 2 for sample locations.

	Map No.	1	2	3	4	5	6	7	8	9
	Easting	601986	603626	608276	610615	610665	622301	622566	622650	624900
	Northing	5839963	5840803	5843637	5839965	5839990	5835413	5834126	5832700	5826280
	Field No. / Precision	H97 BC-75	H97 BC-74	H97 BC-5	H97 BC-33	H97 BC-35	H97 BC-13	H97 BC-12	H97 BC-15	H97 BC-17
SiO_2	±0.01	72.89	73.19	74.05	73.07	73.72	70.67	64.83	64.74	68.76
TiO_2	±0.01	0.26	0.25	0.22	0.24	0.29	0.3	0.47	0.52	0.39
Al_2O_3	±0.01	13.85	13.83	13.59	13.82	14.27	14.45	14.8	14.83	14.54
Fe_2O_3	±0.01	0.71	0.45	0.65	0.92	0.54	1.52	2.69	2.56	1.88
FeO	±0.01	1.14	1.45	0.51	0.93	1.58	1.2	2.22	2.63	1.67
MnO	±0.01	0.02	0.03	0.03	0.03	0.03	0.05	0.08	0.09	0.05
MgO	±0.01	0.69	0.58	0.64	0.58	0.54	0.76	2.48	2.67	1.24
CaO	±0.01	0.76	0.6	1.05	0.58	0.97	2.45	5.17	5.42	3.83
Na_2O	±0.01	2.83	2.29	3.72	2.9	4.04	3.49	2.33	2.13	2.94
K_2O	±0.01	4.92	5.04	2.85	4.71	2.13	3.57	2.85	2.36	2.76
P_2O_5	±0.01	0.17	0.17	0.15	0.15	0.15	0.1	0.12	0.12	0.1
LOI	±0.01	1.22	1.39	1.99	1.36	1.33	0.94	1.35	1.45	1.25
SUM	±0.01	99.51	99.37	99.71	99.35	99.62	99.63	99.5	99.63	99.54
Nb	±5	18	21	23	18	21	35	16	16	26
Sr	±5	107	108	180	122	265	697	574	542	504
Y	±5	15	16	18	15	21	18	21	22	20
Zr	±5	112	116	101	118	118	159	142	149	140
V	±5	17	19	17	24	26	56	123	139	74
As	±0.5	2.9	4.5	2.9	3.1	1.9	3.1	2.8	2.7	2
Ba	±50	440	820	1800	430	290	1000	760	700	1000
Co	±1	4	4	-	3	3	4	13	10	7
Cr	±5	170	190	140	150	160	150	200	160	150
Cs	±1	6	6	2	3	6	3	2	2	2
Hf	±1	4	5	3	4	4	6	5	5	6
Rb	±15	210	170	110	160	77	100	91	72	82
Sc	±0.1	5.2	5.2	3.2	4.8	6.7	4.5	18	18	11
Th	±0.2	9.9	11	8.6	8.9	11	20	9.9	10	15
U	±0.5	3.2	5.5	1.5	3.9	7.1	3.4	3.4	3	3
La	±0.5	26	25	9.5	20	29	110	37	36	43
Ce	±3	48	49	22	38	53	140	58	53	69
Nd	±5	21	17	10	15	16	38	18	19	16
Sm	±0.1	3.8	3.5	2.5	2.8	3.9	5.2	3.5	3.3	3.6
Eu	±0.2	0.8	0.8	-	0.8	1	1.7	1.3	1.2	1.3
Yb	±0.2	1.9	2	1.8	2	1.9	1.5	1.8	1.7	2.1
Lu	±0.05	0.33	0.28	0.2	0.26	0.33	0.22	0.36	0.34	0.36

Notes

Major oxides and Nb to V determined at Cominco Research Laboratories, Vancouver, B.C.
As to Lu determined by thermal neutron activation analysis at ActLabs, Ancaster, Ontario.
All samples milled in a steel mill by Cominco Research Laboratories
Major oxides by X-ray fluorescence. Nb to V by pressed pellet X-ray fluorescence.
FeO determined by acid digestion /volumetric. LOI (Loss on ignition) by fusion at 1100°C
Major oxides as per cent. Elements Nb to Lu in parts per million

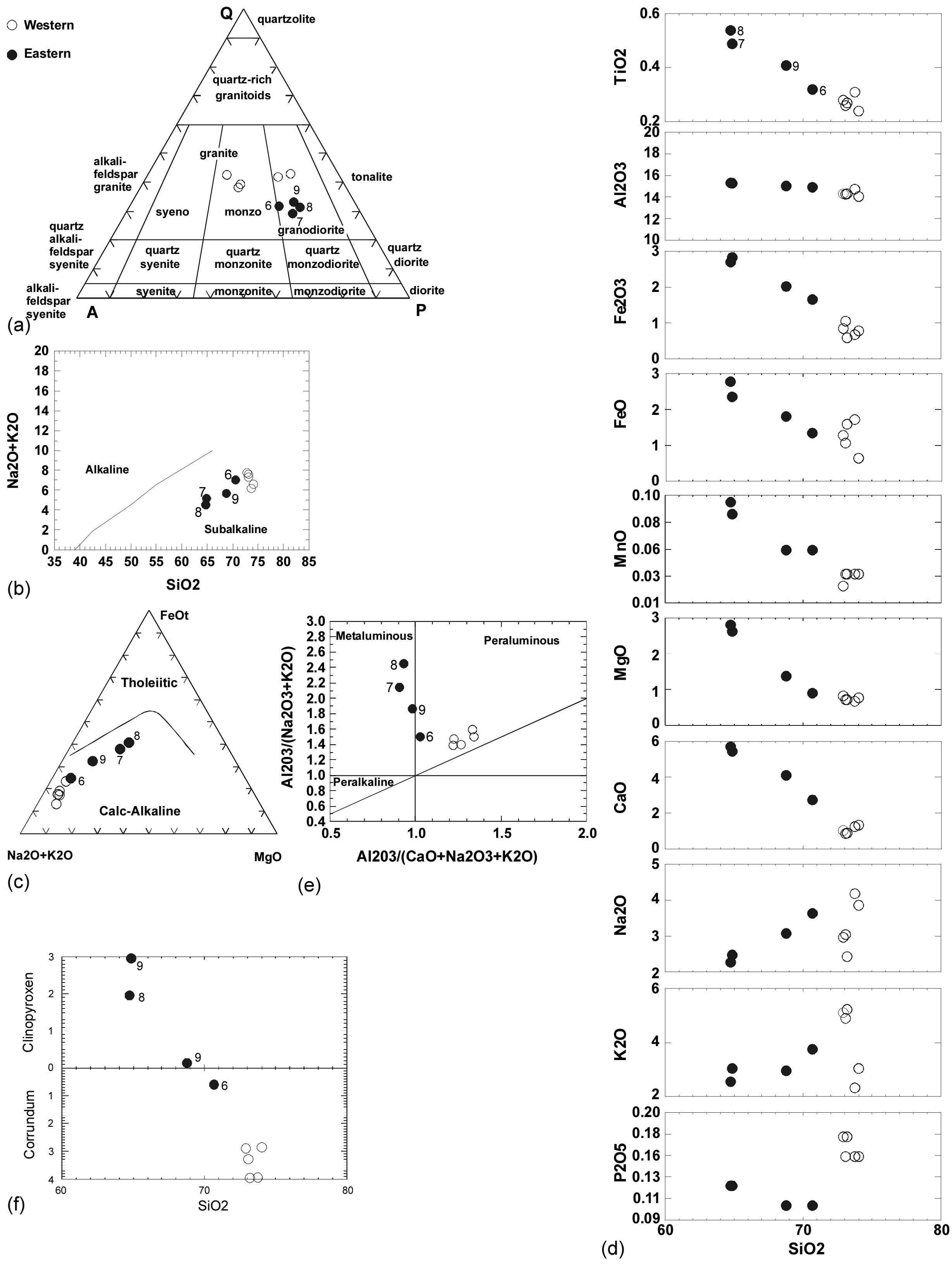


Figure 3. (a) Mesonormative plot of data from Table 1 for Quesnel Lake Gneiss. Ternary diagram from Streckeisen (1979). (b) Diagram showing alkalinity of Quesnel Lake Gneiss based on data in Table 1. Diagram by Irvine and Baragar (1971). (c) FeOt-MgO-Na2O+K2O plot for Quesnel Lake Gneiss based on data in Table 1. Diagram from Irvine and Baragar (1971). (d)Harker variation diagrams for Quesnel Lake Gneiss based on data in Table 1. (e)Plot of Shand's Indices for Quesnel Lake Gneiss based on data in Table 1. (f)Plot of normative corundum and clinopyroxene for the Quesnel Lake Gneiss for data from Table 1.

Lithogeochemisty

Nine samples of the Quesnel Lake Gneiss were analyzed; five from the Western and 4 from the Eastern suite (Figure 2). Results include whole rock, trace and rare-earth element data (Table 1). As these bodies are locally highly strained, metamorphosed or altered, interpretation of some of the data, particularly the whole rock, should be viewed with caution. Although the Eastern and Western Quesnel Lake gneisses display distinct chemical, as well as lithological trends, they also share some similarities. (Table 1; Figure 3).

Mesonormative plots of this data indicate compositions ranging from granodioritic to granite (Figure 3a). They are subalkaline and fall within the calc-alkaline field as defined in the FeO-MgO-Na2O+K2O diagram of Irvine and Baragar (1971; Figures 3b and c). Harker variation diagrams of the major elements show typical igneous fractionation trends, however scatter in Na2O and K2O, particularly in the Western Gneiss, probably reflects the mobility of these elements during metamorphism and deformation (Figure 3d). In general, the Western Quesnel Lake Gneiss has a higher and more uniform silica content than the Eastern suite.

Greater distinction between the two gneiss varieties is shown in diagrams involving their aluminum content. Plots of Shand's Indices indicate that the Eastern Quesnel Lake Gneiss is metaluminus whereas samples from the Western suite are clearly peraluminous (Figure 3e). This is corroborated on a plot showing normative values of corundum and clinopyroxene (Figure 3f). Samples from the Eastern Quesnel Lake Gneiss are either clinopyroxene normative or produce less than 1 per cent corundum. In contrast, samples from the Western Quesnel Lake Gneiss are all corundum normative, with values as high as 4 per cent. This is reflected by the presence of igneous garnet in some of the samples south of Browntop Mountain and the indication that these were originally two-mica granites.

Radiogenic isotopes also distinguish the two parts of the Quesnel Lake Gneiss. 87Sr/86Sr ratios from Montgomery (1985) and tabulated by Rees (1987) show that the Western Quesnel Lake Gneiss is clearly more radiogenic than its Eastern counterpart. Values for the Western suite range from 0.7199 to 0.7478 whereas the Eastern gneiss has values between 0.7030 and 0.7088.

Finally, geochemical, isotopic and petrographic data from these two suites indicates that the Western Quesnel Lake Gneiss has characteristics of an S-type granite whereas the Eastern Gneiss more closely approximates an I-type granite (Chappell and White, 1974; White and Chappell, 1983). Montgomery (1985), working in the Isosceles Mountain area, also found that the Eastern Quesnel Lake Gneiss, and the Mount Perseus Gneiss to the south, generally display I-type characteristics. These bodies, although similar in certain aspects with parts of the Eastern Quesnel Lake Gneiss in the present map area, tend to be less siliceous and more alkaline such that some parts of the Eastern Quesnel Lake Gneiss are syenitic in composition.

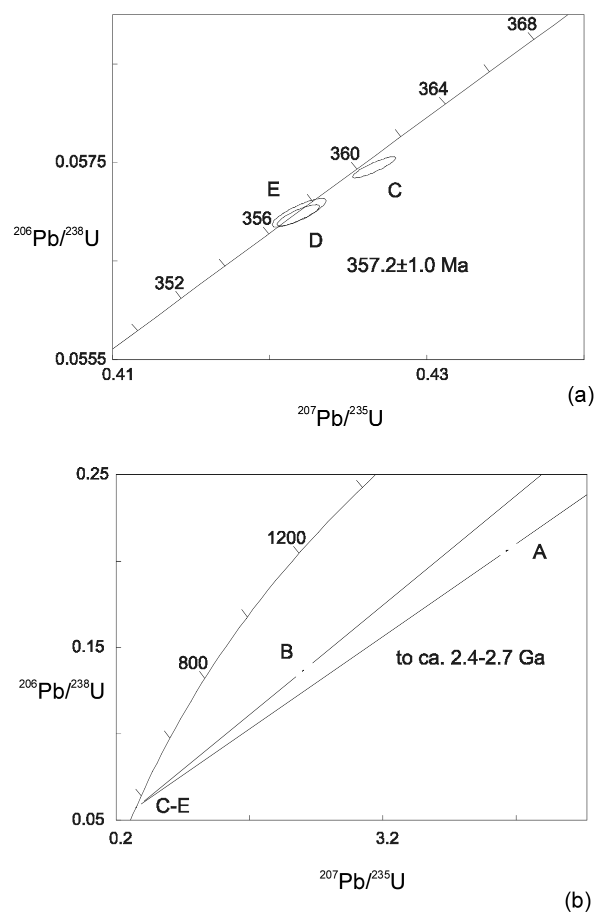


Figure 4. (a) U-Pb concordia plot for zircon from Quesnel Lake Gneiss at locality 5. Sample numbers correspond to Table 2. Error ellipses are plotted at the 2δ level of uncertainty. (b)U-Pb concordia plot for zircon from Quesnel Lake Gneiss at locality 5. This diagram shows location of data points A and B and the corresponding upper intercepts. Sample numbers refer to Table 2. Error ellipses are plotted at the 2δ level of uncertainty

Table 2. U-Pb analytical data for sample of Quesnel Lake Gneiss from locality 5.
See Figure 2 for location of sample.

Fraction[1]	Wt	U^2	Pb^{*3}	$^{206}Pb^4$	Pb^5	$^{208}Pb^6$	Isotopic ratios (1σ,%) [7]			Apparent ages (2σ,Ma) [7]	
	mg	ppm	ppm	204Pb	pg	%	$^{206}Pb/^{238}U$	$^{207}Pb/^{235}U$	$^{207}Pb/^{206}Pb$	$^{206}Pb/^{238}U$	$^{207}Pb/^{206}Pb$
A c,p,eq[1]	12	259	64	15603	3	16.3	0.20610 (0.10)	4.5979 (0.15)	0.16180 (0.08)	1208.0 (2.1)	2474.6 (2.7)
B f, p,eq[5]	14	243	35	8153	4	8.2	0.13654 (0.09)	2.3035 (0.16)	0.12236 (0.08)	825.1 (1.5)	1990.9 (2.7)
C c,p,e,m	20	409	22	7004	4	4.1	0.05745 (0.09)	0.4266 (0.16)	0.05386 (0.09)	360.1 (0.7)	365.2 (4.1)
D c,p,e,n,m	26	422	23	7283	5	4.8	0.05696 (0.09)	0.4218 (0.16)	0.05370 (0.10)	357.1 (0.7)	358.7 (4.4)
E f,p,e,n,m	14	406	22	4167	5	6.7	0.05699 (0.13)	0.4219 (0.20)	0.05369 (0.12)	357.3 (0.9)	357.9 (5.5)

Notes: Analytical techniques are listed in Mortensen *et al*. (1995).

1Upper case letter = fraction identifier;Zircon fractions A-D air abraded 10-30 volume%; E unabraded; Grain size, intermediatedimension: c=134mm to 104mm; f=104mm to 74mm; All fractions nonmagnetic on Franz separator at sideslope of 5° and field strength of 1.8A. Front slope for all fractions is 20°; Grain character codes: e=elongate, eq=equant multifaceted; p=prismatic; n=needles; Numeral=number of grains analysed; m=>10 grains.

2 U blank correction of 1pg ± 20%; U fractionation corrections were measured for each run with a double 233U-235U spike (about 0.004/amu).

3Radiogenic Pb.

4Measured ratio corrected for spike and Pb fractionation of 0.0035/amu ± 20% (Daly collector) and laboratory blank Pb of 2-5 pg± 20%. Laboratory blank Pb concentrations and isotopic compositions based on totalprocedural blanks analysed throughout the duration of this study.

5Total common Pb in analysis based on blank isotopic composition.

6Radiogenic Pb

7Corrected for blank Pb, U and common Pb. Common Pb corrections based on Stacey Kramers model (Stacey and Kramers, 1975)at the age of the rock or the 207Pb/206Pb age of the fraction.

U-Pb Geochronology

Samples of the Western Quesnel Lake Gneiss were collected south of Cariboo Lake for U-Pb geochronology (Figure 2). Gem quality, clear, pale pink zircon, varying in shape from equant multifaceted to very elongate prismatic was recovered from this sample. Fractions A and B were equant multifaceted grains, whereas C, D and E comprised elongate to needle-like prisms. The equant grains gave very discordant results and appear to contain significant Precambrian inherited zircon, while the fractions composed of elongate grains contain little or none of these old components (Figure 4a, Table 2). An interpreted crystallization age of 357.2±1.0 Ma is based on concordant fractions D and E. The average age of inherited components in analyzed equant grains is about 2.4-2.7 Ga, based on the upper intercepts of two chords which extend from the magmatic age of the rock (defined by fractions D and E) through fractions A and B (Figure 4b).This age is consistent with results from samples of the Eastern Quesnel Lake Gneiss in the Isosceles Mountain area and the Boss Mountain Gneiss, which give bracketed ages of emplacement between 335 and 375 Ma (Mortensen *et al*., 1987). This, together with a Rb/Sr age of 351±70 Ma for the eastern-most part of the Eastern Quesnel Lake Gneiss (Rees, 1987), suggests that these two suites are essentially of the same age.

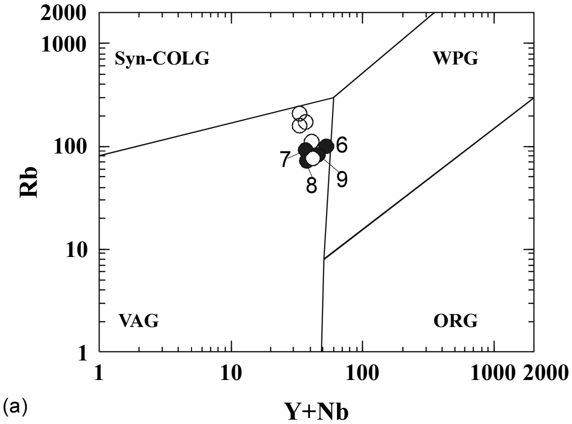
DISCUSSION

The distinct lithologic, geochemical and isotopic characteristics of these two essentially coeval suites reinforces the suggestion originally put forth by Rees (1987) that they represent different phases of a single intrusive event. The S-type characteristics of the Western Quesnel Lake Gneiss, together with its high 87Sr/86Sr ratios and strong inheritance in zircons, strongly suggest that it represents melting of the continental crust. In contrast, the Eastern Quesnel Lake Gneiss displays I-type attributes, although 87Sr/86Sr ratios and inheritance in zircons indicates some assimilation of continental material.

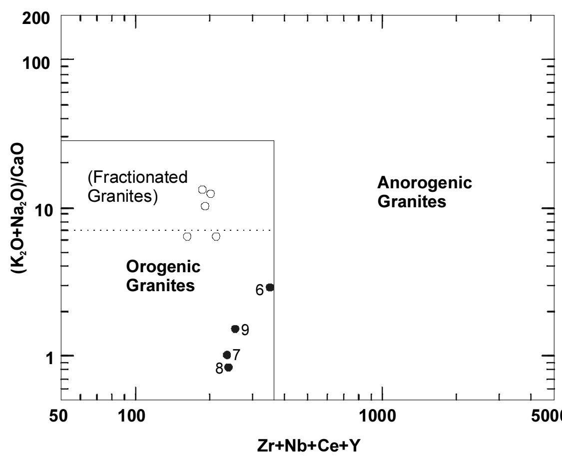
The origin of these granites has been debated by many workers. Some view these granites as being anorogenic in origin and related to rifting along the western edge of ancestral North America (Struik, 1987; Gordey *et al*., 1987). Others have suggested that they were produced in an orogenic setting and are related to compressional tectonism documented within westernmost Ancestral North American miogeoclinal rocks along the southern U.S. Cordillera (i.e. Roberts Mountain Allochthon; Smith *et al*. 1993).

Early attempts at differentiating these two tectonic settings through use of geochemical data was attempted by Montgomery (1985) and Montgomery and Ross (1989) using information from the eastern-most part of the Eastern Quesnel Lake Gneiss in the Isosceles Mountain area. These authors used a discrimination diagram developed by Pearce *et al*. (1984) which utilized the elements Nb, Rb, and Y. Data plotted on this diagram was not conclusive with points forming an area straddling the volcanic arc granite and within plate granite fields. Montgomery and Ross (1989) interpreted this data to indicate the gneisses are calc-alkalic and/or tholeiitic granites intruded into continental crust during subduction of oceanic lithosphere, presumably along an east dipping zone to the west.

Data from this investigation plotted on the same diagram falls within the volcanic arc granite field similar to some of the data points from the Isosceles Mountain area (Figure 5a). The relatively low values of the elements Zr, Nb, Ce and Y also supports an orogenic setting for these granites. (Figure 5b). The data points for the Western Quesnel Lake Gneiss should be viewed with caution. These granites were most likely produced by melting of the continental crust (i.e. sediments) and the geochemistry would be a reflection of the source material and not the tectonic setting. Furthermore, Pearce *et al*. (1984) indicate that average continental crust plots within the volcanic arc granite field of the Rb versus Nb+Y diagram, a feature also supported by granite of the Western Quesnel Lake Gneiss.



(a)



(b)

Figure 5. (a) Plot of Rb versus Y+Nb for Quesnel Lake Gneiss based on data in Table 1. Diagram from Pearce *et al*. (1984). Syn-COLG: syn-collisional granites; WPG: within plate granites; VAG: volcanic arc granites; ORG: ocean ridge granites. (b) Plot of (K2O+Na2O)/CaO versus Zr+Nb+Ce+Y for Quesnel Lake Gneiss based on data in Table 1. Diagram from Whalen *et al*. (1987).

The same cannot be said of the Eastern Quesnel Lake Gneiss. Data for this granite suggests it was produced by melting of igneous source rocks (I-type granite). Subgroups of this granite type include A-type, or anorogenic granites, produced by melting of dehydrated continental crust and M-type resulting from melting of subducted oceanic crust or overlying mantle (Whalen *et al*., 1987). Data for the Eastern Quesnel Lake Gneiss from the present study area indicates this granite is most likely M-type (i.e. volcanic arc granites; Figures 5a and b).

In summary, these data suggests that that the Quesnel Lake Gneisses are the products of arc volcanism. However, parts of the Eastern Quesnel Lake Gneiss from the Isosceles Mountain area have geochemical signatures that indicate a within plate or anorogenic setting (Montgomery and Ross, 1989). Data for syenitic phases in this area (Montgomery, 1985) have values of Zr+Nb+Ce+Y greater than 1000 which are well within the anorogenic field of Whalen *et al*. (1987; Figure 5b), which supports the within plate setting for this data indicated on the Rb versus Y+Nb plot of Pearce *et al*. (1984; see Figure 4 of Montgomery and Ross, 1989).

Clearly, the interpretation of the tectonic setting of the Eastern and Western Quesnel Lake gneisses based on geochemical abundances, is not straightforward. The Western Quesnel Lake Gneiss is probably the product of partial melting of continental crust in an arc setting. The bulk of the geochemical data suggests Eastern Quesnel Lake Gneiss granites were also produced in an arc-setting, although the alkaline nature of some of the phases is not fully understood. Whalen *et al*. (1987) suggested that alkaline or peralkaline granites can be formed in non-anorogenic settings, such as arc or transcurrently faulted subduction zones. The latter two settings would imply back-arc spreading or extension, a scenario envisioned by many workers during Late Devonian to Early Mississippian times along the western edge of Ancestral North America (Robback and Walker, 1995; Ferri, 1997; Gabrielse, 1991).

It is probable that these Early Mississippian plutonic rocks are comagmatic with Late Devonian to Early Mississippian? arc volcanics that are exposed intermittently along the western limit of the Kootenay and Cassiar terranes. These volcanics are most abundant in the Eagle Bay Assemblage north of Kamloops (Schiarizza and Preto, 1987), and may possibly occur in western exposures of the Snowshoe Group (Struik, 1988; Höy and Ferri, 1998). Eagle Bay volcanics are bimodal, calc-alkaline arc volcanics that locally contain alkaline phases (Höy, 1987) and are intruded by a number of ?Late Devonian orthogneisses that are similar to the Quesnel Lake gneisses. Devono-Mississippian calc-alkaline felsic volcanics are also found along western exposures of the Cassiar Terrane in the Germansen Landing area of east-central British Columbia (Ferri and Melville, 1994; Ferri *et al*., 1992, 1993).

The comparison between these terranes, and in particular, the recognition of subvolcanic magmatism related to arc volcanism in the Barkerville Subterrane and Cassiar Terrane, enhances the potential for discovery of base and precious metal mineralization similar to those that occur in the Eagle Bay Assemblage.

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