GEOLOGY OF THE WEST GANDER RIVERS AREA, NEWFOUNDLAND

by

R. Frank Blackwood

INTRODUCTION

The east half of the West Gander Rivers (2D/11) map area and the northwest corner of the Dead Wolf Pond (2D/10) map area were mapped on a 1:50,000 scale during the 1980 field season. Rocks of this area are continuous northeastward and along strike with those of the Gander map area, 2D/15 (Blackwood, 1980) and the Gander River map area, 2E/2 (Blackwood, 1979a). The area forms part of the Gander Rivers Project, initiated in 1978 to map The Gander River Ultrabasic Belt and adjacent rocks from the mouth of Gander River in the northeast to Great Gull Lake in the southwest.

Access is provided by excellent wood roads, operated by Bowater Newfoundland Limited, along the Northwest Gander River and from there to the Southwest Gander River in the vicinity of Paul's Pond. Old, locally impassable, Bowater roads are located in the Dead Wolf Brook - Caribou Lake area. Mapping in the southern half of the map area was carried out by fly camp and helicopter traverses.

Bedrock exposure is nearly continuous along the northern part of the Southwest Gander River; it is also good along parts of Dead Wolf Brook. However, apart from well exposed areas along a ridge south and northeast of Caribou Lake (underlain by the GRUB line), there is very limited outcrop in the rest of the map area.

The northwest corner of the Dead Wolf Pond (2D/10) area formed part of a larger mapping project by the Geological Survey of Canada (Jenness, 1963). Part of the Middle Ridge Granite and its associated metamorphic aureole were outlined.

The West Gander Rivers (2D/11) area was also included in a Geological Survey of Canada study (Anderson and Williams, 1970). Their mapping defined part of the Mount Peyton Intrusive Suite, fossiliferous Silurian country rocks, and the Middle Ridge Granite.

GENERAL GEOLOGY

The area comprises four tectonostratigraphic subdivisions: the Gander Group (1-2), the Gander River Ultrabasic Belt (3-4), the Davidsville Group (5-7), and the Botwood Group (8). The Gander Group is intruded by the Middle Ridge Granite (9) and the Botwood Group by the Mount Peyton Intrusive Suite (10).

Gander Group (Unit 1-2)

The Gander Group (McGonigal, 1973) forms a southwest-northeast trending belt (like all other units in this area) which underlies the eastern part of the map area. A small area of Unit 1 occurs in the extreme northeastern corner of the map area; it forms part of the larger subdivision of the Gander Group that extends to the northeast. Psammite, semipelite and minor pelite constitute Unit 1. A strong foliation overprints these rocks and is defined by a fine to coarse grained schistosity in the more pelitic compositions. The micas are mimitically recrystallized along a preexisting fabric; low to middle amphibolite facies metamorphism, spatially related to the Middle Ridge Granite, is relatively late synkinematic to posttectonic.

Unit 2 is more pelitic in overall composition than Unit 1, with semipelite predominating. However, psammite beds are common in Unit 2 and minor 5 to 20 cm thick quartzite beds occur where it crosses the Southwest Gander River.

Units 1 and 2 are separated by a conformable contact to the northeast (Blackwood, 1980), with the main distinction between the two being the presence of narrow, concordant, amphibolite bands in Unit 2. These bands are apparently conformable with the enclosing metasediments and are interpreted to represent mafic volcaniclastics. The main fabric in Unit 2 is a fine to coarse grained schistosity that is axial planar to small scale, variably plunging, isoclinal folds. Locally, a pronounced strain-slip cleavage overprints the main fabric. The low to middle amphibolite facies metamorphism is demonstrably related to the Middle Ridge Granite, increasing with proximity to the intrusion. Andalusite, cordierite, biotite, garnet, hornblende, and staurolite commonly form posttectonic porphyroblasts.

Gander River Ultrabasic Belt (Units 3 and 4)

The Gander River Ultrabasic Belt (Jenness, 1958), informally referred to as the GRUB line (Blackwood, 1979b), outcrops along two narrow, discontinuous zones northeast and south of Caribou Lake. The GRUB line is interpreted to be in fault contact with the Gander Group (Blackwood, 1979b).

Ultrmafics and their alteration products (Unit 3) mainly define the GRUB line. The zone northeast of Caribou Lake contains fine to coarse grained gabbro and hornblende which are locally banded; the strike of the banding is at a high angle to the regional structural trend. Small areas of serpentinite, magnesite, and amphibolite also occur. In the same zone, southwest of Dead Wolf Brook, a small ultramafic sliver that was originally pyroxenite is mostly altered to tremolite and minor magnesite. Unit 3 south of Caribou Lake contains minor unaltered dunite with tremolite - talc - magnesite schist and serpentinite predominating.

A narrow belt of amphibolite and volcanic rocks (Unit 4) is adjacent to and west of Unit 3 in the zone northeast of Caribou Lake. It is included in the GRUB line although the exact relationship between Units 3 and 4 is unknown. Most of this unit is underlain by amphibolite; a 0.5 to 1.5 cm banding is preserved and interpreted as a primary structure. The amphibolite varies from fine to coarse grained and probably represents mafic volcaniclastics or flows. White, quartz and quartz-feldspar porphyry bands (50 cm to 4 m wide) are interlayered with the amphibolite. The quartz phenocrysts are generally clear and occur in a fine grained felsic matrix. Conglomerate bands, 1-10 m wide, are locally interbedded with the volcanic rocks. Clasts range from 2 mm to 8 cm in diameter and consist mostly of quartz and quartz porphyry in a felsic to mafic matrix; a distinctive blue hue generally marks the quartz. Other bands consist entirely of strongly flattened, recrystallized, fine grained, felsic clasts. These clastic rocks are interpreted as volcanic conglomerates.

The GRUB line is overprinted by the main regional foliation. It is best developed in altered portions of the ultramafic rocks (Unit 3). Intense flattening is generally associated with fabric development in the volcanic rocks of Unit 4. Units 3 and 4 are overprinted by the same amphibolite facies hornfelsing as Units 1 and 2. Hornblende crystals are disoriented, the felsic volcanics are granoblastic and oriented minerals are mimetic. Locally, due east of the juncture of Dead Wolf Brook and Southwest Gander River, Unit 3 contains elongate olivine, disposed in a radiating, criss-crossing pattern. Crystals are 1-2 cm long and 1-2 mm wide with commonly tiangular shaped interstitial material. Nearly all the olivine is pseudomorphed by antigorite and the insterstitial material is also altered to antigorite. The "spinifex-like" texture is interpreted to be metamorphic in origin (Evans and Trommsdorff, 1974), related to the intrusion of the Middle Ridge Granite (Unit 9).

LEGEND

DEVONIAN OR OLDER

MOUNT PEYTON INTRUSIVE SUITE

10 *Fine to medium grained pink granite*

MIDDLE RIDGE GRANITE

9 *Medium grained, two-mica, garnetiferous, leucogranite*

SILURIAN

BOTWOOD GROUP

8 *Fine to coarse grained, light gray sandstone, siltstone, and shale; minor red shale and sandstone; minor fossiliferous calcareous beds*

MIDDLE ORDOVICIAN AND LATER

DAVIDSVILLE GROUP

7 *Fine to coarse grained dark graywacke, commonly with shale intraclasts, interbedded with gray to black siltstone and shale; minor conglomerate lenses*

6 *Gray to black shale with thin siltstone beds, locally graphitic; minor fine to medium grained graywacke beds*

5 *Fine to coarse grained conglomerate with predominantly quartz-porphyry clasts (quartz phenocrysts commonly have a bluish hue)*

MIDDLE ORDOVICIAN OR EARLIER

GANDER RIVER ULTRABASIC BELT (GRUB)

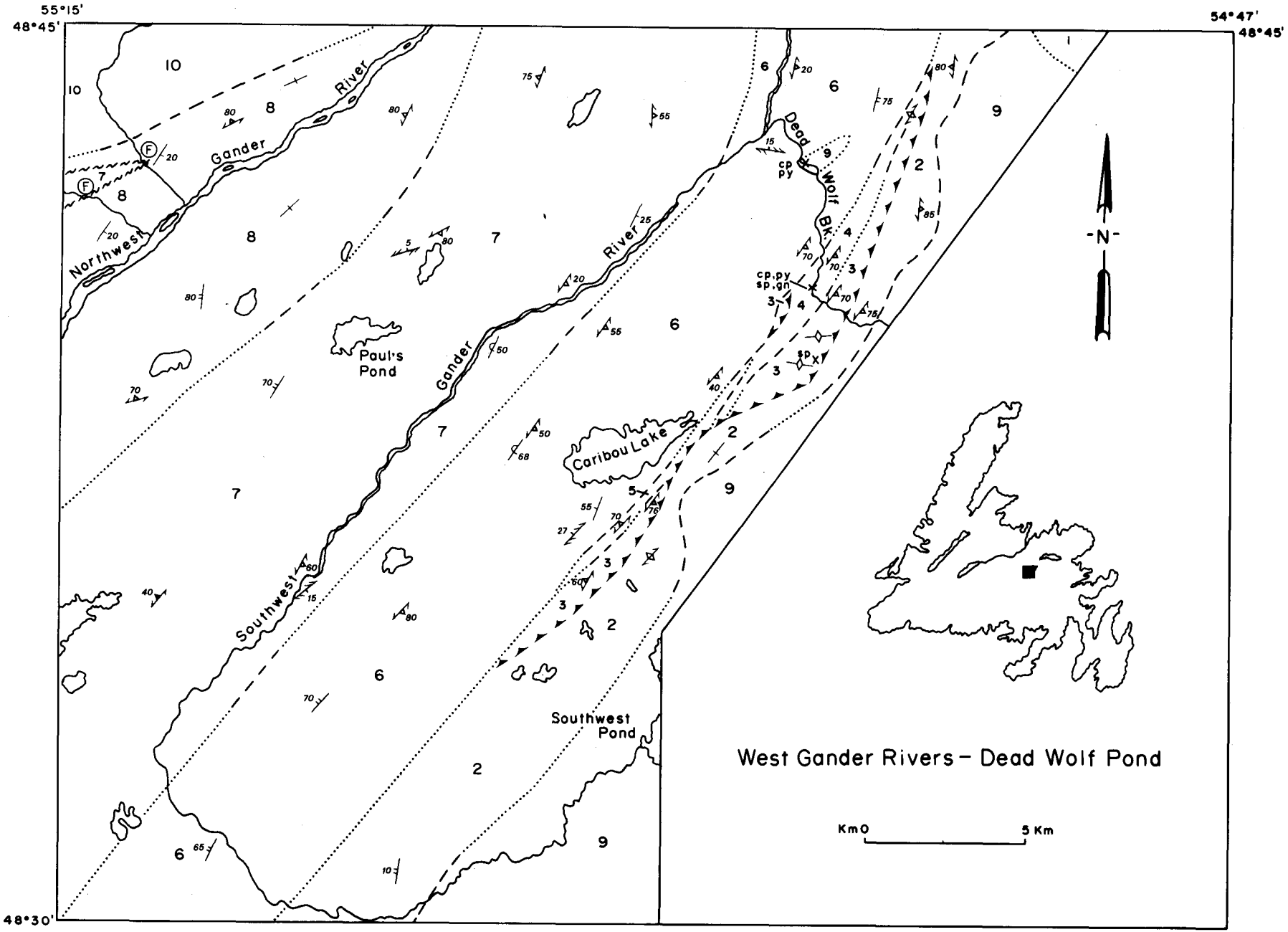
4 *Amphibolite, mafic to intermediate volcaniclastic rocks, and quartz porphyritic felsic volcanics*

3 *Serpentinite and gabbro with minor hornblendite, magnesite, amphibolite (tremolite and hornblende) and talc schist.*

GANDER GROUP

2 *Semipelite, pelite, minor psammite, quartzite, and concordant amphibolite bands*

1 *Psammite and semipelite*


55°15'
48°45'
54°47'
48°45'
48°30'
Gander River
Northwest
Gander River
Southwest
Dead Wolf Bk.
Paul's Pond
Caribou Lake
Southwest Pond
cp
py
cp,py
sp,gn
sp
-N-
West Gander Rivers – Dead Wolf Pond
KmO
5 Km

Davidsville Group (Units 5-7)

The Davidsville Group (Kennedy and McGonigal, 1972) underlies the central part of the map area and is subdivided into three lithological units. Its relationship to the GRUB line is unclear; a nonconformity separates the two elsewhere (Blackwood, 1980) and a similar, perhaps fault modified, contact probably forms the boundary in this region. The Davidsville Group is interpreted to conformably overlie the Gander Group; locally, the contact may be faulted in association with GRUB emplacement.

The base of the Davidsville Group is marked by a fine to coarse grained conglomerate (Unit 5) that forms a narrow belt east of Caribou Lake. It is coarsest in its southern part and adjacent to the GRUB line. The clasts consist almost entirely of quartz porphyry and range from 0.5 to 30 cm in diameter. Mafic patches in the matrix may indicate ultramafic, gabbroic or basaltic debris. The porphyry clasts are similar to those in the volcanic conglomerate beds of Unit 4; the quartz porphyry bands in Unit 4 are a probable source for both occurrences of conglomerate.

The conglomerate of Unit 5 appears to grade abruptly westward into gray and grayish black shale and siltstone (Unit 6) . The shales are locally graphitic and laminated; siltstone beds are 2 to 12 cm thick and have sharp boundaries. Fine to coarse grained graywacke beds form a minor component of Unit 6 and generally occur near the boundary with Unit 7.

The top of the Davidsville Group is mainly marked by fine to coarse grained graywacke with minor shale interbeds (Unit 7). Graywacke beds vary from 5 to 60 cm in thickness with sharp, coarse bases. The finer grained tops are generally laminated and grade into laminated (2 to 6 mm thick) siltstone and shale. Minor, poorly sorted conglomerate lenses commonly contain shale intraclasts. Grayish black shale (phyllite on the southwest Gander River, east of Paul's Pond) and minor gray siltstone, without any graywacke beds, occur as zones within the unit. A faulted sliver of graphitic black shales occurs within the Silurian Botwood Group, north of the Northwest Gander River. A poor collection from a new fossil locality contained the following graptolites: *Climacograptus bicornis* (Hall) or *spiniferus* Ruedemann, *Hailograptus?, Orthograptus?,* and a stipe of *Dicellograptus,* indicating an early or late Caradocian age (John Riva, written communication, 1980).

The Davidsville Group is overprinted by a pronounced slaty cleavage which becomes phyllitic to schistose with proximity to the Middle Ridge Granite. The main fabric is axial planar to recumbent, tight to isoclinal folds, that are overturned to the northwest in the Southwest Gander River and Caribou Lake areas. A widely spaced, strain-slip fabric transposes the main foliation and is best developed in outcrops of shale and siltstone. The metamorphic grade varies from low greenschist in the Paul's Pond area to high greenschist, low amphibolite facies in the Caribou Lake area. In the latter area, the fabric is defined by mimetically crystallized muscovite and biotite; biotite, garnet and andalusite also occur as porphyroblasts.

Botwood Group (Unit 8)

The Botwood Group (Williams, 1962) outcrops in the northwestern part of the map area on either side of the Northwest Gander River; its contact with the Davidsville Group is not exposed but the two are presumed conformable. The group comprises fine to coarse grained sandstone, locally containing detrital mica, interbedded with siltstone and shale (Unit 8). The sandstones are generally graded and thickly bedded with 2 to 4 mm laminations; crossbedding occurs locally. These rocks are light gray or reddish brown in color with gray predominating; most of the red beds occur on the north side of the Northwest Gander River. Fine grained, mostly red, minor conglomerate beds occur locally with the sandstone.

Minor fossiliferous limestone and calcareous sandstone are interbedded with these rocks; fossils include coral, crinoid stems, and brachiopods dated as Silurian (Anderson and Williams, 1970).

A slaty cleavage overprints the Botwood Group. It is concordant with the main regional fabric in the Davidsville Group and is locally folded about moderately tight, small scale, folds.

Middle Ridge Granite (Unit 9)

The Middle Ridge Granite (Strong *et al.*, 1974) underlies the eastern boundary area of the map area. The main body of the granite intrudes Units 1 and 2 of the Gander Group; a small granite body of similar composition intrudes Unit 6 of the Davidsville Group on Dead Wolf Brook and is interpreted as an apophysis of the Middle Ridge Granite. The pluton is a fine to medium grained, approximately equigranular, two-mica, leucocratic granite (Unit 9). Small, red garnets are common in the quartz-feldspar-muscovite and/or biotite assemblage; garnets were not noted in the small plug on Dead Wolf Brook. A whole-rock Rb-Sr isochron age of 370±15 Ma has been obtained for the Middle Ridge Granite (Bell *et al.*, 1977).

The Middle Ridge Granite is generally unfoliated in this area. However, a weak mica alignment occurs locally in the contact area. The metamorphism related to the Middle Ridge Granite has resulted in porphyroblasts that mostly overprint structures in the country rocks; rarely, some porphyroblasts define weak augen.

Mount Peyton Intrusive Suite (Unit 10)

A pink, medium grained, equigranulr granite (Unit 10) occurs in the extreme northwestern part of the map area and forms part of the Mount Peyton Intrusive Suite (This name is informallly used here for the Mount Peyton batholith of Strong, 1979). Pink feldspar is generally more abundant than quartz; minor white feldspar and chlorite occur locally. The granite is unfoliated and gives a whole-rock Rb-Sr isochron age of 380±30 Ma (Bell *et al.*, 1977).

MINERALIZATION

Pyrite and chalcopyrite occur in a 1 m wide shear zone in the small granite plug (Unit 9) on Dead Wolf Brook. NALCO reported pyrite, chalcopyrite, sphalerite and minor galena in volcanic rocks (Unit 4) on the same brook (Potter, 1955). The mineralization is disseminated in a 30 cm wide felsic host and also occurs as small pods and stringers. Minor sphalerite occurs in quartz, associated with an aplite dike that cuts ultramafic rocks (Unit 3) south of Dead Wolf Brook.

Note: An arsenopyrite showing occurs in sheared gabbro (previously interpreted as a fine grained volcanogenic rock) of the Gander River Ultrabasic Belt north of Gander Lake (Blackwood, 1979a). A sample from the showing, located northeast of Jonathans First Pond in the Gander River (2E/2) map area (Blackwood, 1979b), assayed 6 g/t gold.

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