GEOLOGY OF WOLF MOUNTAIN (12A/2W) AND BURNT POND (12A/3E), CENTRAL NEWFOUNDLAND

by

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INTRODUCTION

The Wolf Mountain (12A/2W) and Burnt Pond (12A/3E) map areas are located in south-central Newfoundland approximately 60 km south of Buchans. Access to Granite Lake, a prominent lake in the northern part of the the map area, is by a recently constructed but deteriorating gravel road. This road is an extension of a much older woods road from Millertown and was constructed during the building of dams and ditches for the Bay d'Espoir hydroelectric project in the mid sixties. Dam construction has resulted in flooding of large parts of the map area.

Much of the field area is accessible from this road and from another road which runs along the north bank of the ditch between Granite and Meelpaeg Lakes. Grey River cuts through the eastern half of the map area but is suitable for canoe work only in the spring when water levels are high. Access to the rest of the area is best gained by helicopter as even the largest ponds are shallow and very rocky and, thus, unsuitable for float planes.

The Granite Lake area recently became the target for mineral exploration following lake sediment geochemical studies by Butler and Davenport (1978, 1980) which showed anomalous areas of U, Zn, Mo, and Ag in the northeast part of the map area. Smaller, less anomalous areas of U and Mo occur in the southeast and northwest corners of the map area.

Previous geological mapping in the area is limited. Phendler (1950) examined a belt 5 km wide around Granite Lake prior to flooding and defined the main geological elements. Riley (1957) mapped the west half of the map area as part of 1:250,000 mapping of sheet 12A (west half). Williams (1970) mapped the east half of the map area as part of 1:250,000 mapping of sheet 12A (east half). Smyth (1979) compiled a map of the Burnt Pond sheet (12A/3) using unpublished maps of the Buchans Mining Co. and some reconnaissance mapping.

Exposure in the area is very variable and is generally controlled by rock type. Metasedimentary rocks and mylonitic granites are generally well exposed while more massive granitoid rocks are usually poorly exposed.

The area is covered by an extensive blanket of boulder till and bog with scattered drumlins and eskers. Glacial erratics are very common. Glacial striae are rare but show a southerly direction of ice movement.

GENERAL GEOLOGY

The map area is underlain by a variety of metasedimentary and granitoid rocks. Riley (1957) shows a narrow belt of basic volcanic rocks in the southwest of the map area; however, these were not found during field work (see also Smyth, 1979). The metasediments are tentatively correlated with the Middle Ordovician Bay du Nord Group (Chorlton, 1978) mainly on the basis of lithological similarity. The granitoid rocks form the northwest end of the Devonian North Bay Granite (Jewell, 1939; Colman-Sadd, 1976) and underlie most of the map area. The granitoid rocks are generally weakly deformed but a major mylonite zone cuts the granite and metasediments in the southwest part of the map area.

No fossils were found in the metasediments and no ages have been obtained from this area. Williams, however, reports a K/Ar date of 385 ± 16 Ma from granite 35 km to the northeast of Granite Lake.

DESCRIPTION OF UNITS

The rocks within the map area have been divided into seven units. Units 1 to 3 are metasedimentary and may be metamorphic equivalents. Units 4 to 7 are granitoids which are intrusive into Units 1 to 3.

Unit 1

Unit 1 underlies the north-central part of the map area around Granite Lake. A small embayment of Unit 1 is located at the western boundary of the map area north of Granite Lake. The main rock type in the unit is complexly deformed and migmatized metasediments. The migmatite is composed of a foliated biotite-muscovite tonalite neosome (or mobilizate) and a quartz-biotite-muscovite schist paleosome (or restite).

The paleosome is medium to coarse grained, tightly folded in places, and occurs as parallel layers or angular blocks within the neosome. Apart from rare angular blocks of amphibolite of presumed igneous origin, the paleosome is entirely metasedimentary. This is suggested by alternating layers of quartzite, psammitic schist and pelitic schist. Crossbeds were found in some blocks of quartzite.

The neosome consists of weakly to strongly foliated, medium grained, equigranular granite or granodiorite with minor pegmatite and forms 1 to 30 cm veins which are commonly parallel.

The paleosome is polyphase deformed and metamorphosed and contains two main fabrics. Angular blocks containing the folded schistosity are common as xenoliths in the granite neosome.

The neosome has also been polyphase deformed. This is shown by "Type 1" interference patterns (Ramsey, 1967) where the migmatite forms small isolated basins. Generally, the neosome is moderately schistose.

Towards the southern tip of the migmatite complex around Granite Lake, there is a heterogeneous zone of migmatite, schist and weakly deformed diorite to granite dikes. The general sequence of intrusion is from basic to acidic, ending with garnet-muscovite-tourmaline granite pegmatite. Common throughout this mixed zone are veins of tourmaline which cut all other phases.

Unit 2

This unit occurs at the eastern margin of the map area and forms the northwest corner of a long narrow belt of metasediments which outcrops mainly to the east of the map area (see Williams, 1970). The metasediments are mainly medium grained, thinly bedded to laminated, semipelitic to pelitic biotite-muscovite schists. The metasediments have been deformed to produce tight isoclinal folds which plunge gently to the northeast. Unit 2 contains spots of cordierite and biotite that were probably produced by contact metamorphism during emplacement of Unit 7.

Unit 3

Unit 3 outcrops in the southwest portion of the map area and mainly comprises psammite with lesser amounts of semipelite and rare metaconglomerate. They have been variably deformed and metamorphosed. These rocks are medium to thinly bedded with rare parallel laminations, crossbeds, and graded beds. Younging to both northeast and southwest was found. Bedding and cleavage are generally steeply dipping and, locally, slightly overturned. Bedding has been folded into tight isoclinal folds with a steep axial

LEGEND

DEVONIAN(?)

6, 7 *7 Massive to weakly foliated, medium to coarse grained, porphyritic biotite-muscovite granite.*

6 Massive to weakly foliated, coarse grained, porphyritic biotite granite.

5 *Massive to weakly foliated, uniform to sparsely porphyritic, medium grained biotite-muscovite granite.*

4 *Weakly foliated, uniform medium grained, biotite granite and granodiorite.*

ORDOVICIAN(?)

BAY DU NORD GROUP? (1,2,3)

3 *Psammitic biotite schist with minor pelitic schist, slate, and pebbly sandstone.*

2 *Psammitic and pelitic spotted biotite schist.*

1 *Migmatite and schist, probably derived from 1 and 2; includes abundant granitic dikes south of Granite Lake.*

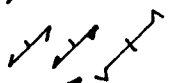
SYMBOLS

Geological boundary (approximate, assumed, gradational) . . . . . 

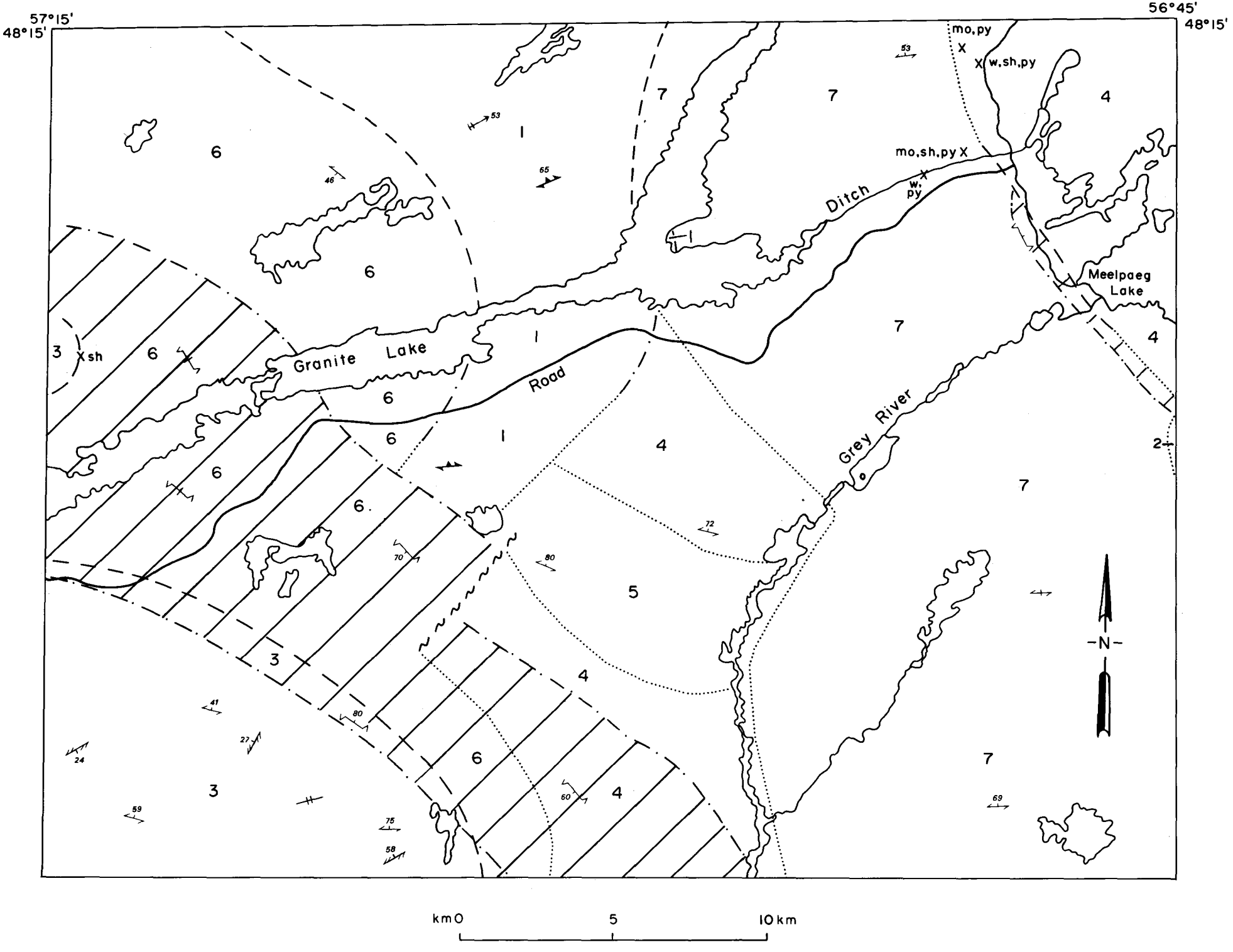
Fault . . . . . 

Shear zone . . . . . 

Bedding (tops unknown) . . . . . 

Cleavage, foliation, mylonitic foliation . . . . . 

Lineation . . . . . 


57°15'
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mo,py
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X w,sh,py
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planar cleavage. A second cleavage has developed in places along large kink bands which have gentle dips. The northeast margin of the unit has been intensely mylonitized with Unit 6. The mylonitic fabric has transposed the main fabric in Unit 3.

Metamorphism of Unit 3 is generally low greenschist facies. However, towards the northeast, the metamorphic grade increases as the granite contact is approached. Towards the southwest corner of the map area, the metamorphic grade increases and spotted biotite-muscovite-garnet schist and hornblende hornfels predominate.

Units 1 to 3 are tentatively correlated on the basis of similar parent rock types and bed forms. The style of folding is comparable with tight similar folds found in all the units. Unit 1, however, appears to be more complexly deformed.

Unit 4

This unit is located in the northeast corner and centre of the map area. The two areas are grouped together because of lithological similarities. The dominant rock type is foliated, medium to fine grained, equigranular, biotite granodiorite. Small amounts of muscovite may be present locally. Xenoliths of migmatite, schists, diabase, and foliated quartz diorite are common in both areas. Unit 4 is cut by Unit 7 near the east end of the ditch and also near the southern end of Grey River.

There are, however, differences between the northeastern and southern areas of Unit 4. The northeastern area has locally well developed, generally steeply dipping layers of biotite-rich and biotite-poor granodiorite. These layers are up to 4 cm thick and are variable in length, but are commonly several metres. This type of layering is absent in the southern region.

Garnet-muscovite pegmatite veins are common and, locally, dikes of coarse grained granite from Unit 7 cut Unit 4. Near the assumed southeast contact with Unit 5, dikes of biotite-muscovite granite similar to Unit 5 cut Unit 4. The northeast section of Unit 4 is cut by mineralized quartz veins which contain molybdenite and wolframite.

Unit 5

Unit 5 outcrops in the centre of the map area and is distinguished from Unit 4 by a significant proportion of muscovite and by lower color index. The rock is mainly a medium grained, weakly foliated, equigranular biotite-muscovite granite. It generally contains about 1% muscovite and 1% to 2% biotite. Scattered xenoliths of quartz diorite are common and the granite is cut by garnetiferous aplite and granite pegmatites.

Unit 6

Unit 6 underlies most of the western half of the map area. The main rock type is pink to gray, medium to coarse grained, weakly foliated, porphyritic, biotite granite. Flow alignment of K-feldspar phenocrysts is locally well developed. Scattered inclusions of strongly foliated granodiorite and quartz diorite, psammitic biotite-muscovite schist, and migmatite are found in Unit 6. Aplite and pegmatite dikes are found throughout the unit.

The southwestern section of Unit 6 together with the northeast margin of Unit 3 have been subjected to intense mylonitization, which has converted the granite and metasediments to mylonite schists. The mylonite zone trends northwestwards and is 5 to 10 km wide. K-feldspar phenocrysts have been variably realigned to form 1 to 2 cm augen. The fabric in the granite is defined by flattened quartz and well aligned biotite and chlorite. Lithic fragments in conglomerates have been flattened to form thin lenses.

Unit 7

Unit 7 underlies most of the eastern portion of the map area. The main rock type in Unit 7 is medium to coarse grained, porphyritic, weakly foliated to massive, biotite-muscovite granite. Locally, the granite shows a very variable texture ranging from aplitic to pegmatitic. The southern region of the unit contains areas of leucocratic, pegmatitic, muscovite granite. The contact between Unit 1 and Unit 7 is intrusive. Coarse grained porphyritic granite dikes cut Unit 1.

A narrow mylonite zone marks the boundary between Units 4 and 7 near Meelpaeg Lake. Unit 7 is intensely flattened to form an augen schist which is faulted against Unit 4, which contains chlorite-filled fractures. This mylonite zone dies out to the northwest and southeast.

Extreme alteration of the granite to epidote and clay minerals is well shown along the walls of the ditch, where numerous northeast trending shear zones cut the granite. Alteration of biotite to sericite is also common around and to the north of the ditch. The alteration is associated with a reddening of the granite and molybdenite-pyrite-fluorite and wolframite mineralization.

MINERALIZATION

Molybdenite

Molybdenite mineralization was discovered by several exploration companies in Unit 7 and Unit 4 in the northeast corner of the map area. Small showings of molybdenite occur along the banks of the ditch in medium grained, porphyritic to equigranular, biotite-muscovite granite of Unit 7. The molybdenite mineralization occurs in quartz veinlets, in pegmatites, in joints as smeared joint "paint", and as disseminations in the granite. Associated minerals are pyrite and fluorite, with minor chalcopyrite in a few places. All showings found along the ditch were small.

Molybdenite mineralization also occurs in the granodiorite of Unit 4 as disseminated minerals in vugs and quartz veins, and also, as smears along joints. The host rock is generally highly fractured. Pyrite is associated with the molybdenite. This occurrence is within an isolated outcrop so the extent of mineralization is not known.

Wolframite and Scheelite

Tungsten mineralization occurs in Unit 7 along the banks of the ditch west of the molybdenite mineralization. Manganese-rich brown wolframite (Higgins, personal communication, 1980) associated with pyrite occurs in small vugs associated with pegmatite. The wolframite crystals are 1 to 2 mm long and line the cavities. Ultraviolet fluorescence of samples taken along the ditch shows that small amounts of probable disseminated scheelite are common.

Coarse pegmatitic wolframite with associated scheelite and pyrite occur within a quartz vein which cuts Unit 4 near the northeast corner of the map area. The main quartz vein is approximately 1 m wide and is discordant to the main tectonic fabric in the host biotite granodiorite. The vein has a sheeted appearance which is partly due to multiple injections of quartz and also to shearing parallel to the quartz layers. Minor wolframite mineralization also occurs in leucocratic granite dikes and segregations within the foliated granodiorite of Unit 4. Scheelite associated with pyrite also occurs in quartz veinlets in this area.

UV fluorescence of a sample of strongly mylonitized granite from the western part of the field area shows possible finely disseminated scheelite.

SPECTROMETER SURVEY

No areas of anomalous radiation were found. Granitoid rocks gave readings on a Scintrex GIS-4 gamma ray spectrometer of approximately 100 to 250 counts per second. Metasediments gave readings of generally less than 100 counts per second.

Future work on the project will include detailed analysis of thin sections and polished sections. 45 granite samples were collected for geochemistry. These will be analzsed for major and trace elements, including Mo, U, F, Li, Be, W, Cu, Pb, Ag and Zn.

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