# GEOLOGY OF THE GANDER RIVER AREA (2E/2), NEWFOUNDLAND

by R.F. Blackwood

## INTRODUCTION

The east half, and the southeast corner of the west half, of the Gander River (2E/2) area was mapped on a 1:50,000 scale during the 1978 field season as part of a larger project (Gander Rivers) that will extend southwestwards along the Gander-Botwood Zone boundary.

Jenness (1958) mapped part of the area for the Mines Branch of the Newfoundland Department of Mines and Resources; he defined the Gander River Ultrabasic Belt. During 1961-1963 the area formed part of a larger mapping project by the Geological Survey of Canada (Williams, 1964).

## GENERAL GEOLOGY

Four broad geological subdivisions are defined in the map area; namely, 1) the Gander Group, 2) the Gander River Ultrabasic Belt, 3) the Davidsville Group, and 4) the Botwood Group.

The Gander Group consists of polydeformed metasedimentary rocks which in the west are apparently overthrust by volcanic and plutonic rocks of the Gander River Ultrabasic Belt. The latter is nonconformably overlain by basal conglomerates of the Ordovician Davidsville Group, a largely shale, siltstone, graywacke sequence. In the west the Davidsville Group is conformably overlain by micaceous sandstones and shales of the Silurian Botwood Group.

### Gander Group (Unit 1)

The southeast corner of the map area is underlain by the Gander Group (McGonigal, 1973). It comprises interbedded, fine grained, psammites and semipelites. Locally, coarser horizons of quartz wacke occur. Psammite beds vary from 25 cm to 2 m thick whereas the more pelitic material is disposed as thinner intercalations.

A pervasive northwest to northeast trending schistosity with shallow westerly dips is developed in the Gander Group. It is axial planar to small and large scale recumbent folds which are overturned to the east. The folds are defined by bedding surfaces and a coplanar fine fabric, suggesting that the folds are second deformation structures. The second schistosity is overprinted by a north trending, moderately to steeply west dipping, crenulation cleavage. This fabric is locally axial planar to upright, open, third phase folds.

The metamorphic grade is apparently of the greenschist facies; one locality contained presumed cordierite porphyroblasts that postdate the second schistosity.

### Gander River Ultrabasic Belt (Unit 2)

The Gander Group is bounded to the northwest by a linear, northeast trending, 4-6 km wide zone of largely mafic to ultramafic igneous rocks called the Gander River Ultrabasic Belt (Jenness, 1958). Its contact with the Gander Group is exposed at one locality west of Jonathans Third Pond, where it is interpreted to be a thrust fault; pyroxenite and serpentinite are faulted over semipelites.

The belt comprises a variety of rock types, the best exposed being ultramafic rocks and their altered equivalents (2a). Medium to coarse grained, massive pyroxenite is the common rock type of the unaltered rocks; minor peridotite occurs locally. Approximately 50 percent of Unit 2a is underlain by serpentinite and magnesite with minor talc-carbonate schist. The light to dark green serpentinite is commonly associated with distinctive rusty-red weathering magnesite; these rock

types underlie most of the unvegetated hills along the belt.

The ultramafic rocks are intruded by fine to medium grained gabbro (2b). Some exposures of gabbro contain pods of pyroxenite; also gabbro, locally with a pegmatitic texture, commonly pervades outcrops of predominantly ultramafic rock. In some places the gabbro is brecciated and cut by narrow zones of finely comminuted material; calcite veining is common in such areas.

Associated with the gabbros are fine to medium grained mafic volcanic rocks (2c). Pillow structures are well developed locally and small breccia zones occur. Parts of this unit are underlain by fine to medium grained tuffaceous rocks, apparently interlayered with porphyritic mafic flows.

Small bodies and veins of trondhjemite (Unit 2d) intrude all other rock types of the Gander River Ultrabasic Belt. These plagioclase-quartz granites with minor biotite and/or chlorite vary from fine to coarse grained. A variety included in this unit consists of coarse quartz phenocrysts in a fine felsic groundmass; this porphyry is locally gradational into coarser trondhjemite. Breccia zones are developed in the northernmost body; angular to rounded fragments of trondhjemite are surrounded by a finely comminuted matrix.

The Gander River Ultrabasic Belt is overprinted by a northeast trending, moderately to steeply west dipping foliation which does not affect massive pyroxenite and gabbro but is generally well developed in the serpentinite and magnesite, locally producing a fine talc-carbonate schist. The mafic volcanic rocks are typically greenschists. In the well foliated parts of the altered ultramafic rocks, the main fabric is moderately to tightly folded. Where developed, the axial planar fabric to these later folds is parallel to the regional trend of the main foliation.

## Davidsville Group (Unit 3)

The Middle Ordovician Davidsville Group (Kennedy and McGonigal, 1972) forms a linear northeast trending belt approximately 12 km wide throughout the map area. The base of the group is exposed along its eastern boundary, where polymictic conglomerate and pebbly siltstone nonconformably overlie the Gander River Ultrabasic Belt, being in direct contact with volcanic rocks, trondhjemite, and ultramafic rocks.

The conglomerate (3a) is best exposed in the Second Pond area of Gander River, where it is repeated by folding and possibly faulting. Clasts are poorly sorted, angular to well rounded, and range in size from 1 to 60 cm across. They comprise pyroxenite, serpentinite, gabbro, trondhjemite (including the breciated variety), jasper, mafic and felsic volcanic rock, psammite, and semipelite. Several of these rock types were foliated prior to incorporation into the conglomerate. Ultramafic and gabbro clasts generally become more abundant close to contacts with same and locally the conglomerate becomes oligomictic where it sits directly on trondhjemite. The conglomerate at Bellmen's Pond in the central part of the Davidsville Group differs from the basal conglomerate to the east and northeast by containing well rounded clasts of mostly sedimentary origin and no ultramafic or foliated clasts.

The presumed basal conglomerates along the eastern margin of the Davidsville Group grade rapidly into thinly bedded siltstones and shales, with local graywacke beds (3b). Bedding, where developed, is quite regular and generally between 5-12 cm wide. These rock types underlie most of the southern and eastern portions of the group. Towards the northwest, fine to medium grained graywacke becomes more extensive and thin conglomerate beds occur locally.

The Davidsville Group is regionally deformed by a steeply dipping, northeast trending, slaty cleavage. This foliation is axial planar to isoclinal folds which plunge moderately to the southwest and northeast. Variably oriented kink bands overprint the main fabric and locally, in the northeast, a widely spaced crenulation cleavage is developed.

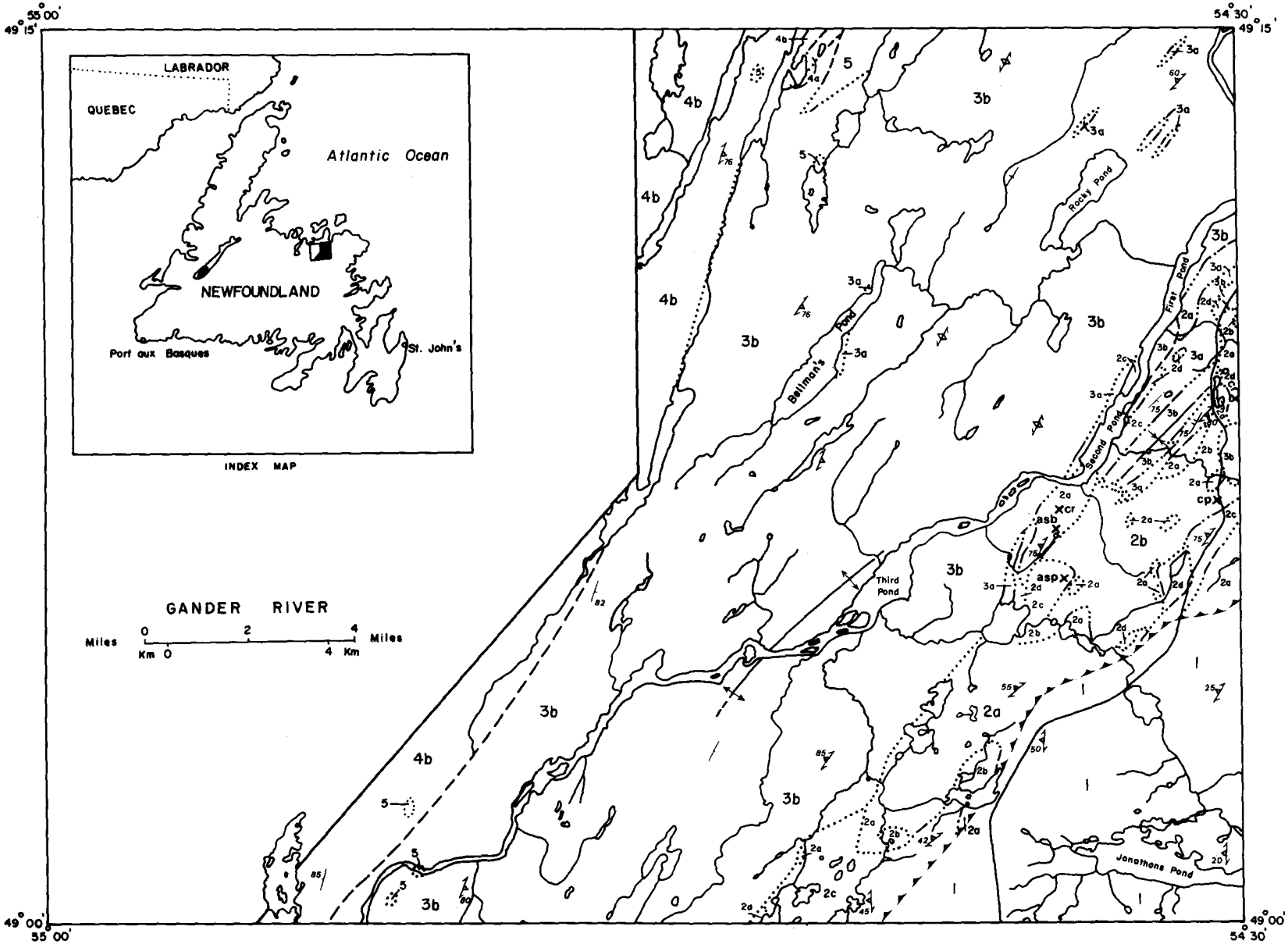
## Botwood Group (Unit 4)

The Silurian Botwood Group (Williams, 1962) occupies the extreme western part of the map area. It appears to overlie the Davidsville Group conformably although the contact is not exposed. Fine grained, red and gray, sandstone and shales (4b) are the most common rock types of the Botwood Group in this area. The sandstones are generally micaceous and, locally, are interbedded with fossiliferous limestone (east of Salmon Pond). A conglomerate horizon (4a) included within the group outcrops in the north. The clasts are well rounded and consist of chert, felsite, psammite, and rare fossiliferous limestone in a coarse grained quartz-feldspar matrix.

The Botwood Group is overprinted by a northeast trending, steeply dipping, slaty cleavage which is regionally concordant with that in the Davidsville Group.

## Diorite (Unit 5)

Several small bodies of fine to medium grained massive diorite intrude the Davidsville and Botwood Groups.



## LEGEND

### SILURIAN OR YOUNGER

5 *Fine to medium grained diorite.*

### SILURIAN

4 **Botwood Group:** *Red and gray micaceous sandstone, shale, minor limestone and conglomerate.*

### MIDDLE ORDOVICIAN AND YOUNGER

3 **Davidsville Group: 3a,** *Conglomerate;* **3b,** *graywacke, siltstone, slates and minor conglomerate.*

### MIDDLE ORDOVICIAN OR OLDER

2 **Gander River Ultrabasic Belt: 2a,** *Ultramafic rocks including pyroxenite, peridotite, serpentinite, talc-carbonate schist, and magnesite;* **2b,** *fine to coarse grained gabbro;* **2c,** *intermediate to basic pillow lavas and pyroclastics;* **2d,** *trondhjemite.*

1 **Gander Group:** *Psammites and semipelites.*

## SYMBOLS

*Geological contact (defined, approximate, assumed)*

*Anticline (defined, approximate)*

*Syncline (defined, approximate)*

*Cleavage, schistosity (age unknown)* 75

*Thrust fault (defined, assumed)*

*Bedding, tops known (inclined)* 80

*Bedding, tops unknown (inclined, vertical)* 80

*Mineral showing: Chalcopyrite - cp, Arsenopyrite - asp, Chromite - Cr, Asbestos - asb*

## MINERALIZATION

Mineralization in the map area is most commonly developed in the Gander River Ultrabasic Belt. Serpentinite bodies locally contain serpentine cross-fibre in discontinuous zones 2-8 cm wide; slip-fibre also occurs. Disseminated chromite is common in magnesite and in some exposures is concentrated in regular 1-2 cm wide zones; this produces a crude banding over 1-2 m on weathered surfaces. Locally, chromite occurs in lenses from a few cm to 1-2 m long and pods a few cm across; these produce distinctive black patches in the magnesite.

Chalcopyrite and pyrite occur in narrow quartz veins 15-25 cm wide, cutting gabbro along the highway. Fine disseminated pyrite occurs in the gabbro and pillowed mafic volcanic rocks. One small outcrop northeast of Jonathans First Pond, interpreted to be a fine grained volcanogenic sedimentary rock, contains narrow veins of a quartz-pyrite-arsenopyrite association. Pyrite and minor chalcopyrite occur in disseminated form in the finely comminuted matrix of the brecciated trondhjemite.

Black slates of the Davidsville Group commonly contain pyrite nodules.

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