

# A PROPOSAL FOR REVISED STRATIGRAPHIC NOMENCLATURE OF THE GANDER AND DAVIDSVILLE GROUPS AND THE GANDER RIVER ULTRABASIC BELT, OF NORTHEASTERN NEWFOUNDLAND

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## ABSTRACT

*The Weir's Pond map area, centred 30 km northeast of Gander, contains parts of two major tectonostratigraphic divisions in northeastern Newfoundland. The Dunnage Zone, to the northwest, is represented by the Ordovician Davidsville Group and the Ordovician or older Gander River complex; the Gander Zone, to the southeast, is represented by the Ordovician or older Gander Group. The Davidsville Group is subdivided into three formations and the Gander Group is divided into two formations. The Gander River complex, is structurally imbricated with the basal part of the Davidsville Group.*

## REGIONAL RELATIONSHIPS

The northeastern corner of the Weir's Pond map area straddles the contact between the two major tectonostratigraphic divisions of the Appalachian Central Mobile Belt, i.e., the Gander Zone and the Dunnage Zone (Figure 1).

The Early Ordovician and/or earlier Gander Group (Kennedy and McGonigal, 1972), representing the Gander Zone (Williams, 1976), underlies much of the central and eastern parts of the area, and has been mapped northeastward to the Carmanville (2E/8) map area (Currie and Pajari, 1977) and southwestward, for 100 km, to the Baie d'Espoir area (Dickson, 1987). The Gander Group passes gradationally eastward into amphibolite-facies metasedimentary rocks, and is interpreted to be the protolith of the Hare Bay Gneiss (Blackwood, 1978).

A package of undated ultramafic, mafic and felsic rocks, the Gander River complex (the Gander River Ultrabasic Belt of Jenness, 1958; Blackwood, 1982), in places, bounds the Gander Group to the west and defines the eastern margin of the Dunnage Zone. The complex extends discontinuously northeastward to the coast, and occurs sporadically south of Gander Lake.

The Davidsville Group (Kennedy and McGonigal, 1972) forms the basal sedimentary division in the eastern part of the Dunnage Zone. Southward, the group passes along strike into the Baie d'Espoir Group (Colman-Sadd, 1980; Dickson, 1987) and northeastward, the group has been mapped to the coast (Currie *et al.*, 1980). The basal part of the Davidsville Group is structurally imbricated with the Gander River complex.

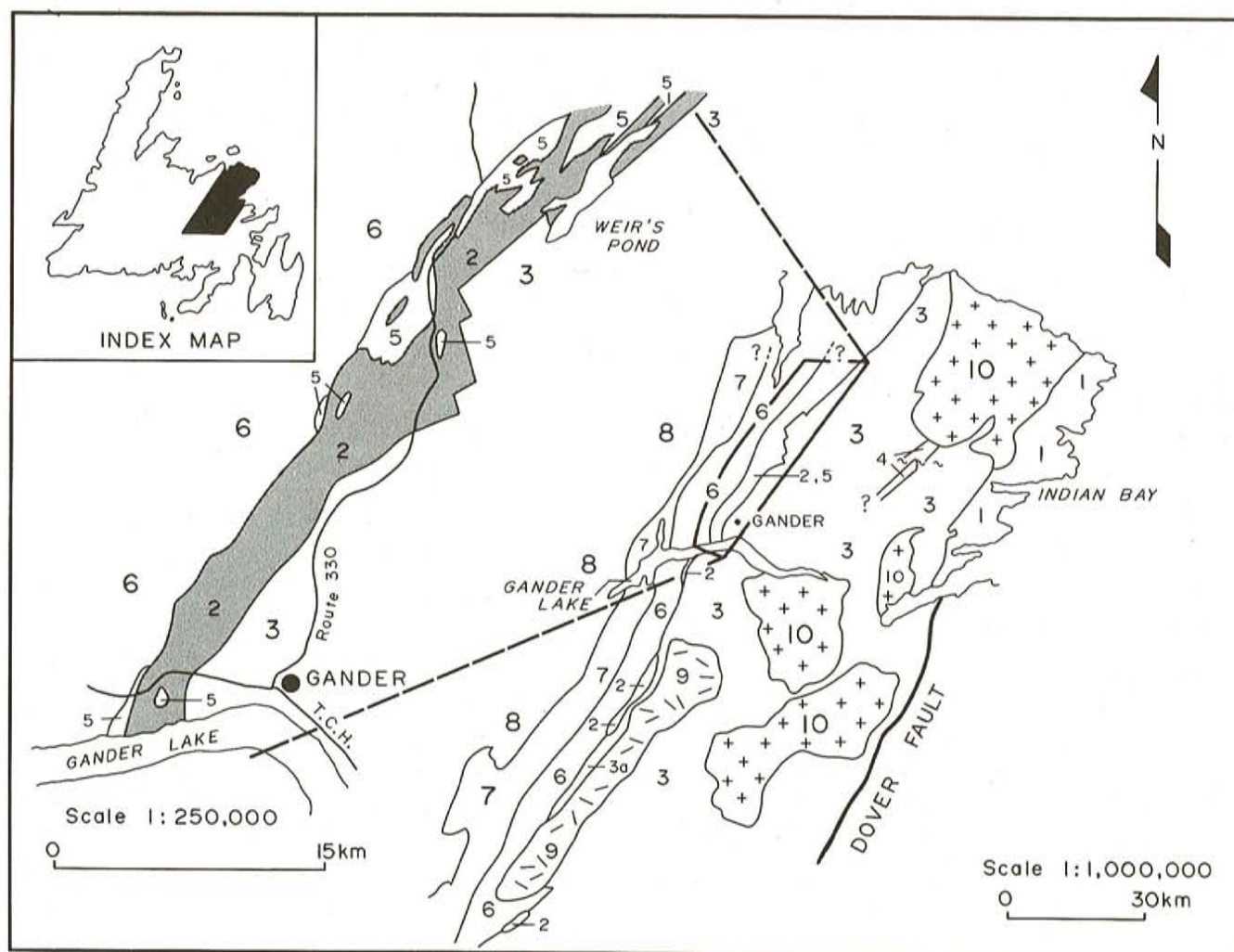
## LOCAL GEOLOGY

### Gander Group

The Gander Group has been informally divided into the Jonathans Pond and Indian Bay formations (O'Neill and Knight, 1988). The term Indian Bay formation was first introduced by Wonderley (Wonderley and Neuman, 1984) but redefined by O'Neill (O'Neill and Knight, 1988). It is proposed (O'Neill, *in preparation*) to amend the term Indian Bay formation to Indian Bay Big Pond formation. This revision is necessary in order to accurately locate the formation, which is exposed principally on the shores, and in the vicinity, of Indian Bay Big Pond. Indian Bay itself, is located on the coast about 15 km to the east. Brief lithological descriptions of the two formations are given below (a detailed account is presented in O'Neill and Knight, 1988 and O'Neill, *in preparation*).

*The Jonathans Pond formation.* The Jonathans Pond formation consists primarily of thin to thick interbedded psammite, semipelite and pelite; it also includes quartz-granule sandstone, quartz arenite, calc-silicate layers or lenses, and mafic sills or dykes.

*The Indian Bay Big Pond formation.* The Indian Bay Big Pond formation is a northeast-striking sequence of metasedimentary and metavolcanic rocks exposed in a narrow belt in the southeastern corner of the Weir's Pond map area. The sedimentary rocks include locally interbedded, grey to dark-grey, buff and maroon sandstone, green, maroon and black pelite and a 6-m-thick chert band. Fossiliferous, fine-grained sandstone boulders and conglomerate boulders, typically angular, are abundant locally and appear to be restricted to the shores of Indian Bay Big Pond. The fossil-



# LEGEND

10	DEVONIAN GRANITE	<b>EARLY ORDOVICIAN OR EARLIER</b>	
9	SILURO – DEVONIAN GRANITE	<b>GANDER GROUP (Units 3 and 4)</b>	
<b>SILURIAN</b>		4	INDIAN BAY BIG POND FORMATION
8	BOTWOOD GROUP	3	JONATHANS POND FORMATION
<b>ORDOVICIAN</b>		2	GANDER RIVER COMPLEX
<b>DAVIDSVILLE GROUP (Units 5 to 7)</b>		<b>SILURO – DEVONIAN AND OLDER</b>	
7	THE OUTFLOW FORMATION	1	UNSEPARATED HARE BAY GNEISS AND GRANITOID ROCKS
6	HUNTS COVE FORMATION		
5	WEIRS POND FORMATION		

**Figure 1.** Location map and geology of northeastern Newfoundland showing the revised stratigraphic nomenclature.



rich boulders are assumed to be derived from a lithologically similar unit within the Indian Bay Big Pond formation. The fauna indicate a late Arenig age (Wonderley and Neuman, 1984). Not all contacts between units in this formation are exposed, and therefore the complete internal stratigraphic continuity of the formation is only assumed. Stratigraphic indicators are lacking in the formation and the relative ages of the units are unknown.

Sandstone of the Indian Bay Big Pond formation is typically much richer in lithic detritus than those of the Jonathans Pond formation. One common type of lithic clast in the Indian Bay Big Pond formation is fine- to medium-grained muscovite  $\pm$  biotite schist. These fragments usually feature one foliation that is clearly crenulated in some clasts, suggesting that the source terrain included polydeformed, metamorphosed (at least to greenschist facies) rocks. An isotropic mineral has been tentatively identified as detrital garnet in some thin sections. Volcanic clasts also occur in the sandstones.

The Indian Bay Big Pond formation is in gradational contact to the northwest with the Jonathans Pond formation. At the contact, grey sandstone and grey-green pelite, of the Jonathans Pond formation, are interbedded with dark-grey sandstone and black laminated pelite of the Indian Bay Big Pond formation. The proportion of black pelite increases eastward and forms about 50 percent of the exposure, near the eastern boundary of this gradational unit. Southward, the contact between the two formations, i.e., on the northwest side of Indian Bay Big Pond, is poorly exposed. However, the rocks in both formations are lithologically similar, and the contact is interpreted to be conformable.

The southeast contact of the Indian Bay Big Pond formation is more problematic because of poor exposure and the presence of a several-km-wide structural high-strain zone around Wing Pond. North of Indian Bay Big Pond, rocks, including some within the Indian Bay Big Pond formation, are heterogeneously highly strained. The contact between the two formations has been modified by this high-strain zone and therefore the nature of the original boundary is unknown. The southeastern belt of the Jonathans Pond formation is interpreted to be a structural repetition.

## GANDER RIVER COMPLEX

O'Neill (*in preparation*), formally proposes to redefine the term Gander River Ultrabasic Belt and amend it to the Gander River complex. Much of the complex comprises gabbroic and mafic volcanic–volcaniclastic rocks; felsic plutonic rocks form a minor but significant component. Also, most, if not all, of the unaltered ultramafic rock in the complex is pyroxenite or pyroxene rich and is therefore relatively SiO<sub>2</sub> rich.

The Gander River complex has not been dated. However, overlying fossiliferous sedimentary rocks containing abundant ultramafic, mafic and felsic detritus (presumably eroded from the complex) range from late Arenig to lower Llandeilo and provide a minimum age for the complex.

## DAVIDSVILLE GROUP

O'Neill (*in preparation*), proposes to subdivide the Davidsville Group into three formations; the subdivision and new nomenclature are briefly discussed here. The eastern formation is termed the Weir's Pond formation and is readily extrapolated southwestward to the north shore of Gander Lake. The Davidsville Group west of the Weir's Pond formation, has been divided into two units (Blackwood, 1979, 1980). These two units define the central and western formations and are termed the Hunt's Cove and The Outflow formations respectively.

*The Weir's Pond formation.* The name Weir's Pond formation is proposed for fossiliferous sandstone, conglomerate, fossiliferous limestone and graphitic black shale units that are structurally imbricated with the Gander River complex and are well exposed in the Weir's Pond area. The oldest rock type in the Weir's Pond formation is a fine- to medium-grained, grey, fossiliferous arenite containing late Arenig fauna of mixed North American and Baltoscandian (European) aspect (Boyce *et al.*, 1988). The rock also contains abundant chromite detritus. This unit is not seen in contact with other units of the formation but interbedded conglomerate, sandstone and siltstone is inferred to lie stratigraphically above the fossiliferous sandstone. This relationship is based on correlation with rocks on the north shore of Gander Lake, several kilometres west of Little Harbour, where fossiliferous rocks of late Arenig age pass conformably westward into conglomeratic sandstones, locally.

On the northwest side of Weir's Pond, fossiliferous limestone nonconformably overlies serpentized ultramafic rock (Blackwood, 1982) of the Gander River complex. The fauna collected from the limestone are of mixed North American and Baltoscandian aspect, Llanvirn to Llandeilo in age, and similar to those recognized in the Cobbs Arm Limestone, Summerford Group on New World Island and in the Spruce Brook Formation of the Through Hill area (Boyce *et al.*, 1988).

Caradoc graphitic black shale of the Weir's Pond formation is exposed near the Middle Ordovician limestone, but both are separated by an exposure gap.

*Hunt's Cove formation.* The name Hunt's Cove formation is informally proposed for a thick sequence of slate and minor conglomerate, mostly outcropping in the Gander River area. The name is taken from a cove on the south shore of Gander Lake where sections of this formation are well exposed. The Hunt's Cove formation is exposed in the northwestern corner of the Weir's Pond area, near Gander River and it is inferred to be in stratigraphic continuity with the Weir's Pond formation. The formation continues southwestward, through map areas 2E/2, 2D/15, 2D/10, 2D/11, 2D/6 to 2D/3. In map area 2D/3, similar rocks are referred to as the St. Joseph's Cove Formation of the Baie d'Espoir Group. Detailed work is required in the area of the transition to substantiate this equivalence. The St. Joseph's Cove Formation was defined by Colman-Sadd (1976) for pelite, siltstone, sandstone and volcanic rocks in the St Alban's map area; it was mapped in the 2D/3 map area by Dickson (1987).



*The Outflow Formation.* The name The Outflow formation is informally proposed for the westernmost unit of the Davidsville Group. Some of the best exposures of the formation occur on the north shore of Gander Lake where 'the Outflow' into the Gander River occurs. It comprises fine- to coarse-grained sandstone, locally with shale intraclasts, interbedded with grey to black siltstone and slate; conglomeratic beds form a minor component. West of 'the Outflow' on Gander Lake, a conformable but abrupt contact occurs with the Hunt's Cove formation. The Outflow formation is mappable northeastward to the coast and southwestward through map areas 2E/2, 2D/15, 2D/14, 2D/11, 2D/6 to 2D/5. In map area 2D/5, similar rocks are referred to as the North Steady Pond Formation (Colman-Sadd, 1980). Again detailed mapping is required to substantiate this equivalence. The North Steady Pond Formation comprises greenish grey pelite, siltstone and sandstone, as well as minor conglomerate and mafic to felsic volcanic rocks; it grades laterally into the St. Josephs Cove Formation (Colman-Sadd, 1976). Dickson (1987), however, in the Mount Sylvester area, interprets the contact between the St. Joseph's Cove and North Steady Pond formations to be a fault, locally marked by ultramafic lenses.

### ACKNOWLEDGMENTS

Sean O'Brien and Steve Colman-Sadd are thanked for critically reading the manuscript.

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