

LOWER AND MIDDLE ORDOVICIAN CONODONTS FROM CENTRAL NEWFOUNDLAND AND THEIR CORELATIVES IN WESTERN NEWFOUNDLAND

by

Svend Stouge

INTRODUCTION

Conodonts have been known from central Newfoundland since Williams (1962) published a brief fauna list from Limestone Island west of Little Bay Island, western Notre Dame Bay (Figure 3). This was followed by a report on conodonts of Tremadoc to Lower Arenig age from South Catchers Pond (Bergström *et al.*, 1972) (Figure 1). Bergström *et al.* (1974) presented data from the Cobbs Arm Limestone and equivalent strata on New World Island, central Notre Dame Bay (Figure 4), and they recognized that the fauna covered the time interval Upper Llanvirn-Llandeilo. Further information and knowledge of conodont distribution of Lower and Middle Ordovician age was documented by Hibbard *et al.* (1977) from the Dunnage Mélange (lower Arenig) (Figure 1), by Blackwood (1978) and Stouge (1979a; in press) from the Davidsville Group (Upper Llanvirn-Llandeilo) and by Kean (1979) from the Buchans area (Upper Llanvirn-Llandeilo). Hunter (1978) presented a complete taxonomical description of the conodont fauna from New World Island.

This information, with additional knowledge on conodont distribution presented here, forms the basis for the recognition and dating of faunas associated with volcanic rocks and their correlation with faunas from the carbonate platform sequence of the Great Northern Peninsula.

The stratigraphy of Notre Dame Bay has recently been outlined by Dean (1977, 1978), and his terminology is applied to this report.

PROVINCIALISM AND COMPOSITION OF CONODONT FAUNAS

Conodonts were influenced by provincialism throughout most of the Ordovician Period (*e.g.* Barnes & Fåhræus, 1975). The two principal provinces are referred to as the Midcontinent Fauna Province and the North Atlantic Fauna Province. Two separate stratigraphic standard references, one for each province, are in use (Figure 2).

The majority of the fauna elements identified from central Newfoundland are of North Atlantic Fauna Province affinities. A minor part belongs to the Midcontinent Fauna Province. One assemblage includes species which so far are unknown from the North Atlantic region. Correlation can be readily made with European conodont successions (Lindström, 1971; Bergström, 1971), whereas correlation to the North American Midcontinent sequences (Ethington & Clark, 1971; Sweet *et al.*, 1971) is more uncertain. Some of the correlations between the volcanic terrane and the carbonate platform terrane can be made using mixed faunas from slope deposits of the Cow Head Group.

UPPER TREMADOC TO LOWER ARENIG AGE (Figure 1)

At South Catchers Pond (Figure 1) trilobites (Dean, 1970) and conodonts (Bergström *et al.*, 1972) have been recorded in bedded and conglomeratic limestones of the Catchers Pond Group (Neale & Nash, 1963; Dean & Strong, 1975). The conodont fauna includes

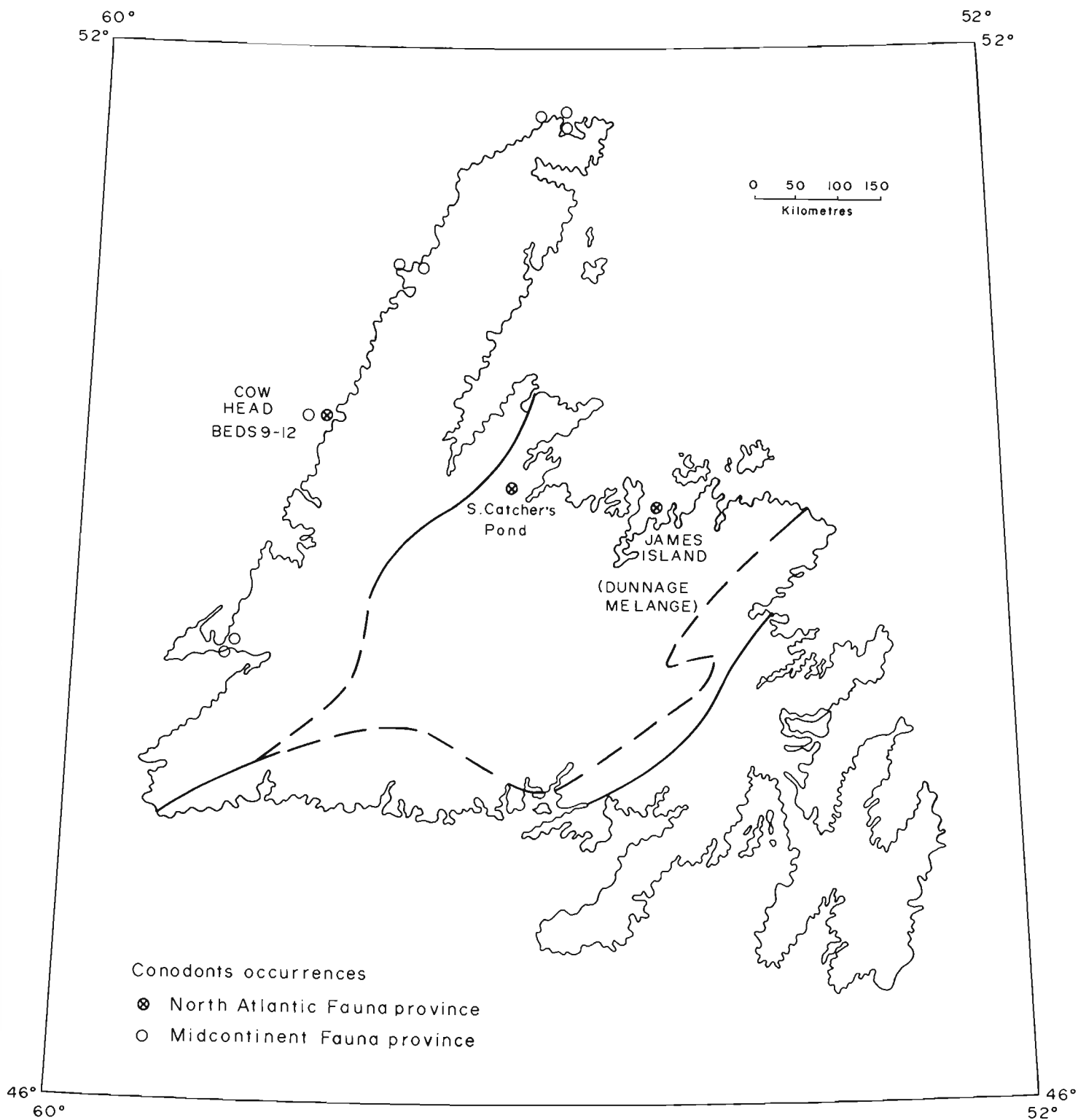


Figure 1. Distribution of Tremadoc-Arenig (Canadian) conodont localities in central Newfoundland and their known correlatives on the Great Northern Peninsula.

Figure 2. Correlation of stratigraphic units in western and central Newfoundland and their ranges in terms of North American and British standard units as indicated by conodonts. Note that the central Newfoundland carbonate deposits apparently are pretransgressive.

SYSTEM	BRITAIN & SCANDINAVIA GRAPTOLITE ZONES	BRITISH SERIES	N. AMERICA SERIES STAGE	EUROPE CONODONT ZONES	NORTH AMERICAN CONODONT FAUNAS	NEWFOUNDLAND CONODONT FAUNAS	WESTERN NEWFOUNDLAND AUTOCHTHON	WESTERN NEWFOUNDLAND ALLOCHTHON	CENTRAL NEWFOUNDLAND	←-TRANSGRESSION REGRESSION →
O R D O V I C I A N	<i>Nemagraptus gracilis</i>	CARADOC	BLACK-RIVERAN	<i>Amorphognathus tvaerensis</i>	7	<i>Polygnathus</i> <i>Appalachignathus</i>	LONG POINT GROUP			
	<i>Glyptograptus teretiusculus</i>	LLANDEILO	CHAZYAN	<i>Pygodus anserinus</i> Upper	6			? Daniel's Harbour Lime Breccia	COBBS ARM LIMESTONE	←
				<i>Pygodus serro</i> Lower	5		Hiatus			→
	<i>Didymograptus murchisoni</i> & <i>Didymograptus bifidus</i>	LLANVIRN		<i>Eoplocognathus suecicus</i>	4	<i>Cordylodus?</i> <i>Periodon</i> <i>Histiodela</i>	TABLE HEAD FORMATION			←
		?	WHITE-ROCKIAN	<i>Eoplocognathus? variabilis</i> Upper		<i>Eapriionidus</i>			LUSH'S BIGHT	←
				<i>Eoplocognathus? variabilis</i> Lower	2-3	Hiatus				→
	<i>Didymograptus hirundo</i>		LOWER	<i>Microzarkodina fiabellum parva</i>	1					
				<i>Paraistodus originolis</i>						
				<i>Baltoniodus navis</i> <i>B. triangularis</i>	E-1	5				← ?
	<i>Didymograptus extensus</i>	ARENIG	CANADIAN	<i>Oepikodus evae</i>	E	4				← ?
				<i>Prinoniodus elegans</i>	D	3				←
				<i>Paraistodus proteus</i>	Cor D	2 1				→
		TREMADOC								

Prioniodus elegans Pander which is the zonal fossil of the Scandinavian conodont zonal succession (Lindström, 1971) (Figure 2). *P. Elegans* conodont zone is uppermost Tremadoc to Lower Arenig in age (Bergström *et al.*, 1972).

Prioniodus elegans has also been recorded from Beds 9 and 10 of the Cow Head Group, western Newfoundland (Fahraeus & Nowlan, 1978). These beds tentatively correlate with conodont faunas 3 and 4 of an unnamed unit and the Catoche Formation of the St. George Group (Stouge, in press). Conodont faunas 3 and 4 are assigned to Midcontinent fauna D and part of Midcontinent fauna E (Upper Canadian) of the North American fauna succession (Ethington & Clark, 1971) (Figure 2).

The Dunnage Mélange at James Island (Figure 1) has yielded a small conodont faunule. Other fossils include Cambrian trilobites (Kay & Eldredge, 1968) and Tremadocian graptolites (Hibbard *et al.*, 1977). The conodonts, in contrast, are of Lower Arenig age (*Oepikodus evae* conodont Zone-Figure 2).

In western Newfoundland *Oepikodus evae* (Lindström) is present in Bed 11 and 12 in the Cow Head Group (Fahraeus & Nowlan, 1978). Beds 11 and 12 are tentatively correlated with conodont faunas 4 and 5 from the Catoche Formation (Stouge, in press). This is Midcontinent fauna E (Upper Canadian) (Figure 2).

UPPER ARENIG TO LOWER LLANVIRN AGE (Figure 3)

The Cutwell Group on Long Island and the correlative Western Arm Group on Limestone Island (Dean, 1977, 1978) (Figure 3) include fossiliferous limestones. The limestones are bedded or conglomeratic and interbedded with graywackes and tuffs. The macrofossils include crinoids, brachiopods, gastropods and cephalopods (Williams, 1962; Strong & Kean, 1972). The shelly fossils have not yet been described, but were indicative of an Upper Arenig age.

Abundant conodont elements are recorded, but most of the species are new. Genera of the North Atlantic and the Midcontinent Fauna provinces are present. Several forms, however, cannot definitively be included in the current recognized major faunal provinces (Stouge, 1980).

The fauna includes *Periodon flabellum*-*P. aculeatus*, *Polonodus* sp. and *Cordylodus* ? *horridus*. Compositionally, the genera are similar to those of the Table Head Formation (Upper Whiterock) of western Newfoundland, but the species are either new or slightly older (Stouge, 1980). The phyletic evolutionary stage of *Periodon* is the same as the one described from Bed 13 and 14 in the Cow Head Group by Fahraeus & Nowlan (1978). The association of species is indicative of an Upper Arenig-Lower Llanvirn age (Lower Whiterock). The fauna correlates with *Microzarkodina parva* and *Eoplacognathus* ? *variabilis* conodont zones (Figure 2).

UPPER LLANVIRN TO LLANDEILO AGE (Figure 4)

The Cobbs Arm Limestone, New World Island (Fig. 4), overlies the Summerford Group and it is overlain by Caradocian shales (Dean, 1977, 1978). The limestone has yielded brachiopods (Neumann, 1976) and trilobites (Dean, 1971, 1976) as well as a profuse conodont fauna (Bergström *et al.*, 1974; Hunter, 1978).

The recorded conodont faunas cover the *Pygodus serra*-*P. anserinus* conodont zones which are Upper Llanvirn-Llandeilo age (Bergström, 1971; Bergström *et al.*, 1974) (Figure 2). In terms of the North American succession this corresponds to Midcontinent Faunas 5-6 (Sweet *et al.* 1971) or Chazyan.

Additional collections from various localities from central Newfoundland (Figure 4) were all indicative of and correlative with the faunas of the Cobbs Arm Limestone. These localities include

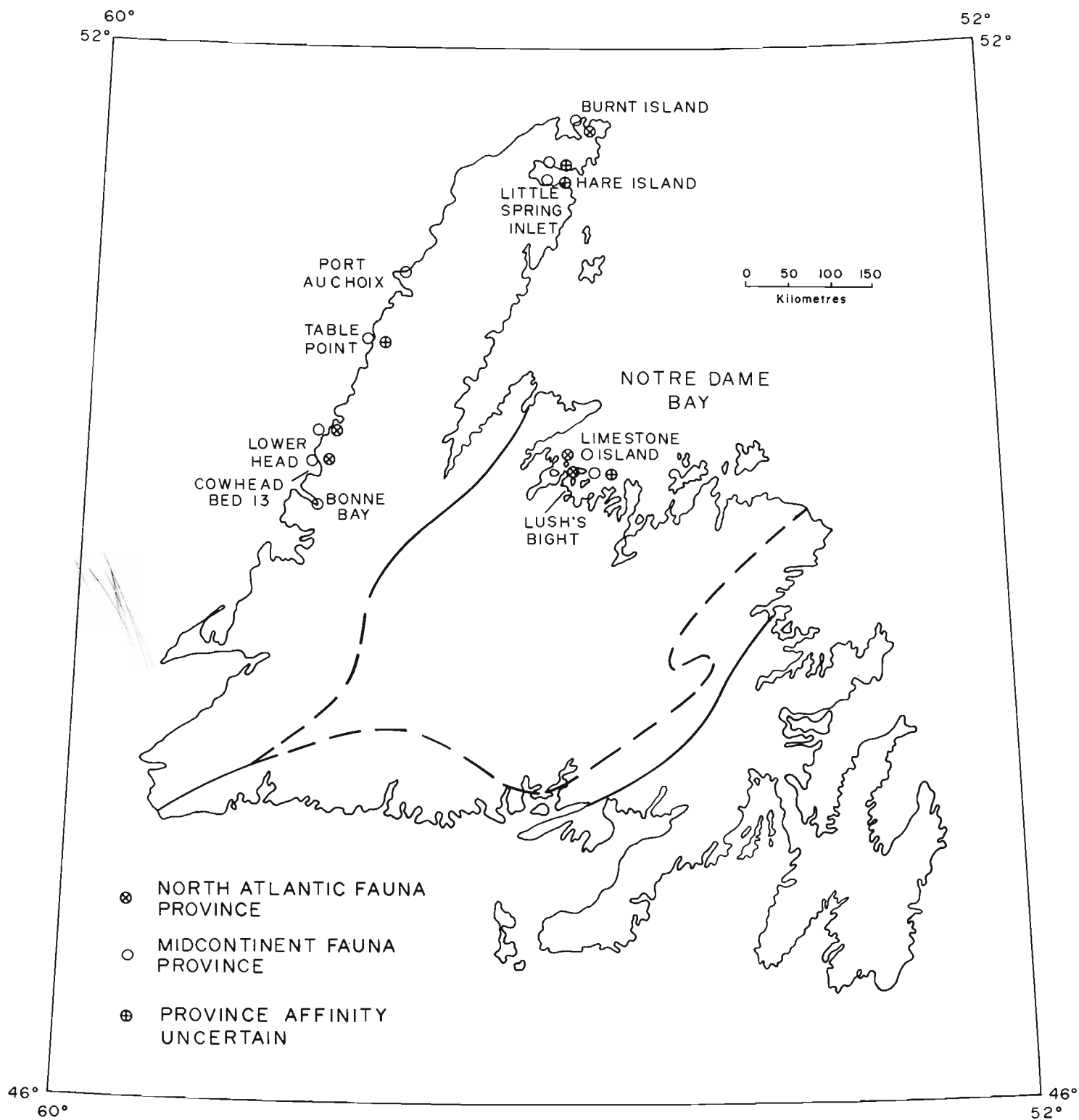


Figure 3. Distribution of Upper Arenig - Lower Llanvirn conodont localities, central Newfoundland and their known correlatives on the western platform.

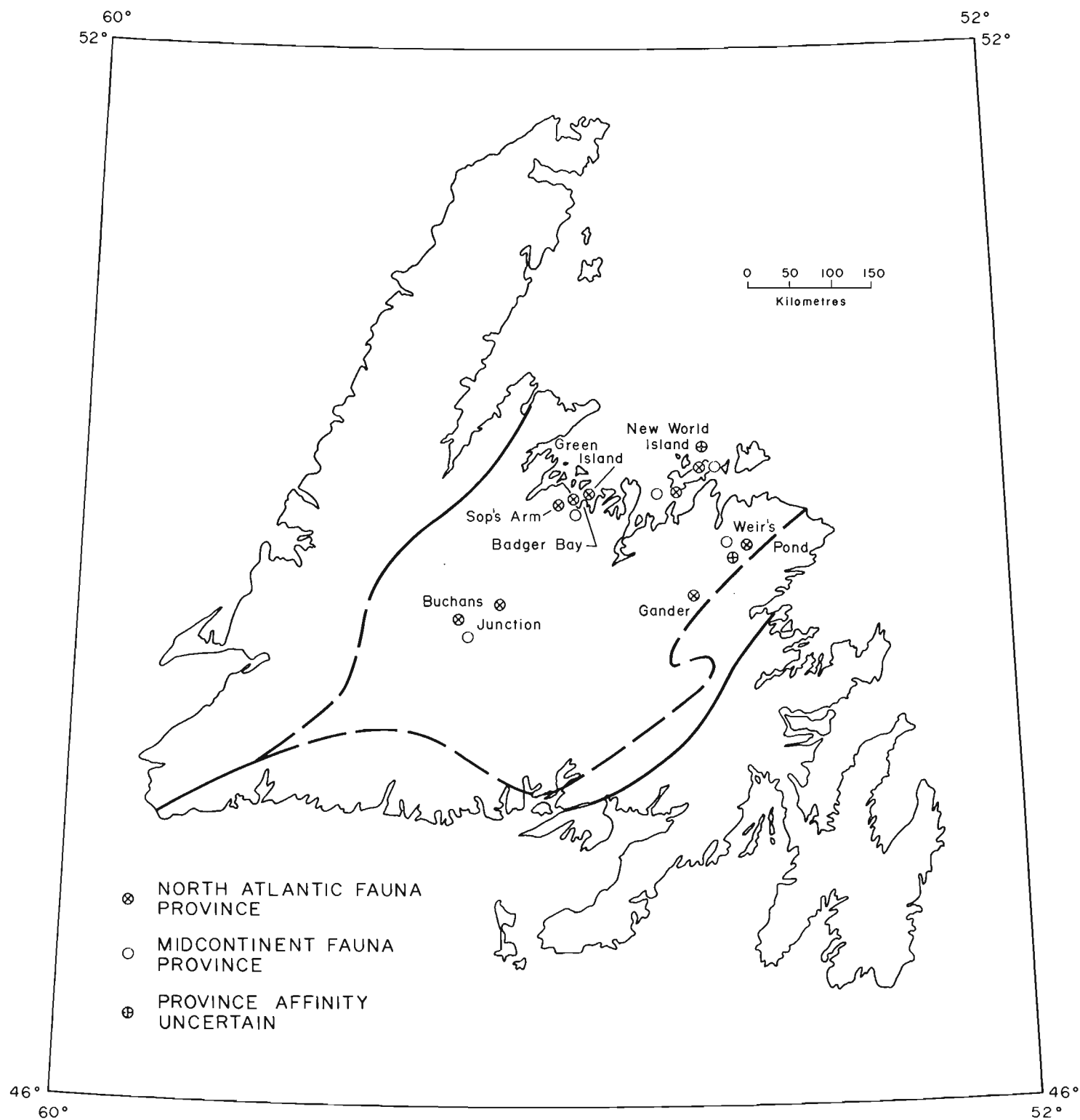


Figure 4. Upper Llanvirn - Llandeilo conodont localities in central Newfoundland.

limestones from the base of the Davidsville Group at Weir's Pond (Stouge, 1979a; in press) and from the Buchans junction Area (Kean, 1979).

Limestone boulders collected from the Sops Head Complex in Sops Arm, the Badger Bay area, and from the Boones Point Complex at Green Island (Figure 4) yielded conodonts of similar composition to those in the Cobbs Arm Limestone. The limestone boulders may have been derived from the Cobbs Arm Limestone or lateral equivalent strata.

SUMMARY

Three Ordovician limestone units in central Newfoundland have yielded conodonts. The ages straddle the boundaries of the following Ordovician series: Tremadoc-Arenig, Arenig-Llanvirn, Llanvirn-Llandeilo.

The conodont faunas can be indirectly correlated with those of the western platform, Great Northern Peninsula, and directly with the European faunas and faunas from the slope deposits along the western margin of the ancient North American craton. The Tremadoc-Arenig fauna correlates with Beds 9 and 10 of the Cow Head Group. Part of this time interval correlates with a disconformity which has been recognized at the base of the Catoche Formation (Knight, 1978; Boyce, 1979) and elsewhere (Stouge, in press). The Upper Arenig-Lower Llanvirn age fauna shares species with Beds 13 and 14 of the Cow Head Group and genera with the Table Head Formation (Upper Whiterock). In western Newfoundland this time interval has traditionally been recognized as an important disconformity (Schuchert & Dunbar, 1934, and others). The youngest fauna so far has no contemporaneous shelly fauna on the western platform. The neoautochthonous Long Point Group (upper *Pygodus anserinus* to *Amorphognathus tvaerensis* zones; Fåhræus, 1973) is slightly younger (Bergström *et al.*, 1974).

The distribution of the faunas is that the oldest one has only been recorded from a restricted area in northwest-central Newfoundland. The middle fauna has been recorded only from two localities in northwestern Notre Dame Bay. The youngest fauna is recorded from widely distributed localities across central Newfoundland extending from Sops Arm in the west to Weir's Pond in the east and from the Buchans area to the southwest.

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