GEOLOGY OF THE BEWS CREEK AREA
SOUTHWEST MARGIN OF FRENCHMAN CAP GNEISS DOME
(82M/2E)

By T. Höy

INTRODUCTION

The Bews Creek area (Fig. 3) is located southeast of the confluence of Bews Creek and Perry River, 25 kilometres west-northwest of Revelstoke. Access to the western part of the area is provided by a logging road that follows the Perry River, while the southern part is reached by a logging road along Crazy Creek. The area was mapped in eight days; two days of logging road geology and a six-day fly-camp.

The area was investigated in order: (1) to attempt to tie together, both stratigraphically and structurally, the Jordan River area (Fyles, 1970) with the Perry River area (McMillan, 1973); (2) to attempt to confirm the structural and stratigraphic interpretation of the Jordan River area by Höy and McMillan (1979); and (3) to assess the potential for stratabound lead-zinc and carbonatite occurrences which occur elsewhere along the margins of Frenchman Cap gneiss dome.

The Bews Creek area is underlain by gneissic rock which correlates with core gneisses of Frenchman Cap gneiss dome (units A and B of Wheeler, 1965), and an overlying succession constituting a basal quartzite, a calc-silicate gneiss unit, a second quartzite, and finally a mixed pelitic and calcareous sequence. This succession correlates reasonably well with those established elsewhere in the mantling rocks of the dome.

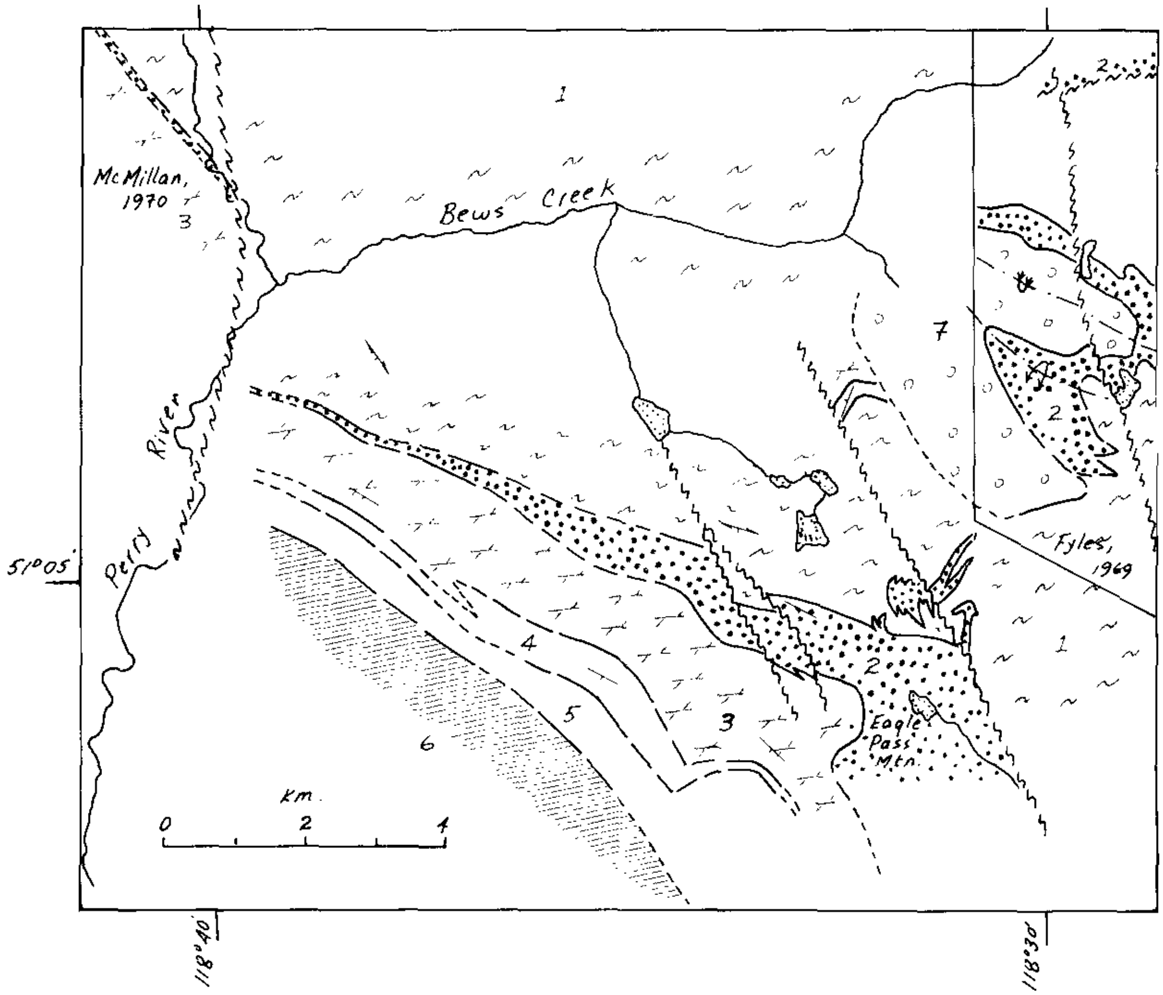
STRATIGRAPHY

Unit 1 comprises well-layered hornblende gneiss, minor amounts of amphibolite and biotite gneiss, and rare calc-silicate gneiss. A granitic orthogneiss occurs in the vicinity of the interference fold structure shown on Figure 4. Unit 1 is continuous in the southeast part of the map-area with unit 10 of Fyles (1970). Unit 10 of Fyles was tentatively correlated with core gneisses (Höy and McMillan, 1979, Fig. 8) and this correlation is in accord with the present study.

A white, relatively pure quartzite (unit 2) overlies unit 1. It is several hundred metres thick north of Eagle Pass Mountain (Fig. 3) but thins to only a few metres near Bews Creek, 8 kilometres to the northwest. A prominent quartz pebble conglomerate occurs near its base and micaceous quartzite layers are common in the Eagle Pass Mountain area.

Diopside-rich calc-silicate gneiss, biotite gneiss, impure marble, and a granular, calcite-cemented quartzite (unit 3) overlie the basal quartzite. Unit 3 is overlain by a second quartzite (unit 4), that is lithologically similar to unit 2, then by a heterogeneous succession comprising quartz feldspar gneiss and pelitic schist with minor amounts of calc-silicate gneiss and quartzite (unit 5).

Overlying pegmatite-laced rocks (unit 6; unit E of Wheeler, 1965) consist of well-layered biotite-hornblende gneiss, pelitic gneiss, quartz feldspar gneiss, and minor quartzite, calc-silicate gneiss, and marble. Unit 6 rocks are tectonically separated from the underlying metasedimentary rocks by a southwest-dipping fault (as predicted by R. L. Brown, personal communication, 1979).



LEGEND

PALEOZOIC – MESOZOIC (?)

7 ORTHOGNEISS, PORPHYRITIC GRANITE GNEISS, GRANITE

PROTEROZOIC – PALEOZOIC (?)

6 GNEISS, SCHIST, ABUNDANT PEGMATITE

5 PELITIC SCHIST, CALCAREOUS SCHIST, QUARTZITE

4 QUARTZITE

3 CALC-SILICATE GNEISS, MINOR MARBLE, BIOTITE SCHIST, GNEISS

2 QUARTZITE, MINOR SCHIST, QUARTZ-PEBBLE CONGLOMERATE

PROTEROZOIC – APHEBIAN

1 MIXED CORE GNEISS· BIOTITE HORNBLENDE PARAGNEISS, ORTHOGNEISS

SYMBOLS

FAULT APPROXIMATE, DEFINED . . . .

FOLIATION . . . .

LAYERING . . . .

OVERTURNED ANTIFORM, SYNFORM . . . .

Figure 3. Regional geology of an area southeast of Bews Creek and Perry River, along the southern margin of Frenchman Cap gneiss dome (northeast corner after Fyles, 1970).

Unit 7, described as a porphyritic granite gneiss by Fyles (1970), was not visited. Its eastern contact is taken from Fyles (1970) and its southwestern contact from Wheeler (1965).

Correlation of the Bews Creek succession with sequences established elsewhere along the margin of Frenchman Cap dome is relatively straightforward. The succession, consisting of basal quartzite, calc-silicate gneiss and biotite gneiss, a second quartzite, and an overlying somewhat pelitic and calcareous sequence, is recognized on the northwestern margin (Höy, 1979a), western margin (McMillan, 1973), and eastern margin (Brown and Psutka, 1979). A similar stratigraphic succession is inferred (Höy and McMillan, 1979) in the more complex Jordan River area (Fyles, 1970).

The core gneisses may represent Lower Proterozoic Aphebian crystalline basement. Samples of both core paragneiss and orthogneiss from the eastern side of Frenchman Cap, collected by R. L. Brown, have yielded dates of approximately 2.1 Ga (R. L. Armstrong, personal communication, 1979). A basal quartzite, locally containing quartz pebble conglomerate, overlies core gneisses around the entire margin of the dome. Furthermore, in one locality fragments of gneissic rocks believed to be core gneiss clasts lie in the quartzite near its base (Fig. 5). The margins of these fragments are diffuse and the only recognizable structure within them, the penetrative mineral foliation, parallels that of both the surrounding quartzite and underlying gneiss. The fragments are inferred to have a sedimentary origin, but it is possible that they have a structural origin. They could represent a fragmented impure sedimentary layer near the base of the quartzite or perhaps a fragmented early fold nose. There are no features typical of boudinaging adjacent to the fragments and it is suggested that they are clasts of basement gneiss incorporated in the quartzite during its deposition.

The age of basal quartzite and overlying metasedimentary succession is not known. They may be correlative with the Middle and Upper Proterozoic Purcell Supergroup as suggested by Read (1979), or with the Upper Proterozoic Windermere Group or the Lower Paleozoic platformal succession exposed to the east as suggested by a number of authors including Wheeler (1965), Fyles (1970), and Höy and McMillan (1979). They do not closely resemble any of these successions. Based on the platformal nature of the Frenchman Cap succession, correlation with the Upper Purcell Supergroup or the Lower Paleozoic seems most likely.

STRUCTURE

The axial surface of an anticlinal fold trends west-northwest through the area. It is the western extension of an early fold described by Höy and McMillan (1979) that opens in the south and closes to the north in the Jordan River area. Unit 1, correlated with core gneisses, occurs in its core and the overlying succession is, in part, repeated on its limbs.

Minor structures are common in all outcrops. Mineral lineations plunge at varying angles to the southwest throughout the area. They are interpreted to parallel fold axes of the earliest recognized folds and in the instances where early folds can be clearly documented by interference structures mineral lineations lie parallel to the early fold axes. The prominent foliation is axial planar to these early (phase 1 ?) minor folds. Relatively open to very tight (phase 2 ?) minor folds that deform the foliation are present in most outcrops. Their axes generally trend southwesterly subparallel to the phase 1 (?) mineral lineations and their axial surfaces are upright to west dipping. Interference patterns between phase 1 and phase 2 folds, which are common on outcrop scale (Fig. 5), may also occur at map scale (Fig. 4).

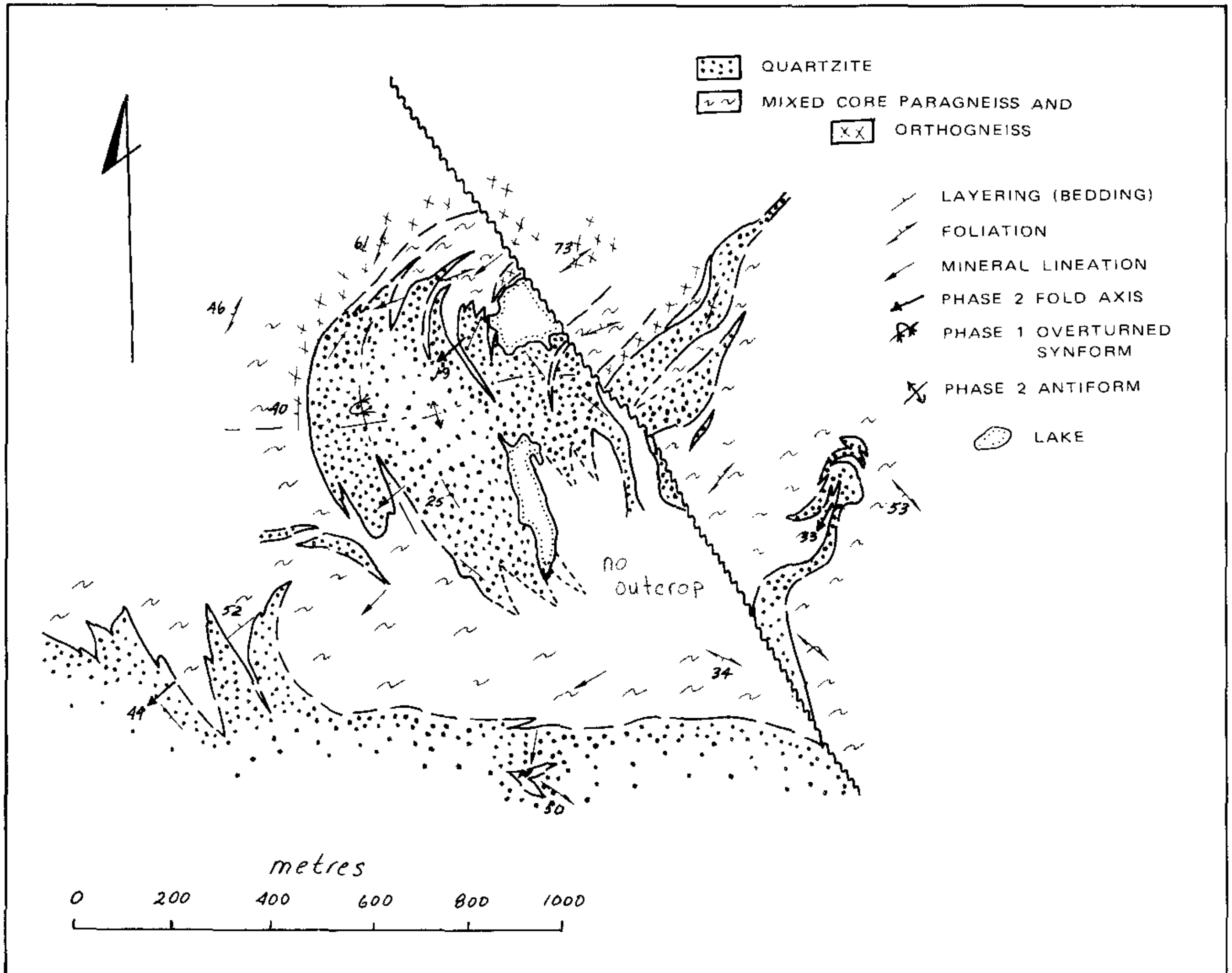


Figure 4. Detailed geological map showing complex interfolding of core gneiss and basal quartzite; map centre is located *approximately* 2 *kilometres north-northeast* of Eagle Pass Mountain.

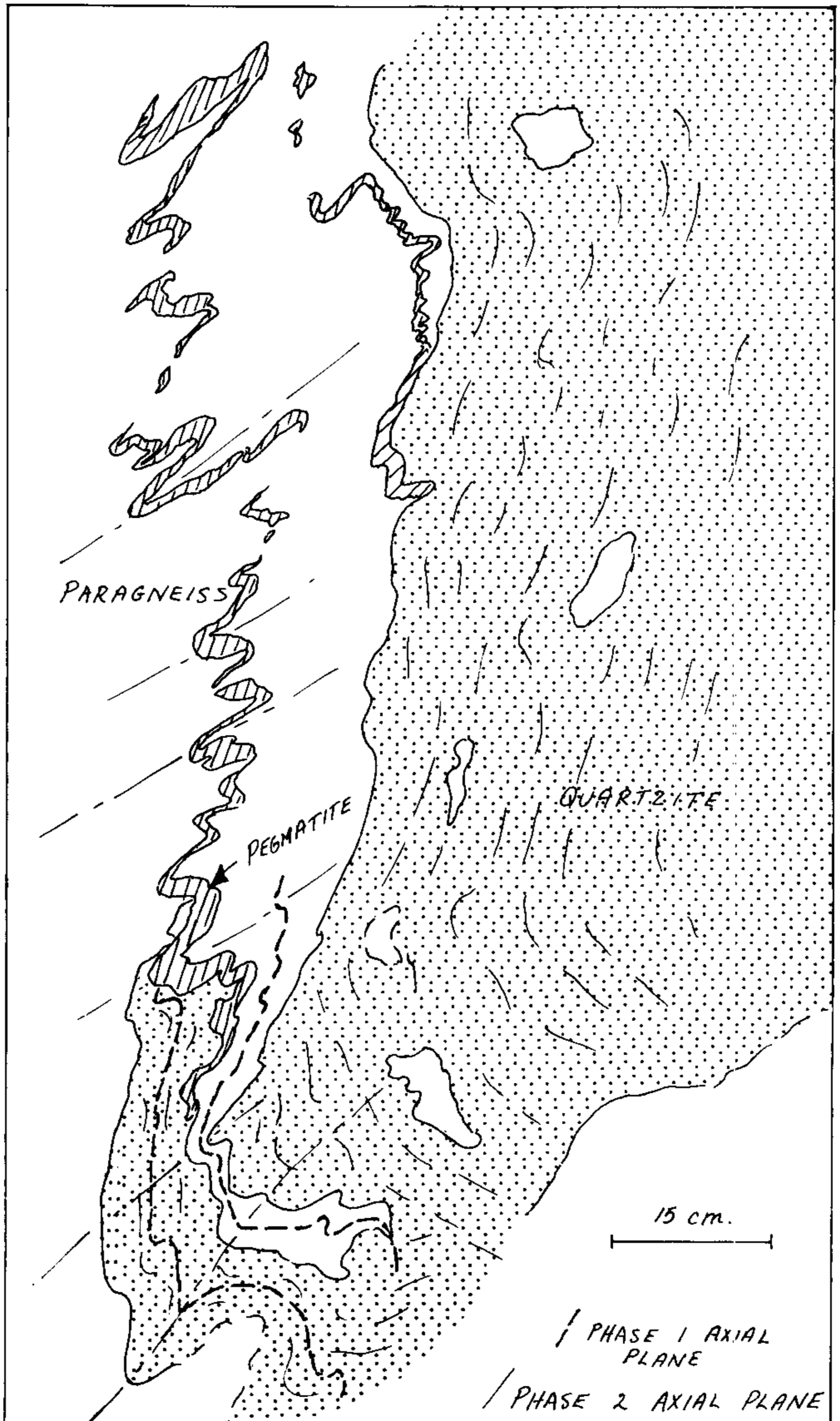


Figure 5. Detail of interference of Phase 1 and Phase 2 minor folds involving core gneiss (no pattern) and basal quartzite (unit 2). Note sharp contact between core and quartzite and clasts (?) of core gneiss near base of quartzite (*see* discussion in text).

SUMMARY

A succession of metasedimentary rocks overlies with apparent conformity gneissic rocks correlative with core gneisses of Frenchman Cap dome. Both core gneisses and the overlying succession are complexly interfolded by at least two phases of deformation. An early (?) northwest-trending anticlinal fold dominates the structure of the area, repeating the stratigraphic succession in the south, but phase 2 minor folds are the most conspicuous folds on outcrop scale.

Stratabound lead-zinc deposits and showings occur elsewhere at a number of horizons within the metasedimentary cover rocks (Höy and McMillan, 1979; Höy, 1979b). The calcareous succession immediately above the basal quartzite (unit 3) hosts the Cottonbelt (Höy, 1979a) and King Fissure (Boronowski, 1976) deposits further north, but no lead-zinc mineralization was seen in this succession in the Bews Creek area. A stratiform carbonatite layer containing anomalous concentrations of niobium and other rare earths occurs in the Perry River (McMillan and Moore, 1974) and Cottonbelt (Höy, 1979b) areas within rocks correlative with unit 3. Nepheline syenite and syenite intrusions occur in Perry River and Jordan River areas. Neither the carbonatites nor the nepheline syenites were seen in the Bews Creek area.

ACKNOWLEDGMENTS

I was ably and cheerfully assisted in the field by Peter Mustard. W. J. McMillan spent several days in the field with me, and many ideas presented in this note developed through discussion with him, and as a consequence of our joint paper in *Geological Fieldwork, 1978.*

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