GEOLOGY OF THE OTTER - NIPISHISH - STIPEC LAKES AREA, LABRADOR (N.T.S. 13K/2,3,6,7)

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INTRODUCTION

Geological mapping on a 1:50,000 scale was continued in the Central Mineral Belt of Labrador during the 1977 field season. The main objectives of this season's program were to delineate the southern limit of recognizable Bruce River volcanic rocks into the zone of Grenville deformation and metamorphism, and to attempt to establish in the field the relationship between the felsic volcanic rocks of the Aillik and Bruce River Groups (Smyth, 1977).

Previous work (Smyth *et al.*, 1975) had shown that the felsic volcanic rocks of the Bruce River Group extended to the southeast from the Croteau - Moran area at least as far as the Gravelly River. Williams (1970) had shown a belt of similar sheared felsic porphyries and quartz-sericite schists between Otter Lake and Nipishish Lake which he considered to be deformed equivalents of the Aillik Group found around Walker Lake. This season's mapping has shown that the porphyries in the Otter-Nipishish area can be best correlated lithologically with the Bruce River Group to the north of the Gravelly River shear zone. The distribution of these felsic rocks has been refined, and a large post-Bruce River Group granitic batholith has been recognized (Figure 1). Previous work in the area by Fahrig (1959) and Williams (1970) had assigned this granitic terrain to the Archean complex, although Robinson (1956) recognized its intrusive nature with the volcanics.

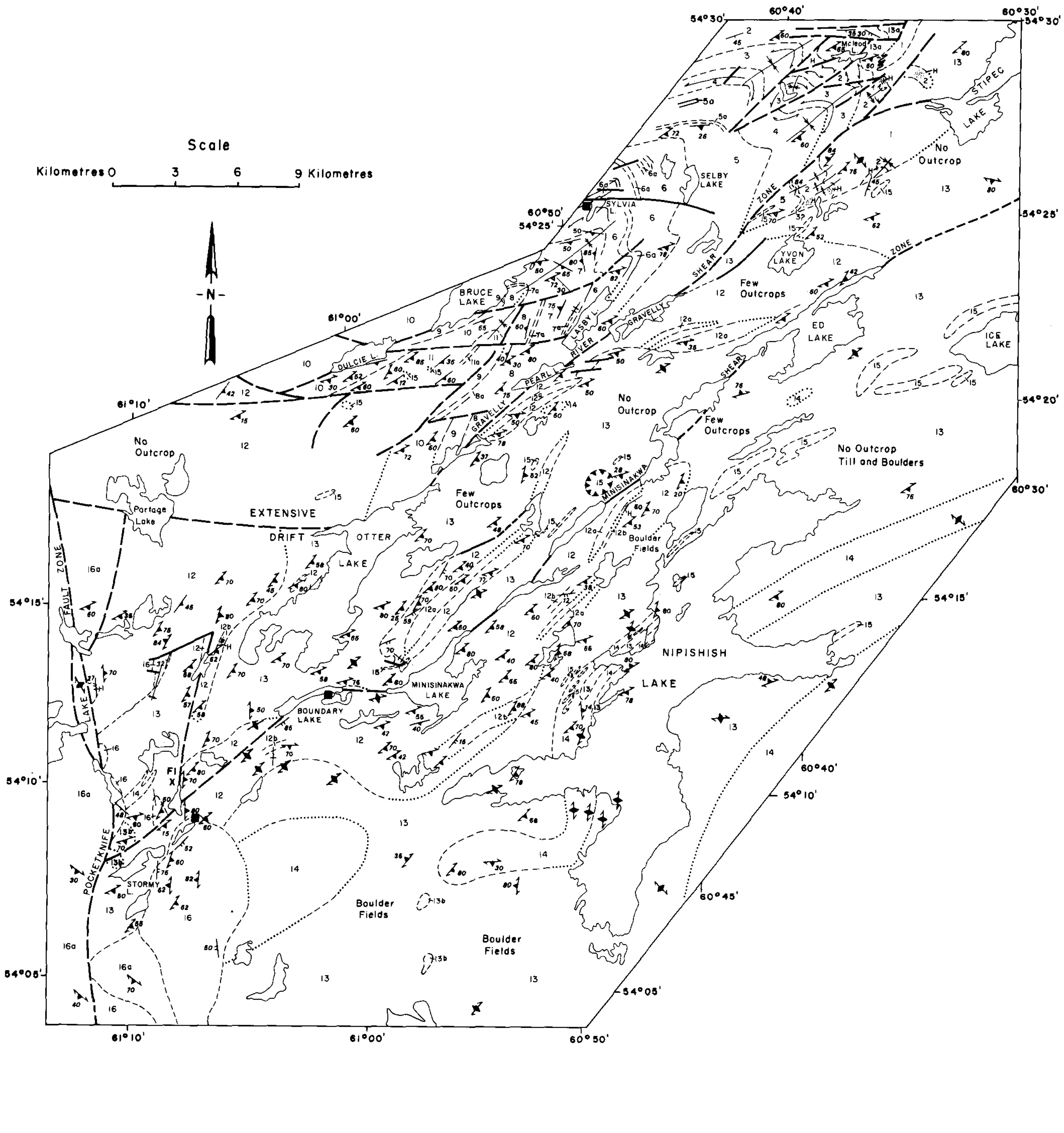
Exposure in the map area is varied, with 80-90 percent bedrock outcrop around Bruce Lake, dropping to nil over large areas of the extensive boulder terrain and till deposits around Nipishish Lake.

PRE-BRUCE RIVER GROUP ROCKS (1)

A belt of polydeformed metasedimentary and metavolcanic rocks with extensive rusty zones occurs in the vicinity of Stipec Lake and extends northeastward to Oscar Lake (Williams, 1970; Smyth, 1977). Semipelitic schists dominate, but metaquartzite and minor calcsilicate rocks have been recognized. Though most of the metavolcanics are green schistose rocks showing no primary features, isolated outcrops of mafic crystal tuffs have been observed.

Parts of the schist zone show low degrees of deformation and metamorphism, and primary bedding in siltstones and mudstones can be recognized. The regional metamorphic mineral assemblage in the pelitic and semipelitic rocks is quartz-feldspar-muscovite-biotite-garnet-tourmaline; in basic rocks it is actinolite-plagioclase. The regional assemblage is locally overprinted or modified by static growth in the contact aureole of the adjacent granitic body (Unit 13). Andalusite (?) porphyroblasts, altered to white mica, have been observed to overgrow the main foliation and are flattened by later deformation in zones of metasediments adjacent to the granite just north of the map area. In thin sections of schists from southwest of Stipec Lake, spinel-cordierite (?) symplectites have been observed, which appear to be due to the thermal breakdown of garnet porphyroblasts.

The age of these rocks is uncertain. Smyth (1977) considered them equivalents of the Moran Group, a correlation which seems valid based on lithological similarity. There is a possibility, however, that they may be an upfaulted part of the Archean terrain, an interpretation that Bailey (this volume) has given to similar rocks to the east.



1. Area north of Gravelly River Shear Zone: R. Smyth, B. Marten, A.B. Ryan, 1974; A.B. Ryan, 1976; and D. Bailey, 1977.
2. Area of Minisinakwa and Boundary Lake: A. Harris, 1977.
3. Area of Stormy Lake: R. Smyth and B. Marten, 1974; R. Smyth, 1976; D. Kontak, 1977.
4.Remainder: A.B. Ryan and R. Smyth, 1976; A.B. Ryan, 1977; except area west of Pocketknife Lake Fault, compiled from Fahrig (1959).

LEGEND

NEOHELIKIAN

SEAL GROUP

16	*Conglomerate, quartzite, mafic flows;* **16a,** *mafic flows and sills dominant.*

ELSONIAN (?)

15	*Coarse grained gabbro (Michael gabbro).*
14	*Fine grained muscovite-biotite granite and aplite.*
13	*Medium to coarse grained biotite monzonite and granodiorite (Otter Lake granite);* **13a,** *leucogranite;* **13b,** *diorite.*

PALEOHELIKIAN

BRUCE RIVER GROUP

12	*Gray, purple and red porphyritic ignimbrite and flows; contains some 12b;* **12a,** *andesite flows, tuff, breccia;* **12b,** *tuffaceous sandstone, lapilli tuff.*
11	*Gray rhyodacite flows and ignimbrite;* **11a,** *felsic tuff.*
10	*Maroon and red ignimbrite.*
9	*Andesite flows and breccia.*
8	*Gray porphyritic rhyodacite and ignimbrite;* **8a,** *felsic tuff.*
7	*Pink ignimbrite, gray towards the top;* **7a,** *felsic tuff and tuffaceous sandstone.*
6	*Massive and porphyritic andesite flows, agglomerate, and breccia;* **6a,** *felsic tuff and ignimbrite.*
5	*Ignimbrite, undivided;* **5a,** *andesite.*
4	*Massive mafic flows and agglomerate.*
3	*Dacite and andesite flows.*
2	*Tuffaceous sandstone, minor gray quartzite, and conglomerate; gabbro sills locally abundant.*

APHEBIAN (or ARCHEAN ?)

1	*Semipelitic and pelitic schist, quartzite, slate, and mudstone; metavolcanic mafic flows and tuffs; rusty zones common.*

SYMBOLS

Bedding; tops known (inclined) ....

Bedding; tops unknown (inclined, vertical) ....

Syncline; anticline ....

Cleavage (inclined, vertical) ....

Geological contact (defined, approximate, assumed) ....

Fault (defined, approximate, assumed) ....

Structural trend from air photograph ....

Thrust (approximate) ....

Igneous lamination ....

Hornfels .... H

Uranium showings .... ■

Fluorite occurrence .... x Fl

BRUCE RIVER GROUP (2-12)

The Bruce River Group (Smyth *et al.*, 1975) is a Paleohelikian sequence comprising a coarse basal conglomerate (fanglomerate) division, a middle sandstone division and an upper sequence of felsic and intermediate to basic volcanic rocks. Parts of the upper two divisions occur in the present map area, but since the area northwest of the Gravelly River shear zone has been described by Smyth *et al.* (1975), only the area southeast of this fault is described here. The subdivisions of the felsic volcanics of the Bruce River Group around Bruce Lake (Figure 1) are largely based on work carried out by D. Bailey during the last week of June, 1977. The generally poor exposure south of the Gravelly River has precluded any subdivision of the felsic volcanics in that area.

Openly folded, cross-bedded, varicolored tuffaceous sandstones with lesser impure quartzite and conglomerates (2) are inferred to lie unconformably on the polydeformed schists southwest of Stipec Lake (Smyth, 1977). Diabase sills are common in the sediments here. Along their southeast margin the sandstones have a white "bleached" aspect, with andalusite (?) porphyroblasts. This is interpreted as a zone of hornfelsing by the adjacent granite. Similar spotted hornfels have been observed in sandstones of this unit south of McLeod Lake and along the Gravelly River.

Felsic flows and ignimbrites (12), petrographically dacite to rhyodacite in composition, dominate the volcanic sequence in the map area. Interlayered with them are narrow units of lapilli tuff and crystal tuff, volcanic breccia and tuffaceous sandstones (12b). Porphyritic andesite and poorly to well banded mafic to intermediate tuffs also form local mappable horizons.

The felsic volcanic rocks are generally gray, pale red and maroon in color; feldspar phenocrysts are dominant, although small quartz eyes are sometimes present. Phenocrysts may constitute up to 15 percent of the rock. Eutaxitic foliations are widespread in the rocks around Bruce Lake (Smyth *et al.*, 1975) and have also been observed in some of the least deformed porphyries between Otter and Nipishish Lakes, indicating that they are in part ignimbrites. The massive crystal rich varieties may be flows or nonwelded tuffs.

Three small outcrops of felsic volcanic breccia have been noted in the volcanic rocks between Otter and Nipishish Lakes; similar horizons also occur locally around Bruce Lake. The breccias are dark gray to buff in color, and are composed of angular to subrounded fragments varying in size from a few centimetres to tens of centimetres set in a medium to fine grained tuffaceous matrix. Abundant euhedral crystals of magnetite occur at one locality.

Several narrow belts of diffusely bedded felsic lapilli tuff and cross-bedded tuffaceous sandstone have been partially outlined in the area. The tuffs are pale weathering and poorly sorted. The sandstones are medium to fine grained, feldspar rich, and bedded on a 2-20 cm scale.

Hornfelsing effects, in particular, andalusite (?) porphyroblasts, have been noted in sandstones northwest of Nipishish Lake and in crystal tuffs southwest of Otter Lake.

Massive pyroxene-plagioclase porphyritic andesites and tuffaceous rocks of similar composition occur as narrow units (12a) throughout the area southeast of the Gravelly River shear zone. One such andesite unit forms a high ridge south of Pearl Lake. It consists of zoned and twinned phenocrysts of colorless clinopyroxene up to 3 mm in diameter variably altered to pale green actinolite and biotite, set in an altered groundmass of actinolite, feldspar and quartz. A unit of similar composition containing phenocrysts of altered plagioclase and actinolite (after pyroxene ?) forms a mappable horizon east of Otter Lake. It locally displays a poorly bedded aspect with small rock fragments and variable amounts of felsic to mafic minerals indicating that it is in part pyroclastic.

The most southeasterly belt of Bruce River volcanic rocks has undergone considerable recrystallization and deformation, especially between Minisinakwa and Stormy Lakes. Piche (1957) referred to the rocks in this sector as arkoses and sheared and altered sediments and Gandhi (1970) considered them feldspathic quartzites equivalent to parts of the Aillik Group. Even though there are narrow belts of tuffaceous sediments recognizable in this belt, most of these rocks are now considered to be recrystallized felsic volcanics. Sills and dikes of fine to coarse grained granite are locally present but sericite schists predominate. Locally these rocks have a saccharoidal appearance, are powdery, and show the development of muscovite on cleavage surfaces. In thin section they characteristically display a granoblastic microstructure of quartz and feldspar in which muscovite is the chief foliation forming mineral. Plagioclase is the major feldspar but microcline is always present; quartz is less common as a phenocryst but does form up to 10 percent in some rocks. Recrystallized pumice fragments in the metaignimbrites show a slightly coarser texture of quartz and feldspar than do the surrounding groundmass. Subhedral to euhedral porphyroblasts of garnet, generally less than 2 mm in diameter, are present in all the recrystallized felsic volcanics studied, and epidote, sphene and green-brown biotite are common constituents.

OTTER LAKE GRANITE (13)

Most of the map area east of Otter Lake is underlain by an extensive granitic batholith, here termed the Otter Lake granite, which varies from monzonite to alaskite in composition. A medium to coarse grained biotite-hornblende granite or monzonite is the most common variety. It is locally characterized by irregular xenoliths of massive and porphyritic diorite whose origin is uncertain. However, the presence of several large diorite masses which are marginally intruded by the granite, and the local occurrence of granodiorite and quartz diorite phases in the batholith may indicate the xenoliths are fragments of early crystallized phases being incorporated into later stages of the magma. Inclusions are well exposed along the southeast shores of Otter Lake.

Several outcrops of granite (not shown in Figure 1) are exposed on the floor of a valley in an area of volcanic rocks northwest of Minisinakwa Lake. The volcanics are interpreted as a large roof pendant preserved in the granite, the upper parts of the batholith being exposed by erosion in the valley.

The Otter Lake granite is variably altered. Thin sections from the freshest specimens indicate that the chief constituents are quartz, zoned plagioclase, microcline (commonly perthitic), brown or brown-green biotite (commonly a sagenitic variety) and hornblende. An ubiquitous accessory is euhedral to subhedral grains of sphene up to 2.5 mm in size. In the altered rocks, the biotite is partially or completely replaced by chlorite, and the plagioclase is extensively altered to sericite and epidote; microcline generally remains fresh. Hornblende is partially replaced by pale green actinolite.

This large granitic body has a contact aureole up to 500 m in width. It is best displayed by the Bruce River sandstones north of Yvon Lake, although hornfelsing is also apparent in some of the crystal tuffs in other parts of the volcanic sequence adjacent to the granite. The thermal effects of the granite are best displayed as spotted hornfels with andalusite (?) porphyroblasts, although static thermal breakdown of garnet is suggested by spinel-cordierite (?) intergrowths in the schists near Stipec Lake (see above).

MUSCOVITE GRANITE AND APLITE (14)

A sheetlike body of fine grained, foliated, pink muscovite-biotite granite intrudes the coarser Otter Lake granite along the west shore of Nipishish Lake. A similar granite occurs in the poorly exposed area between Stormy and Nipishish Lakes, and as small outcrops in a stream south of Pearl Lake and in the poorly exposed lowland area south of Ed Lake. A tongue of aplite compositionally similar to the muscovite granite occurs north of Stormy Lake.

A reconnaissance survey of the drift covered area south of Nipishish Lake has shown that the coarse biotite granite and the finer muscovite bearing granite also occur there, but their distribution is unknown.

GABBRO AND DIORITE (15)

Northeast of Nipishish Lake, and extending along the southern margin of the Central Mineral Belt (Williams, 1970; Stevenson, 1970; Greene, 1972), there is a series of coarse grained gabbro dikes termed the Michael gabbro (Fahrig and Larochelle, 1972). These bodies are locally deformed and converted to actinolite-biotite schists along their margins, though the core areas are still undeformed. Thin sections from the core zones of these gabbros display a typical gabbroic texture with clinopyroxene and olivine as the chief mafic minerals.

An isolated occurrence of gabbro forms a prominent hill northwest of Nipishish Lake. It is interpreted to be a klippe of Michael gabbro as it is in thrust contact with the underlying granite. A strong flat lying fabric is developed in the gabbro at the base of the hill where it has been converted to a biotite-actinolite schist. The underlying granite has also developed a flatlying foliation and a flinty mylonite zone occurs at the contact with the gabbro.

Other bodies of gabbro and diorite throughout tbe area may be the same age as the Michael gabbro.

SEAL GROUP (16)

The western part of the map area is underlain by sedimentary and volcanic rocks of the Bessie Lake Formation, the basal part of the Seal Group (Fahrig, 1959; Brummer and Mann, 1961). The Seal Group unconformably overlies the Bruce River Group and the Otter Lake granite (Marten and Smyth, 1975; Kontak, this volume).

Most of the Seal Group in the area is composed of quartzites and conglomerates with intercalated mafic flows. These form a north trending tongue in the Stormy Lake area, and several small outliers east of the Pocketknife Lake fault. Mafic volcanic rocks occur in a fault wedge southwest of Portage Lake.

STRUCTURE AND METAMORPHISM

The northwest portion of the map area is dominated by the Bruce River syncline, an open southwest plunging, upright fold of Grenvillian age, bounded on both limbs by large fault zones, the Bruce River and Gravelly River shear zones (Smyth *et al.*, 1975). South of Gravelly

River, the Bruce River Group is extensively invaded by a large granitic pluton.

A variably developed, generally northeast trending, southeast dipping cleavage is present in all rock units of the area. The heterogeneous nature of this fabric is demonstrated by the zonal deformation of the Otter Lake granite, which varies from an undeformed hypidimorphic textured rock through a schistose "augen gneiss" and grading into mylonite. The foliation is interpreted as a Grenville fabric developed synchronously with the Bruce River syncline (Smyth *et al.*, 1975).

Intense shearing and recrystallization and tight overturned folding are apparent in the volcanic-sedimentary belt in the Minisinakwa sector. At Stormy Lake the unconformity between the Seal Group and underlying Bruce River Group is locally overturned (Kontak, this volume). These features are interpreted as the result of a buttressing effect produced by the surrounding granite mass during deformation. Although the granite-volcanic rock contact (Figure 1) is shown largely as intrusive, locally it is modified by shearing. Granite south of the Seal Group has also been tectonically juxtaposed against the younger supracrustal rocks; klippe of granite have been recognized locally (Mann, 1959; Marten and Smyth, 1975).

The rocks north of the Gravelly River shear zone have suffered very little metamorphic recrystallization. Sericite is present in the cleaved felsic volcanic and sedimentary rocks. Chlorite and/or actinolite are developed in the mafic rocks; relic clinopyroxene phenocrysts are also present in some of the mafic rocks.

In the Otter-Nipishish Lakes area, however, the volcanic rocks are generally more severely cleaved; in many places they have been so extensively recrystallized that only faint indications of volcanic features remain. Euhedral garnets are ubiquitous in the felsic volcanics from this zone and albite replaces the original more calcic plagioclase phenocrysts.

ECONOMIC GEOLOGY

The Stipec Lake schists are characterized by extensive pyrrhotite-pyrite gossan zones, originally located as a result of an airborne EM survey conducted by Brinex in 1971 (Smyth, 1977).

Numerous base metal showings are known from the Bruce River Group (Smyth *et al.*, 1975; Douglas and Hsu, 1976). It also hosts two small uranium showings within the map area, at Sylvia Lake and Boundary Lake. The Sylvia Lake showing consists of small discontinuous veinlets and disseminated grains of coffinite (?) in altered rhyolitic pyroclastics at the intersection of two faults (Bernazeud, 1965). The Boundary Lake showing (Robinson, 1956) occurs in schistose recrystallized felsic volcanics, locally cut by fine to coarse grained sills and dikes of granite. Robinson noted that the zone of radioactivity extended approximately one mile along the strike of the foliation; assay values from two grab samples were 0.001 and 0.143 percent. No other anomalous radioactive zones have been found in the map area using a handheld scintillometer.

The basal Seal Group in the map area hosts the Stormy Lake uranium showing (Robinson, 1956; Marten and Smyth, 1975; Kontak, this volume). The uranium distribution appears to be controlled by the deformed Bruce River Group - Seal Group unconformity (Marten and Smyth, 1975; Kontak, this volume).

The granitic terrain east of Otter Lake is relatively devoid of economic mineralization. Kirwin (1959) reported molybdenite in pegmatite float northeast of Nipishish Lake, and disseminated flakes were observed in the granite just east of Otter Lake.

Airborne radiometric anomalies noted by Brinex (1971) along the west shore of Nipishish Lake correspond roughly to the outline of the fine grained muscovite granite. However, no anomalous readings were obtained on ground scintillometer surveys over outcrops of this granite. It is thought that the Brinex anomalies may be due to radioactive boulders in the extensive boulder fields in the area.

The Michael gabbro contains numerous small showings of pyrite, pyrrhotite and chalcopyrite (Kirwan, 1959).

Small fluorite veinlets have been locally noted in the Bruce River volcanic rocks and the Otter Lake granite.

DISCUSSION

It is evident from mapping during 1977 that the Bruce River volcanic rocks extend to the southeast of the Gravelly River shear zone, but they are not present southeast of Nipishish Lake where the map area is underlain by an Elsonian (?) granitic terrain affected by Grenville deformation. The Gravelly River shear zone is a major structural break, south of which the Bruce River supracrustal rocks have been invaded by a large granitic pluton.

Granite similar to that in the Otter - Stipec Lakes area continues northeastward through the Del Rizzo - Walker Lakes region (Smyth, 1977; Bailey, this volume) where Brinex geologists refer to it as the Walker Lake granite. Ages of 1437±36 and 1645±46 Ma for the Walker Lake granite have been obtained by the K-Ar method on biotite and hornblende, respectively, the hornblende age being considered to be a more reliable indication of the true age (Wanless *et al.*, 1974). If the Walker Lake - Otter Lake batholith is one continuous body, than this age (*i.e.* 1645 Ma) is suspect because the body intrudes rocks of the Bruce River Group which have yielded a Rb/Sr whole rock age of 1474 Ma (Wanless and Loveridge, 1972). On the other hand, the age on the Bruce River Group may be incorrect, or there may be more than one granitic body having similar characteristics in the Otter Lake - Walker Lake region. These problems are presently being investigated by Kontak (see report, this volume) by whole rock Rb/Sr studies on the Otter Lake and Walker Lake granites and the Bruce River volcanic rocks.

A direct correlation between the Bruce River Group and the upper portions of the Aillik Group (*cf.* Smyth, 1977) now seems unlikely on the basis of age, structure and modal composition of the two volcanic sequences (see Bailey, this volume). Tuffaceous sandstones resembling those of both the Bruce River and Aillik Groups form several small outliers between Stipec and Walker Lakes (Smyth, 1977). These sedimentary rocks are intruded by Walker-Otter Lakes type granite, but their age is uncertain.

There is no evidence in the map area for a distinct "Grenville Front", although all the northeast trending faults in the area are considered Grenville structures, *i.e.* northwest directed high angle reverse faults generated at the same time as the Bruce River syncline.

Acknowledgements: *In spite of the wet weather the season went smoothly due to the hard work and jovial character of Pat Laracy, Doug Hibbs and Paul Snow, our assistants for the summer. We also acknowledge the helpful discussions and encouragement of R. Smyth, D. Bailey, D. Kontak and M. Flanagan. The Tuttles in Goose Bay provided excellent logistical support, and M. Byrne supplied excellent service by fixed wing aircraft during camp moves and servicing. The helicopter crews and engineers supplied by Universal Helicopters of Goose Bay also contributed significantly to the success of the 1977 operations especially Greg Neily.*

REFERENCES

Bailey, D.
1977: The geology of the Walker Lake - Maclean Lake area, Central Mineral Belt, Labrador; *in* Report of Activities for 1977, R.V. Gibbons (Editor); Newfoundland Department of Mines and Energy, Mineral Development Division, Report 78-1.

Bernazeud, J.
1965: Labrador uranium project, progress report for 1965; Unpublished private report, Mokta (Canada) Limited.

Brinex
1917: Report on airborne geophysical surveys in the Kaipokok Bay - Seal Lake area, Labrador; Unpublished private report, Brinex.

Brummer, J. J. and Mann, E. L.
1961: Geology of the Seal Lake area, Labrador; Geological Society of America Bulletin, Volume 72, pages 1361-82.

Douglas, C. and Hsu, E.
1976: Mineral occurrences: Snegamook Lake, east half; Newfoundland Department of Mines and Energy, Mineral Development Division, Map 7642.

Fahrig, W. F.
1959: Snegamook Lake; Geological Survey of Canada, Map 1079A.

Fahrig, W. F. and Larochelle, A.
1972: Paleomagnetism of the Michael gabbro and possible evidence of the rotation of the Makkovik subprovince; Canadian Journal of Earth Sciences, Volume 9, pages 1287-96.

Gandhi, S. S.
1970: Seal Lake copper area: monthly report number 1; Unpublished private report, Brinex.

Greene, B. A.
1972: Geological map of Labrador; Newfoundland Department of Mines, Agriculture and Resources, St. John's.

Kirwin, L.
1958: Brinex-Gunnex joint agreement area, Labrador - report on prospecting 1959; Unpublished private report, Brinex.

Kontak, D.
1977: Investigation of four uranium showings in the Central Mineral Belt, Labrador; *in* Report of Activities for 1977, R.V. Gibbons (Editor); Newfoundland Department of Mines and Energy, Mineral Development Division, Report 78-1.

Mann, E. L.
1954: The geology of the Seal Lake area, Central Labrador; Ph.D. thesis, McGill University, Montreal.

Marten, B. E. and Smyth W. R.
1975: Uranium potential of the basal unconformity of the Seal Group, Labrador; *in* Report of Activities for 1974, J.M. Fleming (Editor); Newfoundland Department of Mines and Energy, Mineral Development Division, Report 75-1.

Piche, W. T.
1957: Exploration on the block "D" concession, Labrador, during 1956; Unpublished private report, Frobisher Limited.

Robinson, W. G.
1956: Exploration of block "D" concession, Labrador, during 1955; Unpublished private report, Frobisher Limited.

Smyth, W. R.

1977: The geology of the Stipec Lake - Walker Lake area, Central Mineral Belt, Labrador; *in* Report of Activities for 1976, R.V. Gibbons (Editor): Newfoundland Department of Mines and Energy, Mineral Development Division, Report 77-1, pages 50-56.

Smyth, W. R., Marten, B. E. and Ryan, A. B.
1975: Geological mapping in the Central Mineral Belt, Labrador: Redefinition of the Croteau Group; *in* Report of Activities for 1974, J.M. Fleming (editor); Newfoundland Department of Mines and Energy, Mineral Development Division, Report 75-1, pages 51-74.

Stevenson, I. M.
1970: Rigolet and Groswater Bay map areas, Newfoundland (Labrador); Geological Survey of Canada, Paper 69-48.

Wanless, R. K. and Loveridge, W. D.
1972: Rubidium-Strontium isochron age studies, Report 1; Geological Survey of Canada, Paper 72-23, pages 57-59.

Wanless, R. K., Stevens, R. D., Lachance, G. R. and Delabio, R.N.D.
1974: Age determinations and geological studies: K-Ar isotopic ages, Report 12; Geological Survey of Canada, Paper 74-2, pages 54-55.

Williams, F. M. G.
1970: Snegamook Lake (east half) Newfoundland; Geological Survey of Canada Open File 42.