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Geological Survey of Canada
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PAPER 83-26

LATE PROTEROZOIC TO EARLY TERTIARY STRATIGRAPHY OF SOMERSET ISLAND AND NORTHERN BOOTHIA PENINSULA, DISTRICT OF FRANKLIN, N.W.T.

W.D. STEWART

Canada

1987

GEOLOGICAL SURVEY OF CANADA
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Available in Canada through

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or by mail from

Canadian Government Publishing Centre
Supply and Services Canada
Ottawa, Canada K1A 0S9

and from

Geological Survey of Canada offices:

601 Booth Street
Ottawa, Canada K1A 0E8

3303-33rd Street N.W.,
Calgary, Alberta T2L 2A7

A deposit copy of this publication is also available
for reference in public libraries across Canada

Cat. No. M44-83/26E Canada: $20.00
ISBN 0-660-12511-0 Other countries: $24.00

Price subject to change without notice

Cover: *Kimberlite diatreme at Elwin Bay, northwestern Somerset Island. ISPG photo 827-185.*

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Original manuscript submitted: 83-03-09

Approved for publication: 85-02-05

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LATE PROTEROZOIC TO EARLY TERTIARY STRATIGRAPHY OF SOMERSET ISLAND AND NORTHERN BOOTHIA PENINSULA, DISTRICT OF FRANKLIN, N.W.T.

Abstract

The geology of Somerset Island and Boothia Peninsula is dominated by Boothia Uplift, a prominent, linear structural feature projecting northward from the mainland into the centre of the Canadian Arctic Archipelago. The Archean-Aphebian crystalline core of the uplift is flanked by sedimentary rocks of the Arctic Platform.

The oldest sedimentary units, the Neohelikian Aston and Hunting formations, are cut by two sets of intrusive rocks, the older truncated by the sub-Hunting unconformity, and the younger by the sub-Cambrian unconformity.

The overlying Paleozoic succession consists mainly of platform carbonates, although the upper two formations contain clastic sediments, reflecting the influence of Boothia Uplift during Late Silurian to Early Devonian time.

The oldest Paleozoic rocks belong to the Turner Cliffs (Upper Cambrian to Lower Ordovician) and Ship Point (Lower to Middle Ordovician) formations. New evidence suggests that these units are not directly correlative with the type sections established on Baffin Island. The Ship Point Formation is conformably overlain by the Bay Fiord (Lower Ordovician), Thumb Mountain (Upper Ordovician) and Irene Bay (Upper Ordovician) formations, of the Cornwallis Group. The Bay Fiord and Thumb Mountain formations are separated by a major Middle Ordovician unconformity. The Cornwallis Group is succeeded by the Allen Bay Formation (Upper Ordovician to Upper Silurian). Dolostones of the upper Allen Bay pass eastward into the evaporitic carbonates of the Cape Crauford Formation (Lower to Upper Silurian). Both formations are succeeded conformably by the Upper Silurian (Ludlovian) Cape Storm and Douro formations; the last carbonate units deposited prior to the rise of Boothia Uplift. The Douro Formation is overlain conformably by the Late Silurian (late Ludlovian to early Pridolian) Somerset Island and Peel Sound formations.

Post-Silurian kimberlite diatremes occur in a northeast-southwest trending belt on Somerset Island.

The Upper Cretaceous Kanguk Formation is known only from a single, isolated outlier in southern Somerset Island. The Eureka Sound Formation (Paleocene) is preserved in minor, fault-bounded structural depressions on both Somerset Island and northern Boothia Peninsula.

Résumé

La géologie de l'île Somerset et de la péninsule Boothia est dominée par un caractère structural linéaire, dénommé le soulèvement de Boothia, qui se trouve en saillie allant du nord du continent jusqu'au centre de l'archipel Arctique canadien. Le noyau cristallin du soulèvement, daté de l'Archéan à l'Aphébien, touche des roches sédimentaires de la plate-forme arctique.

Les unités rocheuses sédimentaires les plus anciennes, comprenant les formations d'âge néohélikien d'Aston et de Hunter sont coupées par deux groupes de roches d'intrusives parmi celles-ci la plus ancienne est tronquée par la discordance sub-Hunting et par celle moins âgée, dénommée la discordance sub-Cambrien.

La succession de couverture datée du Paléozoïque comprend la plupart des carbonates de plate-forme, ce qui souligne l'influence du soulèvement de Boothia pendant le Silurien supérieur jusqu'au Dévonien inférieur, bien que des deux formations supérieures contiennent des sédiments clastiques.

Les roches paléozoïques les plus anciennes appartiennent aux formations de Turner Cliffs (datée du Cambrien supérieur jusqu' à l'Ordovicien inférieur) et de Ship Point (datée de l'Ordovicien inférieur à l'Ordovicien moyen). Des recherches récentes indiquent que ces unités ne se corrèlent pas directement aux coupes types déjà établies sur l'île de Baffin. La formation de Ship Point est superposée en concordance par les formations du groupe de Cornwallis, c' est-à-dire, les formations de Bay Fiord (datée de l'Ordovicien inférieur), de Thumb Mountain (datée de l'Ordovicien supérieur), et d'Irene Bay (datée de l'Ordovicien supérieur). Les formations de Bay Fiord et de Thumb Mountain sont séparées par une discordance majeure de l'Ordovicien moyen. Le groupe de Cornwallis est suivi par la formation d'Allen Bay (datée de l'Ordovicien supérieur au Silurien supérieur). Des dolostones de la partie supérieure de la formation d'Allen Bay passent vers des carbonates évaporitiques à l'est de la formation de Cape Crauford (datée du Silurien inférieur au Silurien supérieur). Les deux formations sont superposées en concordance par les formations de Cape Storm et de Douro datées du Silurien supérieur (Ludlovien), ce qui représentent

les dernières unités de carbonates déposées avant que le soulèvement de Boothia ait lieu. La formation de Douro est superposée en concordance par des formations de Somerset Island et de Peel Sound du Silurien supérieur (du Ludlovien supérieur au Pridolien inférieur).

Des diatrèmes de kimberlite post-siluriennes sont localisées dans une zone orientée du nord-est au sud-ouest de l'île Somerset.

La formation de Kanguk datée du Crétacé supérieur n'est connue que par une avant-butte isolée située au sud de l'île Somerset. La formation d'Eureka Sound (datée du Paléocène) est préservée dans des dépressions structurales mineures, qui sont bordées de failles, sur l'île Somerset et au nord de la péninsule Boothia.

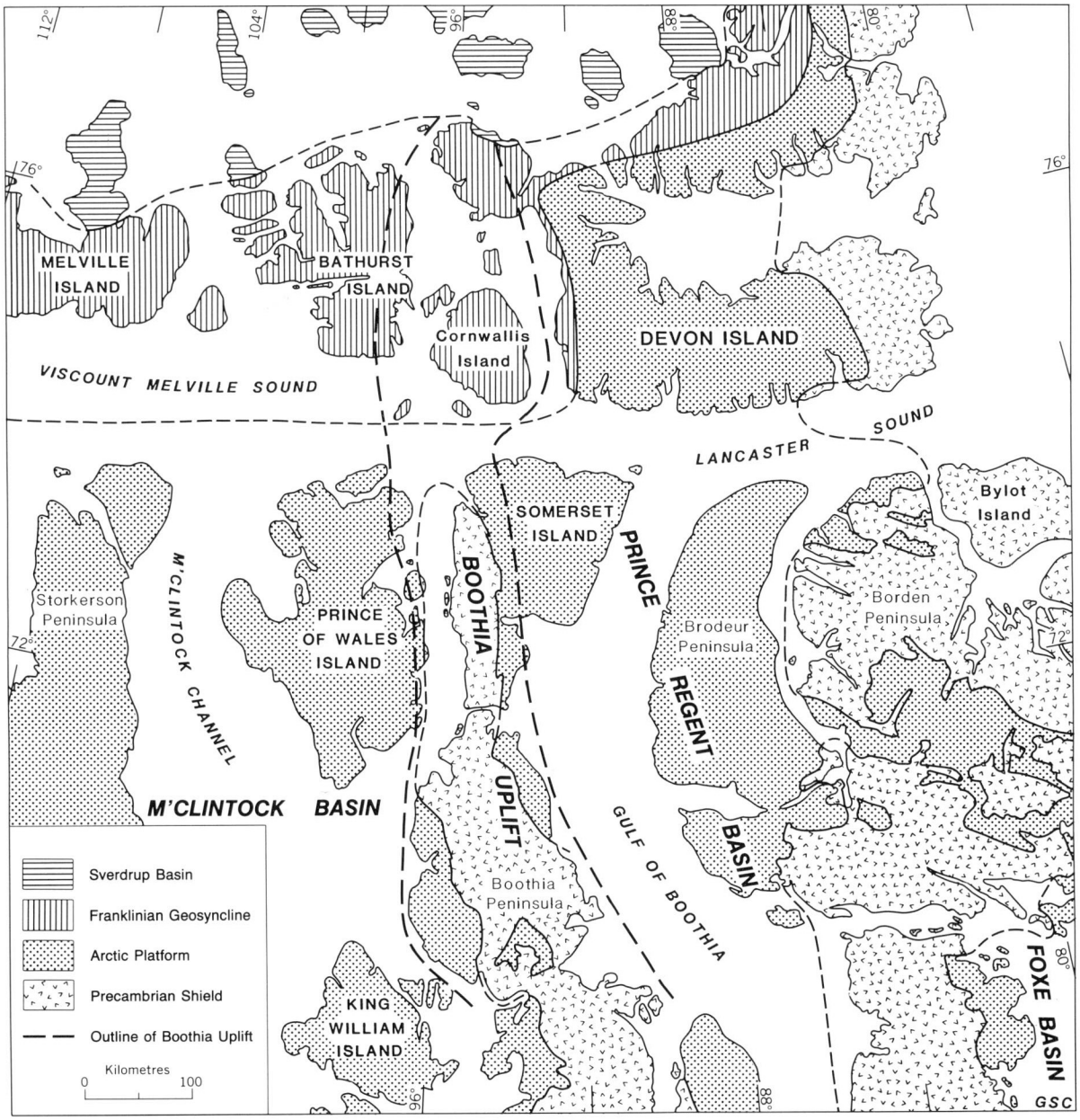

Figure 1. *Stratigraphic-structural provinces of the central Canadian Arctic Archipelago, and location of the report area.*

INTRODUCTION

Location and accessibility of report area

This report describes the Upper Proterozoic to Lower Tertiary stratigraphy of Somerset Island and northern Boothia Peninsula, an area of approximately 41,000 square kilometres situated in the southeastern part of the Canadian Arctic Archipelago (Fig. 1). The report area is bounded by latitudes 70°25' and 74°10'N, and longitudes 90°10' and 96°40'W.

Air and sea transport into the region are provided by commercial carriers to Resolute Bay in southern Cornwallis Island. From there, the report area is accessible by fixed wing STOL aircraft equipped with balloon tires. Recent geological operations on Somerset Island and Boothia Peninsula have utilized these aircraft for remote gas caching, provisioning, and camp moves, while helicopters have been used for daily geological field work.

Previous work

The Geological Survey of Canada commenced systematic geological investigations in the report area and surrounding islands during Operation Franklin in 1955 (Fortier et al., 1963). Reconnaissance studies were confined mainly to the coastal areas of Somerset Island, although numerous helicopter landings were made in other parts of the island. The results of these studies have been reported by Thorsteinsson and Tozer (1963), McMillan (1963), Norris (1963) and Blackadar (1963a, b).

Reconnaissance mapping was completed in the region in 1962 during Operation Prince of Wales, which covered Somerset, Prince of Wales and King William islands and that part of Boothia Peninsula situated north of Spence Bay. Geological maps on a scale of 1:506,880 (1 inch to 8 miles) and a brief stratigraphic and structural report were published by Blackadar and Christie (1963) as a result of this work. The Precambrian geology of the area was later described by Blackadar (1967), and three new lower Paleozoic formations were erected in the Boothia Peninsula region by Christie (1973).

Field investigations by the Geological Survey of Canada resumed in the area under the name, Operation Boothia, during the field seasons of 1975 and 1976. Mapping and stratigraphic studies were conducted throughout Somerset Island and northern Boothia Peninsula as far south as 70°25'N latitude under the general supervision of J.Wm. Kerr, who assumed responsibility for mapping the sedimentary rocks. Detailed stratigraphic and sedimentologic studies were undertaken by G.E. Reinson in 1975 (Reinson et al., 1976) and A.D. Miall in 1976 (Miall and Kerr, 1977, 1980). The geology of kimberlite diatremes intruding the lower Paleozoic rocks of Somerset Island was investigated by R.H. Mitchell of Lakehead University. The structure and petrology of the crystalline rocks of the Precambrian Shield were studied by C.D.S. deVries of the University of Calgary, whose tragic death in 1979 left that work unfinished.

Studies by the University of Ottawa commenced on Somerset Island in 1964 (see Dineley, 1965, 1966), resulting in a series of publications and dissertations embracing the entire stratigraphic column. The Proterozoic sedimentary rocks of northwestern Somerset Island were studied by Tuke et al. (1966) and Dixon (1974). Dixon (1973a, b) investigated the stratigraphy of Upper Cambrian to Upper Ordovician rocks in the Aston Bay, Creswell Bay and Lang River areas of Somerset Island, and erected a new unit, the Lang River Formation, in his study area. The Upper Silurian to (?)Lower Devonian stratigraphy of the island has been reported on in detail in dissertations by Jones (1974a), Savelle (1978), Gibling (1978), and Narbonne (1981). The geology of the Upper Cretaceous and Lower Tertiary rocks of southern Somerset Island has been described by Dineley and Rust (1968) and Dixon et al. (1973).

Present study

The author was commissioned by the Geological Survey of Canada, in 1981, to compile the final geological map sheets of the area covered by Operation Boothia. The project was later expanded to include the production of a summary stratigraphic report.

The four accompanying geological map sheets were compiled in collaboration with J.Wm. Kerr, whose annotated air photographs and field notes provided the main database. Additional map information was obtained from numerous published and unpublished stratigraphic and structural studies by geologists from the Geological Survey of Canada and the University of Ottawa. All available stratigraphic sections measured by these workers have been plotted on the geological maps (Appendix 1).

Each geological map sheet represents a composite of two or more of the original base maps used during the mapping. The four geological map sheets are named as follows from north to south, together with the names and NTS numbers of their component base maps: **Somerset Island North** (Somerset Island, NTS 58C; and parts of Resolute, NTS 58F; Maxwell Bay, NTS 58E; and Cape Clarence, NTS 58D); **Somerset Island South** (Creswell Bay, NTS 58B; and part of Fitzgerald Bay, NTS 58A); **Boothia Peninsula North** (Brentford Bay, NTS 57G; and part of Franklin Strait, NTS 67H, G); and **Boothia Peninsula Central** (Thom Bay, NTS 57F; and part of Pasley Bay, NTS 67E).

The stratigraphic report that follows is intended to provide a comprehensive summary of the stratigraphy and correlation of the various sedimentary formations defined in the report area during the course of Operation Boothia. The geology of the crystalline rocks of the Precambrian Shield, which is not discussed here, has been described by Blackadar (1967) and Kerr and deVries (1976, 1977).

Details concerning the lithology, thickness, and depositional environments of the Upper Proterozoic to Lower Tertiary formations in the report area have been abstracted entirely from earlier stratigraphic reports. The age and correlation of most of the formations have been refined, and in some cases revised, as a result of: re-evaluations of reported fossil collections, new conodont identifications from samples collected during Operation Boothia, and new stratigraphic and biostratigraphic data from neighbouring islands.

The present report incorporates and enlarges upon an earlier report by Miall and Kerr (1980), who described the Upper Cambrian to Upper Silurian stratigraphy of Somerset Island and northeastern Boothia Peninsula. The stratigraphic nomenclature employed by those authors remains unchanged, but revisions have been made in the correlation of the Upper Cambrian to Middle Ordovician part of the sequence in light of recent lithostratigraphic and biostratigraphic studies by Thorsteinsson and Mayr (in press) on Devon Island.

The Upper Silurian to (?)Lower Devonian stratigraphy of the report area has undergone considerable revision since 1975. Recent studies by Thorsteinsson and Uyeno (in Thorsteinsson, 1980) have contributed significantly to the understanding of the biostratigraphy of these rocks, and form the basis for correlations between the report area and neighbouring islands. Additional new and re-evaluated faunal evidence is reviewed in the present report in an attempt to provide a more precise evaluation of the age and correlation of the formations involved.

Acknowledgments

This report has benefited significantly from discussions with a number of workers who have been involved with the geology of the report area and adjacent areas over the past two decades: J.D. Dixon, M.R. Gibling, B. Jones, J.Wm. Kerr, U. Mayr, A.D. Miall, G.E. Reinson, R. Thorsteinsson and H.P. Trettin. In addition, J.D. Dixon, M.R. Gibling and G.M. Narbonne kindly provided the author with unpublished stratigraphic data stemming from their Ph.D. thesis work in Somerset Island. The biostratigraphic data included in this report were provided through the considerable efforts of T.T. Uyeno (conodonts), B.S. Norford (macrofossils), and D.J. McIntyre (pollen and spores).

GEOLOGICAL SETTING

Structural setting

The structural geology of the report area is dominated by Boothia Uplift (Fortier et al., 1954; Kerr and Christie, 1965; Thorsteinsson, 1980), a prominent cratonic feature projecting northward from the North American mainland, across the Arctic Platform and Franklinian Geosyncline, and under the unconformable sedimentary cover of the Sverdrup Basin (Fig. 1). The northward trend of this structural feature appears to have been controlled largely by the gneissic trends of its crystalline core, termed the Boothia Horst by Kerr (1977). This trend is approximately perpendicular to the depositional strike of the lower Paleozoic sediments contained within the Arctic Platform and the Franklinian Geosyncline.

The Boothia Horst was raised vertically in a series of pulses assigned to the Cornwallis Disturbance by Kerr (1977). Its sedimentary cover rocks were consequently deformed, giving rise to a broad anticlinorium originally named the Cornwallis Fold Belt by Thorsteinsson (1958). Due to the northward plunge of Boothia Uplift, its deepest structural levels can be observed in the report area, where the crystalline core of that structural feature is exposed.

The deformed sedimentary cover rocks that occur along the east flank of Boothia Uplift on Somerset Island and northeastern Boothia Peninsula form a broad belt characterized by block faulting, flexures, and relatively gentle folding. Their counterparts in northwestern Boothia Peninsula trend northward along the west flank of the uplift, and are exposed farther north in a comparatively narrow, folded and faulted zone in eastern Prince of Wales Island (Fig. 1). A marked asymmetry is evident in the uplift owing to the contrasting structural styles of the deformed zones on either side. Northward, these two zones merge as the crystalline core of the uplift plunges from view beneath Barrow Strait.

In western Somerset Island and northeastern Boothia Peninsula, the eastern margin of the deformed belt is marked in places by a flexure or fault across which bedrock attitudes become gently inclined eastward. Elsewhere, the degree of structural deformation simply diminishes eastward. In gross aspect, the distribution of formations on Somerset Island depicts a large, asymmetrical syncline, with the youngest formations [Late Silurian to (?)Early Devonian in age] preserved in the core. A gentle reversal of dips in central Somerset Island brings rocks as old as Early Silurian in age back to the surface in the eastern coastal cliffs of that island.

The Boothia Horst, its deformed sedimentary cover, and adjacent parts of the Arctic Platform were later fragmented by faulting during a Cretaceous-Tertiary event, named the Eurekan Rifting Episode by Kerr (1977). Kerr and deVries (1977) infer that many of the pre-existing faults in the report area were rejuvenated during this episode, and that other faults generated during that time were guided by older structures present within the Shield and its sedimentary cover.

Summary of depositional history

Generalized accounts of the history of sedimentation in areas adjacent to Boothia Uplift have been summarized by Kerr and Christie (1965), Brown et al. (1969) and Kerr (1977). Detailed analyses of the sedimentary histories of Upper Silurian to (?)Lower Devonian formations that were influenced directly by the rise of Boothia Uplift have been published by Gibling and Narbonne (1977), Miall and Gibling (1978) and Thorsteinsson (1980). The last account differs from its predecessors mainly in the interpretation of the timing and extent of the diastrophic episodes that occurred during that period. A generalized history of sedimentation in the report area follows, based on the above sources (see Table 1).

Sedimentation commenced in the report area during late Proterozoic time with deposition of the clastic sediments of the Aston Formation. After consolidation, these sediments were intruded, uplifted and eroded. The dolomitic rocks of the Hunting Formation were later deposited, partly unconformably on the Aston Formation, and partly nonconformably on crystalline Shield rocks. A second tectonic event involving folding and intrusion followed, and the Hunting Formation was eroded. These unnamed tectonic events were attributed by Kerr (1977) to possible arching along the present axis of Boothia Uplift during late Proterozoic time.

TABLE 1

Table of formations, Somerset Island and northern Boothia Peninsula

AGE	FORMATION AND THICKNESS (m)		LITHOLOGY
LOWER TERTIARY	*EUREKA SOUND (300)*		Sandstone, minor siltstone
LOWER CRETACEOUS	*KANGUK (15 +)*		Shale
Unconformity			
UPPER SILURIAN OR LOWER DEVONIAN	*PEEL SOUND, upper part (120)*		Conglomerate
Unconformity(?)			
UPPER SILURIAN	*PEEL SOUND, lower part (480)*		Sandstone, conglomerate, siltstone
	SOMERSET ISLAND (150-400 +)		Dolostone, limestone, siltstone
	DOURO (172-275)		Limestone, dolomitic limestone
	CAPE STORM (125-405)		Dolostone, minor limestone, sandstone
LOWER TO UPPER SILURIAN	*CAPE CRAUFORD (580)*		Dolostone, dolomitic limestone, gypsum, anhydrite
UPPER ORDOVICIAN TO UPPER SILURIAN	*ALLEN BAY (381-1000 +)*		Dolostone, minor sandstone
Unconformity(?)			
UPPER ORDOVICIAN	*IRENE BAY (8-43)*	CORNWALLIS GROUP	Limestone, dolomitic limestone, shale
	THUMB MOUNTAIN (25-115)		Limestone, calcareous dolostone
Unconformity			
MIDDLE ORDOVICIAN	*BAY FIORD (6-196)*		Dolostone, minor anhydrite
LOWER TO MIDDLE ORDOVICIAN	*SHIP POINT (64-247)*		Dolostone, minor sandstone
LOWER ORDOVICIAN	*TURNER CLIFFS, Upper member (85-169 +)*		Dolostone
UPPER CAMBRIAN TO LOWER ORDOVICIAN	*TURNER CLIFFS, Lower member (196-250)*		Dolostone, lesser sandstone
Unconformity			
NEOHELIKIAN	*HUNTING (1159-?2134 +)*		Dolostone, minor siltstone, shale, sandstone
Unconformity			
NEOHELIKIAN	*ASTON (530-762 +)*		Sandstone, minor siltstone, rare shale
Nonconformity			
ARCHEAN-APHEBIAN			Metamorphic and intrusive rocks

GSC

Paleozoic sedimentation commenced in the report area by Late Cambrian time, as initially clastic, and later predominantly carbonate, sediments encroached over cratonic crystalline rocks containing structurally depressed assemblages of Proterozoic sedimentary and intrusive rocks. A long period of sedimentation, spanning Late Cambrian through Late Silurian time followed, during which a predominantly carbonate succession was deposited in the report area. Sedimentation was more or less continuous, except for a major Middle Ordovician hiatus probably caused by widespread uplift of the Arctic Platform, with the amount of displacement increasing southward toward the Precambrian Shield (Table 3). In all, eight predominantly carbonate formations were deposited in the report area before Boothia Uplift was raised during the Cornwallis Disturbance. The latter event caused a major and permanent change in the patterns of sedimentation that had persisted for more than 100 million years.

The initial rise of Boothia Uplift during Late Silurian (late Ludlovian) time created a topographically high area along the western edge of the report area. Increasing amounts of clastic detritus were shed into the flanking basins during deposition of the Somerset Island and Peel Sound formations and their equivalents in eastern Prince of Wales Island. The sedimentary cover of the central part of Boothia Uplift was stripped away, exposing crystalline rocks of the Boothia Horst beneath. At first, these movements affected only the region south of Barrow Strait, but by Early Devonian (late Lochkovian) time crustal movements commenced north of the strait, as indicated by the presence of coarse clastics of that age in eastern Cornwallis Island (Thorsteinsson, 1980). No definite evidence is available to indicate when diastrophism ceased in the report area, but Thorsteinsson (*op. cit.*) has published evidence suggesting that crustal movements there probably terminated before Zlichovian time.[1] As no Paleozoic sediments younger than about Late Silurian or, possibly, Early Devonian age are preserved in the report area, no definite statement can be made regarding how long Paleozoic sedimentation continued there. However, transported Middle to Upper Devonian vertebrate remains and Carboniferous palynomorphs have been recovered from the Lower Tertiary Eureka Sound Formation of Somerset Island and northern Boothia Peninsula (Dineley and Rust, 1968; W.S. Hopkins, unpubl. rept., 1977), suggesting that formations of those ages were at one time present.

The Upper Cretaceous to Lower Tertiary sedimentary history of the report area is recorded in isolated, fault-bounded outliers containing the Kanguk and Eureka Sound formations. The Kanguk Formation, which has only been identified at a single locality in southern Somerset Island, is representative of a period of widespread, marine, fine clastic sedimentation during Late Cretaceous time. Its stratigraphic relationship with the Eureka Sound Formation in the report area is not known, but elsewhere in the Arctic Islands it is overlain conformably by the latter formation (Van Dyck, 1981). The deposition of the mainly sandstone Eureka Sound Formation during Early Tertiary (Paleocene) time marked the commencement of dominantly continental sedimentation in areas as far south as northwestern Boothia Peninsula.

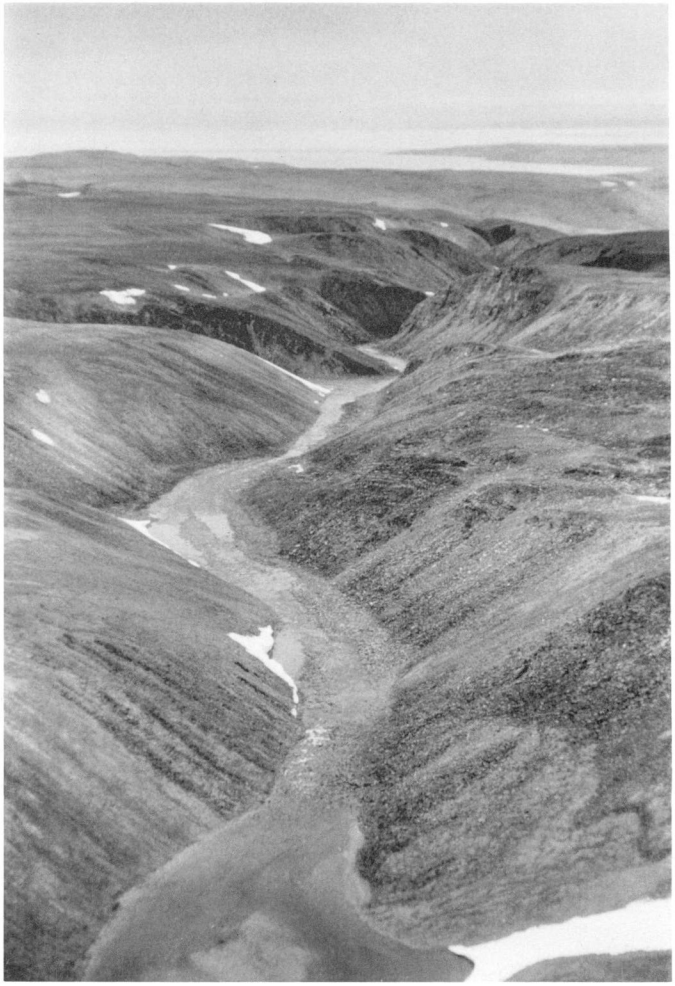

Figure 2. *Stream exposure of the Aston Formation south of Aston Bay, northwestern Somerset Island. Aston Bay and the light coloured dolostones of the Hunting Formation appear in the background. ISPG photo. 1981-1.*

Sedimentation during this period may have occurred partly contemporaneously with faulting that was active during the Eurekan Rifting Episode (Kerr, 1977).

The Kanguk and Eureka Sound formations are best known from the Sverdrup Basin (Fig. 1). The presence of these formations in the report area attests to the extremely widespread nature of Late Cretaceous to Early Tertiary sedimentation in the present area of the Canadian Arctic Archipelago.

[1]The exact timing and extent of the diastrophic episodes affecting Boothia Uplift during Late Silurian to Early Devonian time are currently being debated. Detailed accounts of the differing interpretations have been given by Miall and Gibling (1978), Thorsteinsson (1980), and Miall (1983).

STRATIGRAPHY

Neohelikian

Aston Formation

Definition and distribution

The Aston Formation (Fig. 2) constitutes the basal part of the sedimentary column in northwestern Somerset Island. Rocks now assigned to this formation were described originally by Blackadar (in Gill, 1957), and were later formally named and described by that author (Blackadar, 1963b). The type section is located about 11 km south of Aston Bay (**Somerset Island North**).

The Aston Formation is exposed on both the east and west flanks of Boothia Uplift. In the vicinity of Aston Bay, outcrops of the formation occupy a zone 40 km in length, bordering crystalline rocks of the Precambrian Shield. The formation is absent elsewhere at the surface throughout the remainder of the report area. Outcrops of the Aston Formation are also present in a narrow zone bordering crystalline Shield rocks at Savage Point in eastern Prince of Wales Island, and on adjacent smaller islands in Peel Sound (Christie et al., 1966; Dixon et al., 1971).

Contacts and thickness

In areas where its lower contact has not been tectonically disturbed, the Aston Formation rests nonconformably on crystalline rocks of the Precambrian Shield. Where exposed, the lowermost Aston beds overlying the nonconformity are conglomeratic sandstones.

The contact between the Aston and Hunting formations was originally thought to be conformable (Blackadar, 1963b, p. 146; Tuke et al., 1966, p. 701, 702), but recent studies have confirmed Dixon's (1974) suggestion that the contact is unconformable. Three lines of evidence support this interpretation:

1. Kerr and deVries (1976) recognized that the Aston-Hunting succession is cut by two sets of intrusions, the older of which is truncated at the contact between the two formations.

2. Mapping demonstrates that the Aston Formation thins in a northwesterly direction, and that the Hunting Formation rests directly on crystalline Shield rocks in the vicinity of Cape Granite (**Somerset Island North**). This suggests that the Aston Formation is being truncated by a sub-Hunting unconformity.

3. At a single, well exposed locality, Dixon (1974) observed a 6.1 m thick conglomerate unit at the base of the Hunting Formation, the presence of which is suggestive of an erosional contact.

In the southeastern extremity of its outcrop area, the Aston Formation directly underlies Paleozoic rocks and the Hunting Formation is missing. This stratigraphic relationship arose from total removal of the latter formation by post-Hunting erosion prior to the onset of Paleozoic sedimentation in that area.

Thickness measurements of the Aston Formation are complicated by the presence of numerous faults and basic intrusions in the sections, and by lateral variation in the preserved thickness of the formation, depending on the depth of post-Aston erosion. At the type section, the formation is reported by Blackadar (1963b) to exceed 1189 m (3900 ft) in thickness, of which sediments constitute 762 m (2500 ft) of the total, and intrusive rocks the remaining 427 m (1400 ft). This is probably representative of the maximum thickness attained by the Aston Formation on Somerset Island.[1] A maximum thickness of about 800 m (approximately 530 m of sediments and 270 m of intrusive rocks) has been reported by Tuke et al. (1966) from observations made on outcrops to the northwest of the type locality, confirming that the formation thins in a northwesterly direction along strike.[2]

Lithology

The dominant rock type of the Aston Formation is a red weathering, fine- to medium-grained, silica cemented, quartz sandstone. Lesser proportions of white, pink, yellow, and purple sandstone are also present throughout. Petrographic work by Tuke et al. (1966) showed that the sandstones contain up to 10 per cent feldspar, together with small amounts of rock fragments and rare zircon. A few conglomeratic sandstones and pebble bands, containing granule- to pebble-sized material, occur locally. Sedimentary structures, chiefly trough and planar crossbedding and parallel laminae, are abundant throughout.

A thick sequence of interbedded siltstones, sandstones and shales occurs near the base of the formation, and a similar, though thinner, sequence occurs within about 100 m of its top. The siltstones are purple and contain variable proportions of quartz sand. Silty to sandy red shales are sparingly interbedded. Sandstones interbedded with these lithologies commonly contain layers of red shale clasts and rare shale lenses. Small-scale crosslamination and lesser trough and planar crossbedding are the main sedimentary structures. Exposed bedding surfaces commonly exhibit low amplitude, sinuous-crested ripples and desiccation cracks.

A distinctive and apparently unique red dolosiltite unit occurs within a few metres of the base of the formation, forming a widely recognizable marker bed (Fig. 3). The unit is 10 m thick and contains large numbers of columnar stromatolites, detailed descriptions of which have been published by Tuke et al. (1966, p. 705).

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[1]Blackadar (1963b) estimated a thickness of 2134 m (7000 ft) for the Aston Formation in the area about 13 km east of Cape Granite. Present mapping, however, shows that this estimate was made for rocks now assigned to the Hunting Formation.

[2]Stewart (in Reinson et al., 1976) reported a thickness of about 1400 m from a section located in the same area where Tuke et al. (1966) carried out their studies (UTM coordinates for this section are: base at Zone 15X VM 441400E, 8164800N; top at Zone 15X VM 440750E, 816100N). Subsequent re-evaluation of this section suggests that it is about 1300 m thick (1175 m of sediments and 125 m of intrusive rocks), but that much of it has been repeated by a fault, coinciding with a major dyke located about mid-section. The true thickness of sediments in this section, therefore, appears to be about half the original estimate (approximately 585 m), a figure which accords reasonably well with the estimate made by Tuke et al. (*op. cit.*).

Hunting Formation

Definition and distribution

The Hunting Formation is a dominantly dolomitic sequence overlying the Aston Formation and underlying the lower Paleozoic succession in northwestern Somerset Island. Rocks now assigned to the Hunting Formation were described originally by Blackadar (in Gill, 1957), and were later formally named and described by Blackadar (1963b). The type section is situated along Hunting River south of Aston Bay (**Somerset Island North**).

The main outcrop belt of the Hunting Formation occupies a broad zone bordering the south shore of Aston Bay. The formation is absent elsewhere at the surface throughout the remainder of the report area. Like the Aston Formation, the Hunting Formation was probably deposited on the present west flank of Boothia Uplift. However, subsequent erosion apparently removed almost all of the formation from that area, except for a small remnant identified by Miall (1969, p. 260, 261), 13 km north of Cape Brodie on Prince of Wales Island.

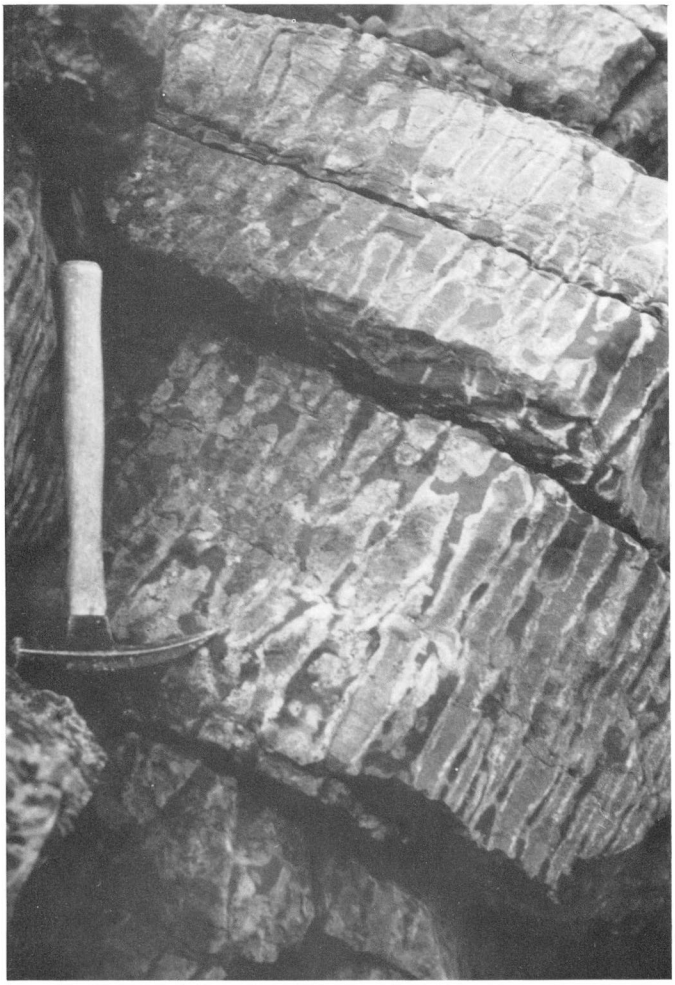


Figure 3. *Distinctive columnar stromatolite marker unit near the base of the Aston Formation, northwestern Somerset Island. ISPG photo. 1981-2.*

Contacts and thickness

Throughout most of its extent, the Hunting Formation rests unconformably on the Aston Formation, except in the vicinity of Cape Granite where it rests nonconformably on crystalline rocks of the Precambrian Shield. The upper contact of the Hunting Formation was considered by Tuke et al. (1966) to be conformable. In a later revision of the stratigraphy, however, Dixon (1974) recognized a progressive southward truncation of the formation by an unconformity at the base of the overlying Paleozoic succession. This relationship was subsequently confirmed during Operation Boothia mapping.

Thickness measurements of the Hunting Formation are complicated by probable fault repetition in certain areas, and by lateral variation in the thickness of sediments preserved beneath the sub-Paleozoic unconformity. The thickest sections of the formation are apparently preserved in the northwesternmost part of its outcrop belt. Measured sections are lacking, but reconnaissance measurements by Blackadar (1963b) suggest that the Hunting Formation may exceed 2134 m (7000 ft) in that area. A much thinner sequence is preserved in the Hunting River area, where Dixon (1974) reported a total thickness of only 1159-1373 m (3800-4500 ft) for the formation.

Lithology

Published lithological descriptions of the Hunting Formation indicate a tripartite subdivision. Dixon (1974) has provided the most complete description of the formation, and this is summarized below, together with observations made by Reinson et al. (1976).

Member 1 (153-183 m thick) is composed mainly of thin to medium bedded, buff-grey (locally purple) dolostone and silty dolostone, succeeded upward by interbedded dolostone and fissile dolostone (Fig. 4). Stromatolitic dolostone is common locally. The base of the member is marked by conglomerate, siltstone, sandstone and sandy dolostone, all of which commonly exhibit contorted and convoluted bedding.

Member 2 (519-586 m thick) is characterized by bluish grey to grey laminated dolostone interbedded with laminated chert and cherty dolostone. The last rock type contains columnar and domal stromatolites, and may be composed of up to 50 per cent chert. The conspicuous banded appearance of Member 2 is visible on air photographs.

Member 3 (488 m thick) comprises a number of dolostone types, together with minor proportions of sandstone and red to buff coloured shale. The main dolostone types include stromatolitic dolostone, intraformational dolostone breccia, massive dolostone, and planar and crosslaminated dolostone. A distinctive colour banding is imparted by alternating beds of red to purplish red dolostone and grey to bluish grey or buff dolostone. The siliciclastic content of the member increases upwards, and red sandstone and siltstone units appear in its uppermost part.

Figure 4. *Lower part of Member 1 of the Hunting Formation south of Aston Bay, northwestern Somerset Island; showing interbedding of purple, sandy siltstone with light coloured sandy dolostone. Dolostones of the Hunting Formation form the background. View to the north. ISPG photo. 827-68.*

Age and correlation of the Aston and Hunting formations

Kerr and deVries (1976) recognized two sets of dykes, sills and plugs intruding the Aston and Hunting formations. The older set intrudes only the Aston Formation, and is truncated by the sub-Hunting unconformity. The younger set intrudes both formations, and is truncated by the sub-Paleozoic unconformity.

On the basis of paleomagnetic studies conducted on Somerset and Prince of Wales islands, Jones and Fahrig (1978) concluded that the older set of intrusions was emplaced during the Mackenzie Igneous Event, during which widespread igneous activity occurred in relation to continent-wide tensional tectonics dated between 1260 and 1190 Ma (Fahrig and Jones, 1969; Patchett et al., 1978; Fahrig et al., 1981). Jones and Fahrig (*op. cit.*) assigned the younger set of intrusions to the Franklin Igneous Event, dated by Christie and Fahrig (1983) at *c.* 750 Ma. The minimum ages indicated by three samples processed by the Geochronological Laboratories of the Geological Survey of Canada following Operation Boothia, are consistent with this age assignment. The sample identification numbers and ages are as follows: (1) GSC loc. C-45962, 644 ± 19 Ma; (2) GSC loc. C-45955, 673 ± 16 Ma; and (3) GSC loc. C-45959: 661 ± 19 Ma.

The age of the older set of intrusions indicates that deposition and consolidation of the Aston Formation were completed by Neohelikian time (terminology of Stockwell, 1982). The age brackets provided by the two sets of intrusions indicate either a Neohelikian or Hadrynian age for the Hunting Formation.

Correlations with Baffin Island suggest that the Aston and Hunting formations are both entirely Neohelikian in age. In a recent synthesis of the Proterozoic geology of northern Baffin Island, Jackson and Iannelli (1981) concluded that several basins developed penecontemporaneously by rifting along the northwestern edge of the Canadian-Greenlandic Shield about 1.20-1.25 Ga. They suggested that the Aston and Hunting formations were deposited at the western end of one of these basins, the Borden Basin, while sediments assigned to the Bylot Supergroup were accumulating at the eastern end of the basin.[1] The Aston Formation was correlated by Jackson and Iannelli with the lithologically similar Nauyat and Adams Sound formations (Table 2). The Nauyat Formation is firmly dated as Neohelikian in age on the basis of isotopic ages obtained from associated tholeiitic basalt flows. The Hunting Formation was correlated with the lithologically similar Society Cliffs Formation, which was also inferred by Jackson and Ianelli (*op. cit.*) to be of Neohelikian age. Equivalents of the intervening Fabricius Fiord and Arctic Bay formations of northern Baffin Island do not appear to be represented on Somerset Island: these were probably removed by pre-Hunting erosion.

Upper Cambrian to Lower Ordovician

Turner Cliffs Formation

Definition, distribution, contacts and thickness

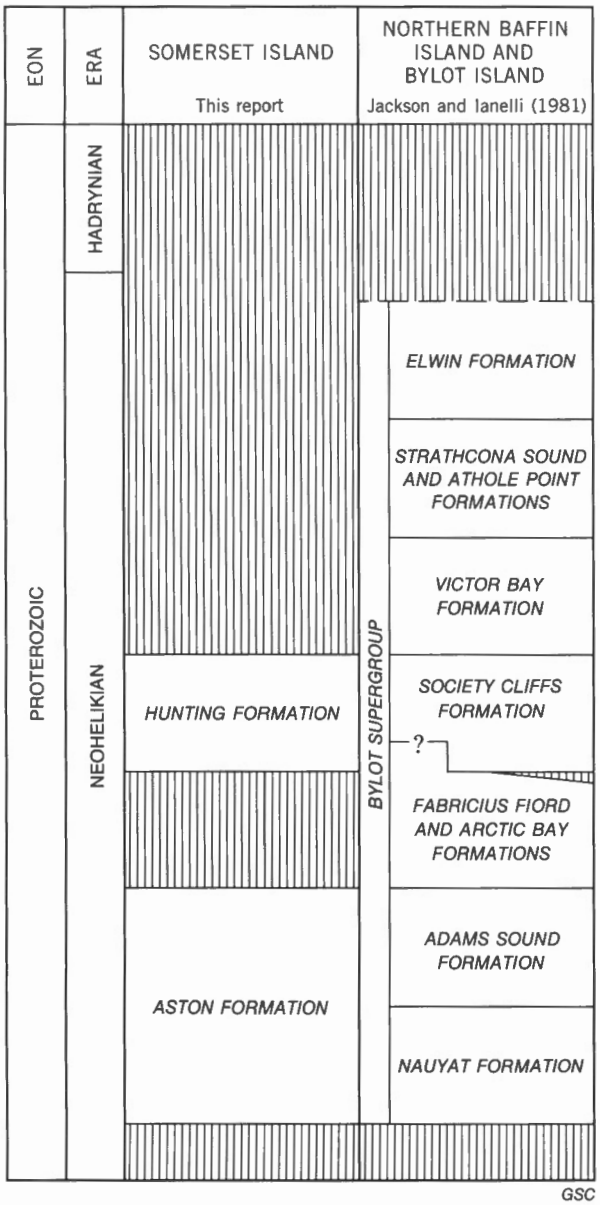
The Turner Cliffs Formation is a dolomitic and clastic succession named by Blackadar (1956) from a type locality situated on the east side of Admiralty Inlet in northwestern Baffin Island. Detailed descriptions of the formation were later published by Lemon and Blackadar (1963) and Trettin (1969), and the formation was redefined by Trettin (1975). At its type locality, the Turner Cliffs Formation is underlain by the Gallery Formation and overlain by the Ship Point Formation.

In a regional well study, Mayr (1978) correlated the lowermost formation penetrated by the Panarctic Deminex Garnier O-21 well (Sec. 34; **Somerset Island North**) with the Turner Cliffs Formation. Miall and Kerr (1980) applied this formational name to the lowermost part of the Paleozoic succession exposed throughout western Somerset Island and northern Boothia Peninsula. These authors subdivided the formation into a lower, variegated dolomitic and clastic member, and an upper, resistant, chert-bearing, dolostone member.

[1]A somewhat different geological history of the area was inferred by Geldsetzer (1973), who suggested that the Proterozoic sediments in northern Baffin Island were deposited on a stable shelf, and that they were later preserved in discrete areas due to downfaulting. Their equivalents on Somerset Island would also have been deposited on the same shelf. Whichever model of sedimentation is correct, the correlations noted above remain unchanged.

TABLE 2

Correlation of Proterozoic formations on Somerset, Baffin and Bylot islands



The Turner Cliffs Formation unconformably overlies the Proterozoic Aston and Hunting formations south of Aston Bay (**Somerset Island North**), and nonconformably overlies crystalline rocks of the Precambrian Shield throughout the remainder of the report area. Its upper contact with the overlying Ship Point Formation is conformable.

The Turner Cliffs Formation ranges in thickness from 307 m at Hunting River (Sec. 41; **Somerset Island North**) to 360 m at Lang River (Sec. 94; **Somerset Island South**). The Lower member has a minimum thickness of 196 m at Hunting River (Sec. 40), and a maximum thickness of 250 m at Lang River (Sec. 94). The Upper member is quite variable in thickness, ranging from 85 m at Hunting River (Sec. 37) to more than 169 m in the Creswell Bay area (Sec. 76; **Somerset Island South**). Lithologically similar rocks assigned to the uppermost part of the Turner Cliffs Formation in the Garnier O-21 well total 40.8 m in thickness (Mayr, 1978).

Lithology

According to Miall and Kerr (1980, p. 5, 6), the Lower member is dominantly dolomitic in character, and contains vertically and laterally variable proportions of stromatolitic, oolitic, and pelletoidal dolostone and massive dolostone. Units of intraformational conglomerate and breccia are reported to be very common. Quartzose or argillaceous sandstone units commonly occur in the basal part of the formation. Most units are thin bedded to finely laminated, and platy to slabby weathering. The succession is interpreted to have been deposited under shallow subtidal to intertidal conditions.

The Upper member was described by Miall and Kerr (*op. cit.*) as a distinctive, resistant, massive, chert-bearing dolostone. Section descriptions by these authors and by Dixon (1973a) show that other, subordinate rock-types are present at some localities, including intraclast breccia and thin bedded, laminated dolostone and sandy dolostone. The member is interpreted as having been deposited mainly under relatively deep water, subtidal conditions.

Age of the Lower member

The oldest fossil known from the Turner Cliffs Formation is the conodont *Proconodontus muelleri muelleri* Miller, collected 150.5 m above the base of the formation and 67 m below the top of the Lower member (GSC loc. C-60638; see Appendix 3). The presence of this taxon suggests a Late Cambrian (Trempealeauan) age (C.R. Barnes, unpubl. rept., 1977). Commenting on the same taxon collected from the Cass Fjord Formation in southeastern Ellesmere Island, Barnes (in Thorsteinsson and Mayr, in press) states that the "*P. muelleri muelleri* Zone occurs in the lowermost part of Fauna A of Ethington and Clark (1971)".

There is no direct evidence to suggest the age range of the considerable thickness of undated strata underlying GSC locality C-60638. The only evidence as to the age of the basal Paleozoic succession in nearby areas comes from trilobite collections from strata 20 and 40 m above the base of the Boothia Felix Formation in southern Boothia Peninsula (Christie, 1973). Palmer et al. (1981) have assigned this fauna to the *Crepicephalus* Zone of middle Dresbachian (early Late Cambrian) age. The stratigraphic relationship between the Boothia Felix and Turner Cliffs formations will be discussed in detail in the next section.

The Lower member ranges upward in age into the Tremadocian (early Early Ordovician). Conodonts from the uppermost part of that member, in Section 98 (GSC loc. C-60709; see Appendix 3), were assigned by Barnes (unpubl. rept., 1977) to Fauna B and the lower part of Fauna C of Ethington and Clark (1971).

Correlation of the Lower member

Miall and Kerr (1980) discussed correlation of the basal Paleozoic stratigraphy in the report area with two stratigraphic successions defined by earlier workers in adjacent areas: the Boothia Felix - Netsilik succession defined in southern Boothia Peninsula by Christie (1973), and the Gallery - Turner Cliffs succession described in northern Baffin Island by Trettin (1969, 1975). A recently completed stratigraphic study of Devon Island by Thorsteinsson and Mayr (in press) has since provided a clearer understanding of lower Paleozoic Arctic Platform sedimentation in the general area. Re-evaluation of presently available data suggests that the Lower member of the Turner Cliffs Formation, as defined in the report area, is correlative with the Boothia Felix - Netsilik succession in southern Boothia Peninsula, and with the Cass Fjord Formation on Devon Island. The basis for this correlation is discussed below. Correlations between the report area and Baffin Island will be considered later in a separate section.

Lower Paleozoic sedimentation commenced in southern Boothia Peninsula at least as early as Dresbachian time, as demonstrated by the presence of *Crepicephalus* Zone trilobites in the lower Boothia Felix Formation. There is no direct evidence to suggest the age of the lowermost Turner Cliffs Formation in the report area, but it is probably significant that a substantial thickness of undated strata underlies the stratigraphic level dated as Trempealeauan in age by conodonts from GSC locality C-60638. Biostratigraphic data from other areas suggest that the basal Turner Cliffs Formation might be as old as Dresbachian in age. In Greenland, Dresbachian (*Crepicephalus* Zone) trilobites have been recovered from the Cass Fjord Formation (A.R. Palmer, in Henriksen and Peel, 1976), and that formation is now known to range downward into the late Middle Cambrian (Palmer and Peel, 1981). On this basis, Thorsteinsson and Mayr (in press) interpreted a similar lower age limit for the Cass Fjord Formation on Devon Island and southeastern Ellesmere Island. In the Panarctic Deminex Cornwallis Central Dome K-40 well on Cornwallis Island, a trilobite fauna, dated tentatively as Dresbachian in age (W.H. Fritz, in Brideaux et al., 1975), has been collected from the lowest Cass Fjord strata penetrated. This evidence for sedimentation dating from at least Dresbachian time, in areas northeast, north, and south of the report area strongly suggests that the basal Turner Cliffs Formation should be of a similar age. The base of that formation is, therefore, tentatively correlated with the base of the Boothia Felix Formation.

Miall and Kerr (1980) provided evidence that the age of the Netsilik Formation is restricted to the older part of the Early Ordovician, and that the Netsilik both correlates with, and is traceable into the Turner Cliffs Formation of the report area. It is further apparent that the Netsilik Formation is correlative with the upper part of the Lower member of the Turner Cliffs Formation, as is suggested by the stratigraphic relationships at Abernethy River (Sec. 98; **Boothia Peninsula North**). There, equivalents of the Netsilik Formation are present beneath a section of blocky weathering dolostones equivalent to the Franklin Strait Formation, as recognized by Christie (1973) farther north at Lost River (Sec. 95). The base of the dolostones corresponds to the division between the lower and upper members of the Turner Cliffs Formation, as defined by Miall and Kerr (*op. cit.*). Thus, at that locality, the top of the Netsilik Formation corresponds with the top of the Lower member of the Turner Cliffs Formation, and the lower part of the Franklin Strait Formation (which will be discussed later in a separate section) corresponds with the Upper member of the Turner Cliffs Formation.

The above discussion suggests that the Boothia Felix - Netsilik succession and the Lower member of the Turner Cliffs Formation represent two stratigraphically equivalent packages of rocks, ranging from Dresbachian to Tremadocian in age. Physical stratigraphic evidence also supports this correlation. The Boothia Felix - Netsilik succession and the Lower member of the Turner Cliffs Formation are very similar in gross lithology (see detailed descriptions by Christie, 1973, and Miall and Kerr, 1980), and are comparable in thickness (about 240 m for the former, and an average of 225 m for the latter). Moreover, both sequences lie between the sub-Paleozoic unconformity and a distinctive, resistant, chert-bearing dolostone.

The Lower member of the Turner Cliffs Formation and its stratigraphic equivalents in southern Boothia Peninsula appear to correlate lithologically and to some extent chronologically with the Cass Fjord Formation on Devon Island and adjacent parts of the Arctic Platform. The Cass Fjord Formation, as described on Devon Island by Thorsteinsson and Mayr (in press), is a variegated dolomitic and clastic succession, very similar in gross lithology to the Lower member of the Turner Cliffs Formation. Correlations with Greenland strata suggest that the base of the Cass Fjord Formation might be slightly older (late Middle Cambrian) than the base of the Turner Cliffs Formation, which, if true, could indicate that sedimentation commenced earlier in the north and encroached southward into the report area by Dresbachian time. Conodonts from the top of the Cass Fjord Formation on Devon Island are reported by Thorsteinsson and Mayr (*op. cit.*) to be referable to Fauna A or possibly Fauna B of Ethington and Clark (1971), while the overlying Cape Clay Formation contains conodonts restricted to Fauna C. This suggests that the contact between these two formations is approximately equivalent in age to the division between the lower and upper members of the Turner Cliffs Formation in the report area (Table 3).

The foregoing suggests that there are striking similarities between the Cass Fjord Formation and the Lower member of the Turner Cliffs Formation. As a result, it is considered probable that future mapping and stratigraphic studies will indicate the desirability of extending the term "Cass Fjord" into the present report area. This has already been done in the case of the Garnier O-21 well by Mayr et al. (1980).

Age of the Upper member

The only direct evidence as to the age of the Upper member comes from a single conodont collection recovered from the stratigraphic interval assigned by Mayr (1978) to the uppermost Turner Cliffs Formation in the Garnier O-21 well (GSC loc. C-30875, 1847.1-1865.4 m; see Appendix 3). Tipnis and Barnes (in Mayr et al., 1980) referred the collection to Fauna C of Ethington and Clark (1971), indicating a late Tremadocian age.

No conodonts have been recovered from the Upper member as defined in western Somerset Island and northern Boothia Peninsula by Miall and Kerr (1980). However, collections have been made from stratigraphic levels immediately below and above the contacts of the member. As was mentioned previously, conodonts from the uppermost part of the Lower member in Section 98 (GSC loc. C-60709) have been assigned a late Tremadocian age (upper part of Fauna B and lower part of Fauna C of Ethington and Clark, 1971). Conodonts from the basal Ship Point Formation in Section 94 (GSC loc. C-60596; see Appendix 3) have been assigned a late Canadian (Arenigian) age by Barnes (unpubl. rept., 1977).

TABLE 3

Stratigraphic correlation, Somerset Island, northern Boothia Peninsula, and adjacent areas

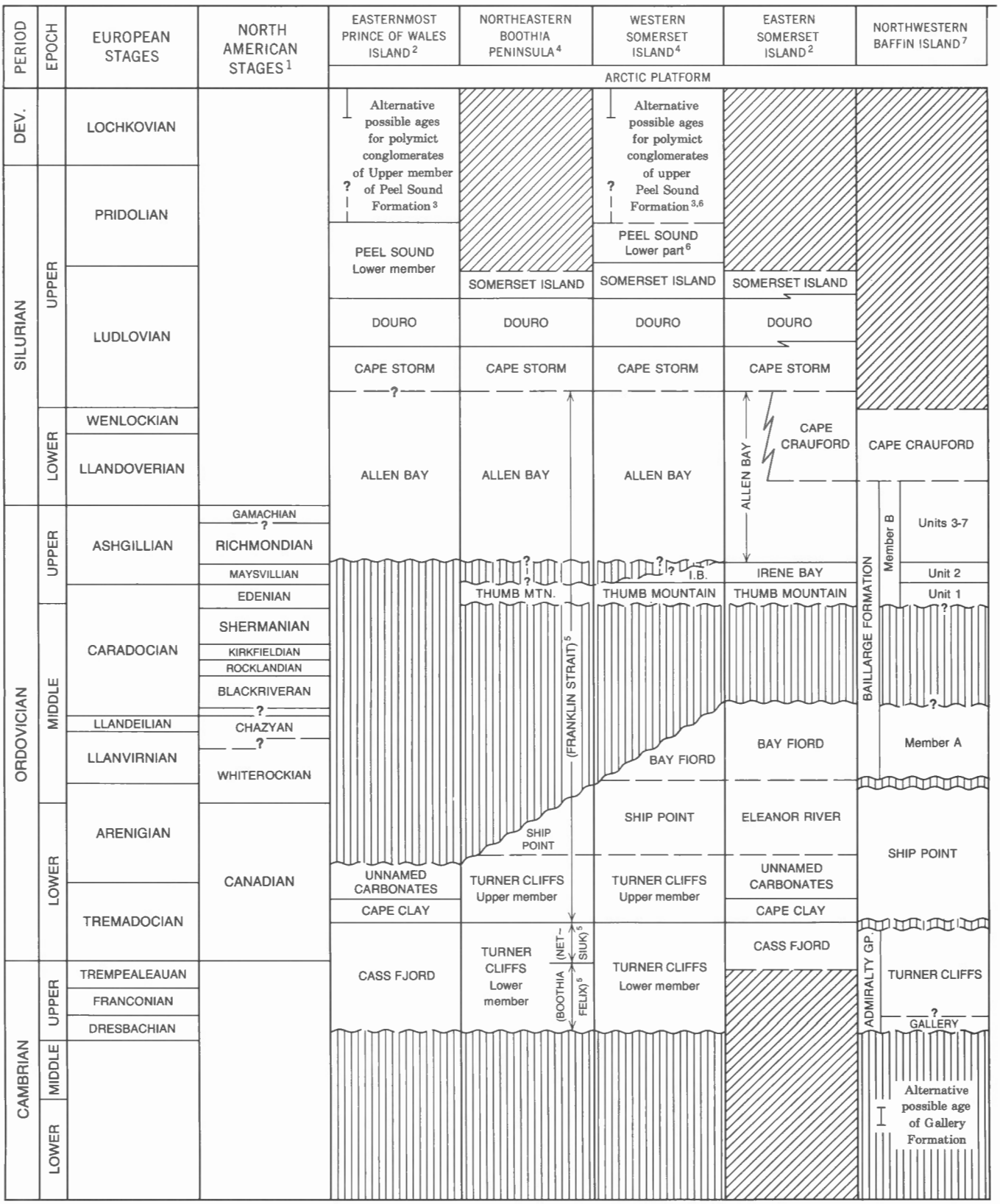
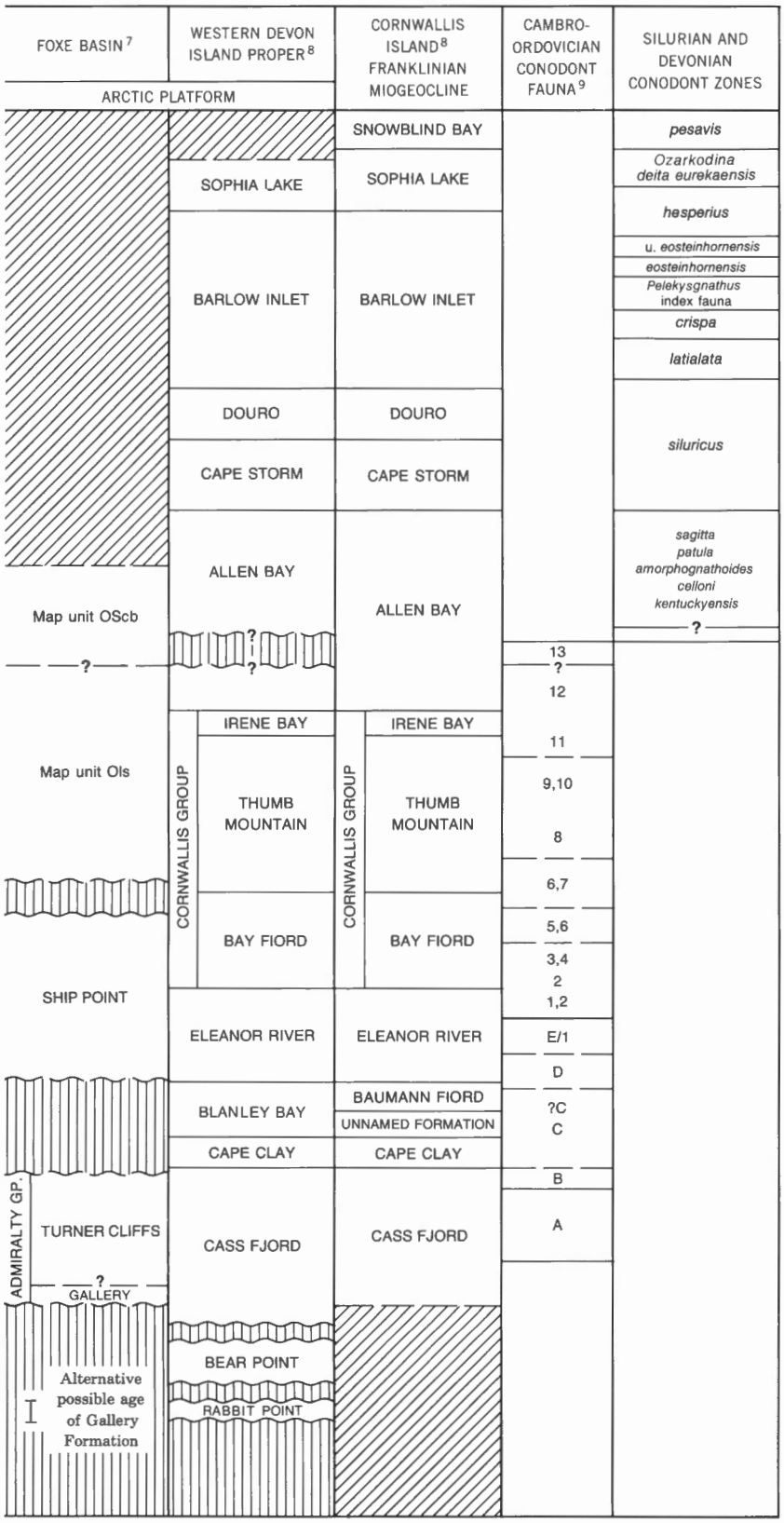


TABLE 3 (cont.)



LEGEND

Unconformity between formations

Interval not exposed, or removed by later erosion

Conformable contact

Conformable contact (precise age uncertain)

Conformable contact (assumed)

Unconformable contact

Unconformable contact (precise age uncertain)

Possible unconformable contact

SOURCES OF INFORMATION

1. After Barnes et al. (1981)
2. Modified from Mayr et al. (1980)
3. Older and younger ages as interpreted by Miall (1983) and Thorsteinsson (1980) respectively
4. This report, modified from Miall and Kerr (1980)
5. Formation defined by Christie (1973), showing stratigraphic position inferred in the present report
6. Lower and upper parts of the Peel Sound Formation refer respectively to Members 1-3 and Member 4, as defined in the Cape Anne Syncline in northwestern Somerset Island
7. Modified from Trettin (1975)
8. After Thorsteinsson and Mayr (in press)
9. After Nowlan (1976)

GSC

From the above two collections, it can be inferred that the Upper member, as defined in outcrop by Miall and Kerr (*op. cit.*), ranges from late Tremadocian to Arenigian in age (Fauna C to at least the lower part of Fauna D, and possibly slightly younger). In Table 3, the upper age boundary of the member has been arbitrarily placed at the level of the lower part of Fauna D, although it is emphasized that the precise position of this boundary is not well established on the basis of available evidence.

Correlation of the Upper member

Miall and Kerr (1980) correlated the Upper member of the Turner Cliffs Formation, as defined by them in outcrop, with a lithologically similar, chert-bearing, dolostone unit assigned originally by Mayr (1978) to the uppermost Turner Cliffs Formation in the Garnier O-21 well. A different correlation is, however, suggested here on the basis of new stratigraphic and biostratigraphic data from Devon Island.

On Devon Island, the Cass Fjord Formation is overlain by the Cape Clay and Blanley Bay formations (Thorsteinsson and Mayr, in press; see Table 3). The Cape Clay Formation was defined originally in Greenland by Poulsen (1927). On Devon Island, it is represented by a thin (65 m thick) succession of thick to massive bedded, chert-bearing dolostone or dolomitic limestone, and is late Tremadocian in age (restricted to Fauna C of Ethington and Clark, 1971). According to Thorsteinsson and Mayr (*op. cit.*), the overlying Blanley Bay Formation is a dominantly dolostone and sandstone succession with local gypsum. It is Tremadocian to Arenigian in age (faunas C to D of Ethington and Clark, 1971), and is overlain by the Eleanor River Formation (Table 3).

In the Garnier O-21 well, the chert-bearing dolostone originally assigned by Mayr (1978) to the uppermost Turner Cliffs Formation was reassigned to the Cape Clay Formation by Mayr et al. (1980). This thin (40.8 m), lithologically distinctive unit strongly resembles the Cape Clay Formation as developed elsewhere in the Arctic Platform, and, furthermore, has been shown to contain a conodont taxon restricted to Fauna C of Ethington and Clark (1971). On this basis, the correlation proposed by Mayr et al. (*op. cit.*) has been accepted in the present report.

The lower part of the Ship Point Formation, as defined originally by Mayr (1978) in the Garnier O-21 well, was reassigned by Mayr et al. (1980) to an unnamed carbonate sequence consisting mainly of dolostone, sandy dolostone, dolomitic sandstone and minor anhydrite. Stratigraphic equivalents of this succession in the KMG Decalta Young Bay F-62 well on Prince of Wales Island have yielded conodonts assignable to Fauna D (Tipnis and Barnes, in Mayr et al., 1980). The unnamed carbonates are probably correlative with the Blanley Bay Formation (Table 3), although this correlation remains tentative, as the precise age limits of the former sequence have not been established.

It was inferred earlier that the Upper member of the Turner Cliffs Formation, as defined in outcrop by Miall and Kerr (1980), ranges from late Tremadocian to Arenigian in age (Fauna C to at least the lower part of Fauna D, or slightly younger). It therefore appears to equate chronologically with at least the combined Cape Clay and Blanley Bay formations on Devon Island, and probably also with the combined Cape Clay Formation and unnamed carbonate sequence in the Garnier O-21 well (Table 3). These stratigraphic relationships, if correct, suggest that the unnamed carbonates present in the subsurface of northeastern Somerset Island pass westward into a lithology more typical of the underlying Cape Clay Formation. As a result, the two-fold subdivision evident in the subsurface is not readily recognizable in outcrop in the western part of the report area.

Lower to Middle Ordovician

Ship Point Formation

Definition, distribution, contacts and thickness

The Ship Point Formation is a dominantly dolomitic succession named by Blackadar (1956) from field studies in northwestern Baffin Island. The type section is located near Ship Point on the east side of Admiralty Inlet. Detailed descriptions of the formation were later published by Lemon and Blackadar (1963) and Trettin (1969), and the formation was redefined by Trettin (1975) to include strata previously assigned to the underlying Turner Cliffs Formation. In northwestern Baffin Island, the Ship Point Formation is overlain disconformably by the Baillarge Formation (Trettin, 1975; see Table 3).

Mayr (1978) recognized correlatives of the Ship Point Formation in the Garnier O-21 well in northeastern Somerset Island. Miall and Kerr (1980) subsequently applied this formational name to the dominantly dolomitic succession lying between the Turner Cliffs and Bay Fiord formations in western Somerset Island (Table 3). The Ship Point Formation is exposed along the eastern flank of Boothia Uplift throughout most of Somerset Island, and was interpreted by Miall and Kerr (*op. cit.*, p. 7) to be absent south of Lang River (Sec. 94; **Somerset Island South**) as a result of erosional truncation.

According to Miall and Kerr (1980), both the lower and upper contacts of the Ship Point Formation are conformable. The lower contact was placed at the level where the distinctive, massive bedded dolostones of the upper member of the Turner Cliffs Formation pass upward into the thin to medium bedded dolostones of the Ship Point Formation. The contact between the Ship Point and Bay Fiord formations was drawn at the base of a distinctive, grey-green, fissile dolostone.

As defined, the Ship Point Formation has a maximum thickness of 210-247 m in the area of Hunting River (secs. 41 and 40 respectively; **Somerset Island North**). The formation thins rapidly southward to only 64 m north of Creswell Bay (Sec. 46; **Somerset Island South**). A partially eroded section, 40 m thick, is present at Lang River (Sec. 94). Apparently correlative strata, assigned by Mayr et al. (1980) to the Eleanor River Formation in the Garnier O-21 well, total 62.4 m in thickness.

Lithology

According to Miall and Kerr (1980, p. 7), the dominant rock type in the Ship Point Formation is thin to medium bedded dolostone with rare chert nodules. Mature quartzose sandstone is present at the base of the formation near Aston Bay (Sec. 31; **Somerset Island North**), and is locally present at other stratigraphic levels in most areas. Other locally

common rock types include intraformational dolostone breccia, stromatolitic dolostone, bioclastic and bioturbated dolostone, and dolomitized oolite. The apparently equivalent Eleanor River Formation in the Garnier O-21 well consists of relatively pure, dominantly finely crystalline dolostone interbedded with lime mudstone, and contains minor amounts of anhydrite and shale in its upper part (Mayr, 1978).

The Ship Point Formation was deposited under shallow subtidal to intertidal conditions.

Age and correlation

Conodonts from the basal bed of the Ship Point Formation (GSC loc. C-60596; see Appendix 3) at Lang River (Sec. 94) have been identified by Barnes (unpubl. rept., 1977) who concluded that the fauna indicates a late Canadian (Arenigian) age.

As no fossils have been collected from other parts of the Ship Point Formation, its upper age boundary must be inferred from biostratigraphic data available from the lowermost part of the overlying Bay Fiord Formation. A conodont collection from that stratigraphic level in Section 46 (GSC loc. C-60645; see Appendix 3) was referred by Barnes (unpubl. rept., 1977) to faunas 2-4 of Sweet et al. (1971), indicating that the base of the Bay Fiord Formation is about late Whiterockian in age. Thus, the uppermost Ship Point Formation may contain rocks as young as Whiterockian in age, assuming that its upper contact is conformable.

The Ship Point Formation is tentatively correlated with the Eleanor River Formation in this report (Table 3). The latter formation was defined by Thorsteinsson (1958) on Cornwallis Island, where it is represented by a predominantly limestone succession with subordinate dolostone. According to Thorsteinsson and Mayr (in press), the Eleanor River Formation ranges from late Canadian to early Whiterockian in age (Fauna D of Ethington and Clark, 1971, to faunas 1 or 2 of Sweet et al., 1971) on Devon Island.

Middle Ordovician

Bay Fiord Formation

Definition, distribution, contacts and thickness

The Bay Fiord Formation named by Kerr (1967a, b) incorporates a predominantly carbonate and anhydrite sequence and constitutes the lowermost of the three formations now assigned to the Cornwallis Group. The type section of the formation is situated about 30 km north of Irene Bay on Ellesmere Island. The Bay Fiord Formation is widely distributed in the Franklinian Miogeocline, and has been identified in the Arctic Platform on Devon and Somerset islands (Thorsteinsson and Mayr, in press; Miall and Kerr, 1980). The lithologically similar Member A of the Baillarge Formation in northwestern Baffin Island has been correlated with the Bay Fiord Formation by Trettin (1969) and Mayr (1978).

The Bay Fiord Formation is exposed in western Somerset Island from the Aston Bay area (**Somerset Island North**) southward to the Creswell Bay area (**Somerset Island South**). The absence of the formation south of Creswell Bay is attributed by Miall and Kerr (1980) to erosional truncation. The Bay Fiord Formation has also been identified by Mayr et al. (1980) in the Garnier O-21 well (Sec. 34) in northeastern Somerset Island.

Both the lower and upper contacts of the Bay Fiord Formation are sharply defined in the report area. The lower contact is conformable, and is placed at the level where the moderately resistant, thin to medium bedded dolostones of the Ship Point Formation pass upward into the relatively recessive, green-grey, fissile dolostones characteristic of the Bay Fiord Formation. The top of the Bay Fiord Formation is marked by a major regional disconformity.

Reconnaissance measurements near Section 41 (**Somerset Island North**) suggest that the Bay Fiord Formation attains a maximum thickness of about 120 m in the Hunting River area. The formation thins southward toward the Creswell Bay area, where it ranges in thickness from as little as 6 m at Section 46 to 45 m at Section 78. In the Garnier O-21 well, the Bay Fiord Formation is 196.3 m thick (Mayr et al., 1980).

Lithology

In western Somerset Island, the Bay Fiord Formation is composed mainly of recessive, dark grey or greenish grey, fissile dolostone (Miall and Kerr, 1980). Subordinate intraformational breccia, ripple-laminated dolostone and oolitic dolostone have also been recorded. In the Garnier O-21 well, this stratigraphic interval contains interbedded, medium grey-brown, partly argillaceous, very fine to finely crystalline dolostone, green-black shale, and minor anhydrite (Mayr, 1978).

The Bay Fiord Formation is interpreted to have been deposited mainly in a shallow water, restricted environment, and possibly partly under temporary supratidal conditions (Miall and Kerr, *op. cit.*).

Age and correlation

The oldest conodonts recovered from the Bay Fiord Formation on Somerset Island suggest that its base is late Whiterockian in age. Conodonts referred by Barnes (unpubl. rept., 1977) to faunas 2-4 of Sweet et al. (1971) have been recovered from the lowermost part of the formation in Section 46 near Creswell Bay (GSC loc. C-60645; see Appendix 3), and from a similar stratigraphic position at a second locality farther south (GSC loc. C-53087).

The youngest preserved Bay Fiord strata in western Somerset Island appear to be Blackriverian in age, as indicated by conodont collections derived from immediately below the upper contact of the formation near Section 31 in the Aston Bay area (GSC loc. C-45606, 7 and 8; see Appendix 3). The collection from GSC locality C-45606 contains *Appalachignathus* sp., which has been referred by Barnes (*op. cit.*) to faunas 6-7 of Sweet et al. (1971). The other two collections contain conodonts assignable to faunas 5 and 6.

A similar age has been inferred for the uppermost Bay Fiord strata in the Garnier O-21 well in northeastern Somerset Island. Conodonts recovered from the

1396.6-1400.3 m interval in that well (GSC loc. C-29864; see Appendix 3) have been referred by Tipnis and Barnes (in Mayr et al., 1980) to faunas 6 and 7 of Sweet et al. (1971).[1]

The age range determined above for the Bay Fiord Formation on Somerset Island (late Whiterockian, faunas 2-4, to Blackriverian, faunas 6 or 7) should be considered a minimum age range in view of the fact that the upper boundary of the formation is a major disconformity. It is notable, however, that this age range corresponds closely to that reported by Thorsteinsson and Mayr (in press) for complete sections of the Bay Fiord Formation on Devon Island (Table 3). In view of this, it is inferred that complete or nearly complete sections of the Bay Fiord Formation are present near Aston Bay and in the Garnier O-21 well.

Post-Bay Fiord unconformity

Dixon (1978) suggested that the major Middle Ordovician unconformity present between the Franklin Mountain and Mount Kindle formations in the Northern Interior Plains could be traced into the platform areas of the Arctic Lowlands, and that hiatuses might be present in the Arctic Platform successions of Victoria, Prince of Wales, Somerset and Baffin islands. In the case of Somerset Island, he concluded that a Middle Ordovician hiatus could be recognized between members 1 and 2 of the Lang River Formation, as originally defined by him (Dixon, 1973a) at Lang River (Sec. 94; **Somerset Island South**). On the basis of detailed stratigraphic studies in the area, Miall and Kerr (1980) inferred that a regional post-Bay Fiord unconformity was responsible for the stratigraphic gap found in the Lang River section, and for similar gaps of varying magnitude identified in other sections situated along the eastern flank of Boothia Uplift. The same unconformity has been recognized in the subsurface of northeastern Somerset Island by Mayr et al. (1980).

Physical stratigraphic and biostratigraphic evidence suggest that the hiatus represented by the post-Bay Fiord disconformity increases in magnitude when followed from northern Somerset Island southward to Boothia Peninsula (Table 3; see Fig. 2 in Miall and Kerr, 1980). The thickest and most complete sections of the Bay Fiord Formation occur in the Garnier O-21 well (Sec. 34) and in the vicinity of Aston Bay (secs. 31 and 41, **Somerset Island North**), where conodonts as young as faunas 6-7 of Sweet et al. (1971) have been recovered from the uppermost part of the formation. Near Creswell Bay (Sec. 46, **Somerset Island South**), the formation is markedly thinner (6 m), and the recovery from that locality of conodonts no younger than faunas 2-4 suggests that only the basal part of the Bay Fiord Formation is preserved. The Bay Fiord Formation disappears southward between Creswell Bay and Lang River (Section 94). At the latter locality the Thumb Mountain Formation rests directly on a thin sequence assigned by Miall and Kerr (*op. cit.*) to the Ship Point Formation. Still farther south, at Lost River (Sec. 95; **Boothia Peninsula North**), strata assigned by Miall and Kerr (*op. cit.*) to the Allen Bay Formation overlie the upper member of the Turner Cliffs Formation.[2, 3] In summary, the stratigraphic relationships described above suggest that post-Bay Fiord erosion cut downward to progressively deeper stratigraphic levels from north to south, thereby resulting in truncation of the Bay Fiord and Ship Point formations, and the uppermost Turner Cliffs Formation in that direction (Table 3).

It now appears likely that the post-Bay Fiord unconformity recognized in the report area can also be recognized in the Arctic Platform successions of northwestern Baffin Island, Foxe Basin and eastern Devon Island. The evidence for this interpretation is discussed below.

In northwestern Baffin Island, the Ship Point Formation is overlain by the Baillarge Formation (Table 3). Member A and Unit 1 of Member B of the Baillarge Formation have been correlated respectively with the Bay Fiord and Thumb Mountain formations by Trettin (1969) and Mayr (1978). As in the case of the Thumb Mountain Formation on Somerset Island, the Arctic Ordovician Fauna occurs throughout Unit 1 (Trettin, *op. cit.*). In areas of the Franklinian Miogeocline where complete sequences of the Thumb Mountain Formation are developed, its lower part is notably poor in fossils, and it is only in the uppermost part of the formation that the Arctic Ordovician Fauna makes its first appearance (Thorsteinsson, 1963; Kerr, 1976b). This suggests that Unit 1 is equivalent in age to only the upper part of the Thumb Mountain Formation as developed in the Franklinian Miogeocline, and that equivalents of the lower part of the Thumb Mountain Formation are missing. A similar conclusion was reached by Miall and Kerr (1980, p. 11) in the case of the Thumb Mountain Formation in northwestern Somerset Island, where conodont evidence suggests that the formation is probably no older than Late Ordovician (see later section). It is, therefore, suggested here that Unit 1 is correlative with the Thumb Mountain Formation in the report area, and that it rests disconformably on Member A of the Baillarge Formation (Table 3).

In Foxe Basin, a disconformity has been reported by Trettin (1975) between the Ship Point Formation and Map unit O1s (Table 3). It is possible that emergence in that area may have occurred at about the same time as in other parts of the Arctic Platform, although this cannot be proven from available fossil evidence. The hiatus in Foxe Basin appears to be much smaller than in other areas, as Trettin (*op. cit.*) has cited fossil evidence indicating that sedimentation of Map unit O1s commenced by Blackriverian time.

In easternmost Devon Island, the lower member of the Thumb Mountain Formation is missing, and the upper member rests directly on the Bay Fiord Formation (Thorsteinsson and Mayr, in press). The disconformity, however, dies out

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[1]Some doubt exists as to the precise stratigraphic position of this collection. The lithological log presented by Mayr (1978) shows that the sampled interval straddles the contact between the Bay Fiord and Thumb Mountain Formations. This log was not adjusted to the mechanical log, from which the formational boundary was picked. However, Mayr (pers. comm., 1982) considers that the fauna was most probably derived from the uppermost Bay Fiord Formation, and this interpretation is accepted in the present report.

[2]As will be discussed in a later section, rocks containing the Arctic Ordovician Fauna, and assigned to the Allen Bay Formation at this locality, are interpreted by the present author to represent lateral, dolomitized equivalents of the Thumb Mountain Formation.

[3]The report by Miall and Kerr (1980, p. 13) erroneously states that the Ship Point Formation underlies the Allen Bay Formation at Lost River.

laterally, as complete sequences of the Thumb Mountain Formation are developed in the western parts of the island situated in closer proximity to the Franklinian Miogeocline.

In summary, present evidence supports Dixon's (1978) concept of a regional, Middle Ordovician disconformity in large parts of the Arctic Platform. Evidence from the report area suggests that the Arctic Platform underwent gentle, positive movement, increasing in displacement in a southward direction. It is possible that gentle, positive movement along Boothia Uplift may have accentuated this process in the western part of the report area, as was suggested by Miall and Kerr (1980), but no definite evidence of such movements can be ascertained at the present time.

Correlations with Baffin Island

The virtual lack of biostratigraphic control in the type area of the Turner Cliffs and Ship Point formations has greatly hindered confident correlations between Baffin Island and the report area. However, regional lithostratigraphic relationships are now much better understood as a result of the recently completed stratigraphic studies on Devon and Somerset islands. The following account discusses the evidence for correlations made by the present writer between the Turner Cliffs, Ship Point and Bay Fiord formations in the report area and their stratigraphic equivalents on Baffin Island.

Published descriptions of the type Turner Cliffs Formation (Lemon and Blackadar, 1963; Trettin, 1969) suggest strong lithological affinities with the Cass Fjord Formation and its equivalents in the report area. Under its present definition, the type Turner Cliffs Formation does not contain any units comparable in lithology to the Cape Clay Formation on Devon Island, or to the upper member of the Turner Cliffs Formation on Somerset Island. It may be significant however, that a unit similar in lithology to the Cape Clay Formation has been described by Lemon and Blackadar (*op. cit.*) at the base of the type section of the Ship Point Formation, as originally designated by Blackadar (1956).

On the basis of gross lithological similarity and stratigraphic position, it is proposed here that the Turner Cliffs Formation on Baffin Island, the Cass Fiord Formation on Devon Island, and the lower member of the Turner Cliffs Formation in the report area are all correlative units (Table 3). The relative stratigraphic position of the Gallery formations is uncertain. Trettin (1969) suggested that the Turner Cliffs and Gallery formations are probably not separated by a major hiatus: if this is true, the Gallery Formation might represent a sandy, shoreward facies-equivalent of the lowermost Cass Fjord Formation and its equivalents on Somerset Island (Table 3).[1]

The correlation suggested here differs significantly from that proposed by Mayr (1978) and accepted by Miall and Kerr (1980). The former author correlated the chert-bearing dolostone, then assigned by him to the uppermost Turner Cliffs Formation, with Member D3 of that formation on Baffin Island. There are, however, significant lithological differences between these two units, as discussed by Mayr (*op. cit.*, p. 9). The correlations proposed here appear to provide the best reconciliation of regional lithostratigraphic relationships as they are presently understood, although they remain subject to confirmation once more refined biostratigraphic control becomes available from Baffin Island.

The lower part of the Ship Point Formation, as redefined by Trettin (1975), is correlated here with the upper member of the Turner Cliffs Formation in the report area, and with the combined Cape Clay and Blanley Bay formations on Devon Island (Table 3). Trettin (1975) subdivided the Ship Point Formation into two members: a lower, mainly quartzose sandstone member (Member A), interpreted to be a basal transgressive unit; and an upper, dominantly pure dolostone unit (Member B), containing minor proportions of clastic material. Member B is comparable in lithology to both the upper member of the Turner Cliffs Formation and the Ship Point Formation in the report area, but Member A appears to be unique to Baffin Island. If the present correlations are correct, then it would appear that a brief regression took place in the present area of Baffin Island during the late Tremadocian, followed by transgression and deposition of the basal clastic unit. Sedimentation apparently carried on, essentially continuously, in adjacent areas, or perhaps with only a minor, undetectable hiatus.

The correlations proposed here suggest that the basal Ship Point Formation in northwestern Baffin Island is older than was previously thought. Trettin (1975) reported conodonts no older than Arenigian in age from Member A of the Ship Point Formation in Foxe Basin, and a similar age was assumed by that author for the base of the formation in its type area. Present correlations, if correct, suggest that Member A is a markedly diachronous unit, becoming younger southeastwards toward Foxe Basin (Table 3).

No reliable biostratigraphic data are available from the upper part of the type Ship Point Formation, and, as a result, its upper age limit can only be inferred through extrapolation from other areas. Two alternative correlations are possible, the first between the type area and Devon Island, and the second between the type area and Foxe Basin.

Lithological correlations suggest that the contact between the Ship Point Formation and Member A of the Baillarge Formation in northwestern Baffin Island is correlative with the contact between the Eleanor River and Bay Fiord formations on Devon Island. Where studied, conodonts from the uppermost part of the Eleanor River Formation do not appear to be younger than early Whiterockian in age (faunas 1 or 2 of Sweet et al., 1971; see Nowlan, 1976, and Thorsteinsson and Mayr, in press). On this basis, it could be inferred that the uppermost Ship Point Formation in northwestern Baffin Island is also no younger than about early Whiterockian in age. Similarly, a late Whiterockian to Blackriverian age range (faunas 2-4 to faunas 6 or 7 of Sweet et al., 1971) could be inferred for Member A of the Baillarge Formation, as this is the age range documented by Thorsteinsson and Mayr (in press) for the Bay Fiord Formation on Devon Island.

[1]Alternatively, the Gallery Formation could be correlative with the late Early Cambrian Rabbit Point sandstone, as defined on Devon Island by Kurtz et al. (1952). This correlation, which was proposed initially by Trettin (1969), cannot be discounted from available evidence.

Evidence from Foxe Basin suggests a considerably younger age for the uppermost Ship Point Formation. Conodonts from that stratigraphic level in the Foxe Basin area were found to include, among other taxa, *Phragmodus flexuosus* Moskalenko, and *Belodella* n. sp. (Barnes, in Trettin, 1975). According to Barnes (unpubl. rept., 1977), both species range through faunas 5 and 6 of Sweet et al. (1971). Hence, the uppermost Ship Point Formation in Foxe Basin is Chazyan in age. Notably, these taxa have also been recovered from the upper part of the Bay Fiord Formation on Somerset Island (GSC loc. C-45606, 7; see Appendix 3) and other areas (Nowlan, 1976; Thorsteinsson and Mayr, in press). It therefore appears that the upper Ship Point Formation, as developed in Foxe Basin, is equivalent in age to the major part of the Bay Fiord Formation as developed elsewhere.

An even younger age is suggested for the upper Ship Point Formation in northern Baffin Island by a trilobite fauna collected by Lemon and Blackadar (1963) from scree, and thought by them to have been derived from that formation at Nautilus Mountain, about 15 km northeast of the type area. The collections included *Bathyurus* sp., which has been dated by B.S. Norford (pers. comm., 1982) as "Whiterock to Blackriver, probably Blackriver" in age. It should be noted, however, that some doubt exists as to the precise stratigraphic position of this fossil collection. Lemon and Blackadar (1963) considered the Ship Point Formation to be the youngest formation present at Nautilus Mountain, but subsequent mapping by Blackadar et al. (1968) recognized an upper unit, assigned by them to the Baillarge Formation at that locality. There is some possibility, therefore, that the scree containing these fossils was in fact derived from the lower part of the Baillarge Formation.

The above discussion indicates a fundamental conflict between an inferred age for the upper part of the type Ship Point Formation, based on correlations with Devon Island, and an apparently documented age, based on fossil collections from outside the type area. This problem will not be resolved until further biostratigraphic data become available from both the type Ship Point Formation and Member A of the Baillarge Formation.

In this report, the Ship Point and Bay Fiord formations on Somerset Island are tentatively correlated with the upper Ship Point Formation and Member A of the Baillarge Formation respectively, in northwestern Baffin Island (Table 3). The correlation between the Bay Fiord Formation and Member A seems reasonably secure as the two units are lithologically very similar, and, furthermore, they occur approximately along depositional strike in relatively close proximity to one another. These two units need not be exactly equivalent in age to the Bay Fiord Formation on Devon Island, although an approximate time equivalence is suggested by biostratigraphic data from Somerset Island. If this correlation is correct, then it can be inferred that the upper Ship Point Formation in northwestern Baffin Island, like the Ship Point Formation on Somerset Island, is probably no younger than Whiterockian in age (faunas 2-4 of Sweet et al., 1971). The upper contact of the Ship Point Formation would therefore be diachronous, in view of the Chazyan age indicated for the uppermost part of that formation in Foxe Basin.[1]

Upper Ordovician

Thumb Mountain Formation

Definition, distribution, contacts and thickness

The Thumb Mountain Formation is the middle of the three Cornwallis Group formations designated by Kerr (1967a). In its type locality, north of Irene Bay on Ellesmere Island, the formation is composed of resistant, slightly dolomitic, argillaceous limestone. The Thumb Mountain Formation has been widely mapped in the Franklinian Miogeocline, and has been identified in the Arctic Platform successions of Devon and Somerset islands (Thorsteinsson and Mayr, in press; Miall and Kerr, 1980). Lithological equivalents of the Thumb Mountain Formation are also present in northwestern Baffin Island, where they are assigned to Unit 1 of Member B of the Baillarge Formation (Trettin, 1969; Mayr, 1978).

As presently mapped, the Thumb Mountain Formation appears to form a laterally discontinuous unit along the eastern flank of Boothia Uplift on Somerset Island and northeastern Boothia Peninsula. It has also been identified in the subsurface of northeastern Somerset Island in the Garnier O-21 well (Mayr et al., 1980). The Thumb Mountain Formation has not been recognized on the west flank of the uplift in northwestern Boothia Peninsula.

The lower contact of the Thumb Mountain Formation is interpreted to be disconformable throughout the report area (Table 3). In the area north of Creswell Bay, a sharp lithological break occurs between it and the underlying Bay Fiord Formation. Elsewhere, the formation is recognized by the abrupt appearance of a limestone or dolomitic limestone containing the Arctic Ordovician Fauna, as at Lang River (Sec. 94; see Dixon, 1973a). The upper contact of the Thumb Mountain Formation is sharp, but the formation is apparently conformable with the recessive, shaly carbonates of the Irene Bay Formation, where that formation is present. In places where the latter formation is missing, the contact was tentatively drawn by Miall and Kerr (1980) as an unconformity.

The Thumb Mountain Formation varies markedly in thickness in the report area. Reconnaissance measurements near Hunting River (Sec. 41; **Somerset Island North**) indicate a maximum thickness of about 78 m in that area. In the subsurface of northeastern Somerset Island, the formation is 115.2 m thick (Sec. 34; Mayr et al., 1980). Immediately north of Creswell Bay (**Somerset Island South**), the formation varies between 3.8 m (Sec. 65) and 25 m (Sec. 74) in thickness, whereas farther south at Lang River (Sec. 94), it is 97 m thick. No measurements are available from northeastern Boothia Peninsula, but estimates from air photographs suggest thicknesses there in the order of 50-60 m.

[1]This interpretation differs from that proposed by Thorsteinsson (1980), who concluded that the base of Member 4 is marked by a major regional unconformity. This topic will be discussed in detail in the next section.

Lithology

At Lang River, the Thumb Mountain Formation is composed mainly of pale grey, thin bedded, dolomitic biomicrite and calcareous biogenic dolostone, containing an abundant and diverse macrofauna (Dixon, 1973a). In other areas, the formation has been described by Miall and Kerr (1980) as a cream, yellowish or greenish grey, slabby to blocky weathering, resistant, fossiliferous limestone. In the Garnier O-21 well, this stratigraphic interval is characterized mainly by light brown, fossiliferous, variably silty, partly argillaceous and dolomitic limestone (Mayr, 1978).

The Thumb Mountain Formation is interpreted by Miall and Kerr (*op. cit.*, p. 11) as having been deposited under low energy, uniform, subtidal shelf conditions.

Age and correlation

Several samples from the Thumb Mountain Formation have been processed for conodonts, but only two have yielded diagnostic taxa permitting a specific age assignment. The first collection (GSC loc. C-45627; see Appendix 3) was referred by Barnes (unpubl. rept., 1977) to Fauna 11 and early Fauna 12 of Sweet et al. (1971), and was assigned a Maysvillian age. The second collection (GSC loc. C-45628) was dated by Barnes as Late Ordovician in age. The map positions of the fossil localities suggest that both collections were derived from the lower part of the formation.

There is no direct evidence to suggest the precise age limits of the Thumb Mountain Formation in the report area. In western Devon Island, where complete sequences of the Thumb Mountain Formation are present, the formation is reported by Thorsteinsson and Mayr (in press) to range from about late Blackriverian to early Maysvillian in age (faunas 6 or 7 to about Fauna 11 of Sweet et al., 1971). Conodont evidence from the report area suggests that the sequence developed there is correlative only with the upper part of the Thumb Mountain Formation as developed elsewhere. As no fossils older than Late Ordovician in age have been positively identified from the Thumb Mountain Formation in the report area, its lower age limit is tentatively placed within the Edenian Stage (Table 3). The upper age limit of the Thumb Mountain Formation in the report area is assumed to be the same as that determined on Devon Island by Thorsteinsson and Mayr (*op. cit.*).

Irene Bay Formation

Definition, distribution, contacts and thickness

The Irene Bay Formation was designated by Kerr (1967a) as the uppermost of the three formations constituting the Cornwallis Group. In its type area, north of Irene Bay on Ellesmere Island, the formation is characterized by dark grey, argillaceous limestone with abundant shaly interlayers. The Irene Bay Formation is widely distributed in the Franklinian Miogeocline, and has been identified in the Arctic Platform successions of Devon and Somerset islands (Thorsteinsson and Mayr, in press; Miall and Kerr, 1980). Lithological equivalents of the Irene Bay Formation are also present in northern Baffin Island, where they have been assigned by Trettin (1969) to Unit 2 of Member B of the Baillarge Formation (Table 3).

The Irene Bay Formation has been recognized in the Garnier O-21 well in northeastern Somerset Island (Sec. 34; Mayr et al., 1980), and in a small area north of Creswell Bay (secs. 65 and 78; **Somerset Island South**). The formation has not been recognized elsewhere in the report area.

The contacts of the Irene Bay Formation are sharp. According to Miall and Kerr (1980), strata across the lower contact of the formation are apparently conformable, whereas its upper contact may be marked by a minor disconformity.

In the area immediately north of Creswell Bay, the Irene Bay Formation ranges up to 43 m in thickness (Sec. 78), but is absent entirely in other, nearby sections (as in Sec. 74; see Figure 2 in Miall and Kerr, 1980). In the Garnier O-21 well, this stratigraphic interval totals 20.1 m in thickness (Mayr, 1978).

Lithology

Miall and Kerr (1980, p. 12) state that the Irene Bay Formation is composed of a recessive succession of interbedded, argillaceous, greenish grey limestone (or dolomitic limestone) and shale. Solitary corals, colonial corals, brachiopods and nautiloids are locally present. In the Garnier O-21 well, this stratigraphic interval consists of green-grey shale interbedded with calcareous siltstone and argillaceous lime mudstone, and contains crinoids and ostracods (Mayr, 1978).

Miall and Kerr (*op. cit.*) suggested that the depositional conditions under which the Irene Bay Formation accumulated were probably similar to those which prevailed during deposition of the Bay Fiord Formation. However, the abundance and diversity of fauna normally found in this formation, together with the absence of evidence for shallow water deposition, suggest that the Irene Bay Formation was deposited in a relatively deep, low energy, subtidal shelf environment.

Age and correlation

No conodonts have been recovered from the Irene Bay Formation on Somerset Island. On Devon Island, conodonts from the Irene Bay Formation have been found to contain elements of faunas 11 and 12 of Sweet et al. (1971), indicating an approximate Maysvillian to Richmondian age (Thorsteinsson and Mayr, in press). A similar age range is assumed for the formation in the report area (Table 3).

Possible post-Irene Bay unconformity

Miall and Kerr (1980, p. 12) have suggested that the apparently discontinuous distribution of the Irene Bay Formation along the eastern flank of Boothia Uplift might be

attributable either to post-Irene Bay/pre-Allen Bay erosion, or to lateral facies changes between that formation and either the Thumb Mountain or Allen Bay formations. No conclusive evidence is available to support one interpretation over the other, but Miall and Kerr favored the possibility of a post-Irene Bay unconformity, at least in Miall and Kerr where the Irene Bay Formation is known to be absent. Their interpretation is followed in the present report (Table 3). The unconformity has not been recognized in the Garnier O-21 sequence in northeastern Somerset Island, suggesting that it may die out eastward toward Prince Regent Basin (Fig. 1).

Present mapping shows that the Allen Bay Formation directly overlies Middle Ordovician and older units at several localities along the eastern flank of Boothia Uplift, suggesting that both the Thumb Mountain and Irene Bay formations were removed from those areas by pre-Allen Bay erosion. There is limited fossil evidence from northeastern Boothia Peninsula to suggest, however, that the Allen Bay Formation, as presently mapped, may contain lateral equivalents of the Thumb Mountain Formation, and that the postulated pre-Allen Bay erosion may not have been as extensive as was originally thought. At Lost River (Sec. 95), fossils were collected by W.W. Nassichuk from a unit then assigned to the lower part of the Franklin Strait Formation (GSC loc. C-24148). This unit was subsequently reassigned to the basal Allen Bay Formation by Miall and Kerr (1980, p. 29) on the basis of lithology. The fossil collection was recently re-evaluated by B.S. Norford (pers. comm., 1982), who dated it as "roughly late Caradoc, about Eden-Maysville" (see Appendix 3). This age is somewhat older than is typical for the basal Allen Bay Formation elsewhere in the Arctic Islands (Table 3), but it does appear to be compatible with the age suggested for the Thumb Mountain Formation by conodont evidence from northwestern Somerset Island. It is therefore suggested here that the massive, blocky weathering dolostones, containing the Arctic Ordovician Fauna at Lost River, represent lateral, dolomitized equivalents of the Thumb Mountain Formation, as recognized and mapped to the north and south of that locality.

The evidence from Lost River suggests that, at least in the area of northeastern Boothia Peninsula, lateral variations in the degree of secondary dolomitization might permit the recognition of the Thumb Mountain Formation at some localities and not others. The same may be true in the case of other localities in the report area where the formation was not recognized during Operation Boothia mapping. Marked lateral variations in the degree of dolomitization were observed in that stratigraphic interval by J.D. Dixon (pers. comm., 1982) during field work in the Hunting River, Creswell Bay and Lang River areas of Somerset Island, thereby lending support to this interpretation. If correct, the stratigraphic relationships inferred here suggest that, in areas where the Irene Bay Formation is missing, only minor erosion took place prior to deposition of the Allen Bay Formation.

Lower Ordovician to Upper Silurian

Franklin Strait Formation (abandoned)

The Franklin Strait Formation was defined by Christie (1973) from a type locality (Sec. 99) situated near Pasley Bay in western Boothia Peninsula. This stratigraphic interval had earlier been mapped as Map unit 9 by Blackadar and Christie (1963), who described it as a succession of "light weathering, relatively competent dolomite, dolomitic sandstone, and minor sandstone containing Ordovician and probably Silurian fossils". Christie (*op. cit.*) designated a reference section for the formation at Lost River (Sec. 95, **Boothia Peninsula North**), where it was studied by Miall and Kerr (1980).

According to Miall and Kerr (1980, p. 13), rocks ascribed to Map unit 9 by Blackadar and Christie (1963) have been reassigned to the Cornwallis Group and the Allen Bay Formation. The geological maps accompanying this report, however, show that Map unit 9 contains older units as well. With one exception, Blackadar and Christie (*op. cit.*) consistently mapped the unit throughout the report area as the stratigraphic interval between the base of the upper member of the Turner Cliffs Formation and the top of the Allen Bay Formation (Table 3). The exception is at Lang River, where the base of the unit was erroneously placed at the base of the Thumb Mountain Formation.

As a result of the recognition of the post-Bay Fiord unconformity by Miall and Kerr (1980), it is now clear that the composition of Map unit 9 varies from one part of the report area to another. In northern Somerset Island, where only minor post-Bay Fiord erosion took place, Map unit 9 contains strata now assigned to the upper member of the Turner Cliffs Formation, the Ship Point Formation, the Cornwallis Group and the Allen Bay Formation (Table 3). In northeastern Boothia Peninsula, where the stratigraphic gap represented by the post-Bay Fiord unconformity is much larger, the Ship Point and Bay Fiord formations are both missing from this sequence.

Upper Ordovician to Upper Silurian

Allen Bay Formation

Definition, distribution, contacts and thickness

The Allen Bay Formation was originally named and described by Thorsteinsson and Fortier (1954) and Thorsteinsson (1958) on Cornwallis Island, where the formation is composed mainly of dolostone together with minor dolomitic and argillaceous limestone, limestone and calcareous shale. On the basis of field studies in southwestern Ellesmere Island, Kerr (1975) later reassigned the uppermost part of the Allen Bay Formation, as originally defined, to the Cape Storm Formation. Other areas in which the Allen Bay Formation has been recognized include: Prince of Wales Island (Thorsteinsson, 1980), Somerset Island and Boothia Peninsula (Miall and Kerr, 1980), and Devon Island (Morrow and Kerr, 1977; Thorsteinsson and Mayr, in press).

The Allen Bay Formation is widely distributed throughout western Somerset Island and northern Boothia Peninsula, where it was originally mapped as the upper part of Map unit 9 by Blackadar and Christie (1963). Eastward from this outcrop area, the upper part of the formation passes laterally into the evaporitic rocks of the Cape Crauford Formation (Table 3). The facies change takes place in the subsurface, and its location is unknown. In the Garnier O-21 well in northeastern Somerset Island, the sequence underlying the Cape Crauford Formation is lithologically similar to the Allen Bay Formation, as developed farther west, and will be referred to as a tongue of the Allen Bay Formation in this report.

The base of the Allen Bay Formation is marked by the appearance of a massive, pale weathering dolostone above the shaly, recessive carbonates of the Irene Bay Formation, where that formation is present; or above the fossiliferous limestones of the Thumb Mountain Formation, where that formation is recognizable. The upper contact of the Allen Bay Formation is generally sharp, but the rocks on either side of the contact are conformable.

Only two complete sections of the Allen Bay Formation have been measured in the report area, and, as a result, the exact distribution of thicknesses of the formation is poorly known. The formation is thinnest in northeastern Boothia Peninsula (Sec. 95), where it is only 381 m thick. From there its thickens northward to 550 m at Lang River (Sec. 94) in southern Somerset Island (Dixon, 1973a; Miall and Kerr, 1980). The thickness of the Allen Bay Formation in northern Somerset Island is unknown, but Miall and Kerr (1980) adopted an earlier suggestion, made by Dixon (1973b), that the formation thickens northward along the east flank of Boothia Uplift due to the northerly tilt of the craton toward the Franklinian Geosyncline. Dixon estimated a thickness of about 1000 m in the Hunting River area (**Somerset Island North**), which is comparable to the 1028.7 m thickness of the stratigraphically equivalent tongue of Allen Bay-Cape Crauford sequence in the subsurface of northeastern Somerset Island (Sec. 34).[1]

Lithology

According to Miall and Kerr (1980, p. 13), the Allen Bay Formation is typically composed of "buff to pale grey, medium bedded to massive weathering dolostone". The dolostone is dominantly finely crystalline, but medium- to coarse-crystalline units are also present. Stromatolitic and bioclastic units are common, while intraclast breccias, thin shaly partings, and sandstone units are rare.

In the Garnier O-21 well, the stratigraphic interval corresponding to the tongue of Allen Bay has been subdivided by Mayr (1978) into five units (units 3-7 of the Baillarge Formation, as originally designated by him). Uniform, fine- to medium-crystalline, light to medium brown dolostone predominates in the sequence, which contains units of medium brown, skeletal limestone sparingly interbedded with dolostone at its base. A single unit of light green shale and scattered beds of anhydrite have also been recorded.

Miall and Kerr (*op. cit.*) have stated that the Allen Bay Formation probably accumulated under both intertidal and subtidal conditions. The same is probably true of the tongue of Allen Bay in the subsurface of northeastern Somerset Island. Largely supratidal conditions subsequently developed in this area during deposition of the evaporitic rocks of the Cape Crauford Formation, while more open marine conditions prevailed to the west during deposition of the laterally equivalent upper part of the Allen Bay Formation.

Age and correlation

No conodonts have been recovered from the Allen Bay Formation in western Somerset Island and northern Boothia Peninsula. As a result, its age range must be inferred from the evidence provided by the identification of conodonts from the underlying and overlying formations, and from regional correlations with strata on other islands.

Conodont identifications suggest that the basal Allen Bay Formation is Richmondian in age (Fauna 12 of Sweet et al., 1971) on Devon Island (Nowlan, in Thorsteinsson and Mayr, in press). A similar lower age limit is assumed for the formation in the report area (Table 3). This age assignment is consistent with the Maysvillian age indicated for conodonts (referable to Fauna 11 and early Fauna 12) from the underlying Thumb Mountain - Irene Bay map unit in the Hunting River area (GSC loc. C-45627; see Appendix 3).

Conodont collections from two neighboring islands suggest that the uppermost Allen Bay Formation is approximately early Ludlovian in age. Thorsteinsson and Uyeno (in Thorsteinsson, 1980) report the occurrence of conodonts belonging to the *siluricus* Zone in the uppermost Allen Bay Formation on Griffith Island. Conodonts from that stratigraphic level on Devon Island have been tentatively assigned by Uyeno (in Thorsteinsson and Mayr, in press) to the upper part of the *sagitta* Zone, indicating an earliest Ludlovian age (Table 3). The apparent slight age discrepancy between the strata in the two areas might possibly reflect diachronism of the upper Allen Bay contact, although presently available biostratigraphic data are too limited to confirm this relationship.

There is no direct evidence to suggest the upper age limit of the Allen Bay Formation in the report area. It is notable, however, that the Cape Crauford Formation is known to range upward in age at least into the early Ludlovian (see later section), and the same may be true of the stratigraphically equivalent upper Allen Bay Formation to the west. In the present report, the upper age boundary of the Allen Bay Formation is tentatively placed at the level of the lowermost *siluricus* Zone (Table 3), in accordance with the position of that age boundary on Griffith Island.

Lower to Upper Silurian

Cape Crauford Formation

Definition, distribution, contacts and thickness

The Cape Crauford Formation was named by Trettin (1969) from a type locality at the northeast end of Brodeur Peninsula in northwestern Baffin Island. There, the formation is represented by a dominantly dolostone and dolomitic limestone succession containing widespread stratified breccias. The latter rock type was interpreted by Trettin to be the product of evaporite solution. The Cape Crauford Formation is the youngest bedrock unit in northern Baffin Island, and is underlain by the Baillarge Formation in its type area (Table 3).

The carbonate-evaporite sequence, exposed along the prominent sea cliffs between Port Leopold and Batty Bay in northeastern Somerset Island, was correlated by Miall and Kerr (1977, 1980) with the Cape Crauford Formation, in

[1]What was thought to be a complete section of the Allen Bay Formation, totalling only 338 m in thickness, was measured north of Aston Bay by A.D. Miall in 1976 (Sec. 30). The beds below the section were tentatively assigned to the undivided Cambro-Ordovician map unit at the time, but it now seems likely that these beds in fact also belong to the Allen Bay Formation, thus explaining the anomalously low thickness as a partial measurement only.

accordance with earlier observations by Jones and Dixon (1975) and Mayr (1978). This sequence had formerly been assigned to the Read Bay Formation during Operation Franklin (McMillan, 1963; Norris, 1963; Blackadar, 1963a). Equivalent rocks were penetrated by the nearby Garnier O-21 well (Mayr, *op. cit.*).

The lower and upper contacts of the Cape Crauford Formation are gradational. The lower contact of the formation is known only from the Garnier O-21 well. In this well the lower contact was placed by Mayr (*op. cit.*) at the level above which anhydrite becomes prominent in the sequence. The Cape Crauford Formation grades laterally westward into the upper part of the Allen Bay Formation (Table 3).

The Cape Crauford Formation is 578.8 m thick in the Garnier O-21 well (Mayr *op. cit.*). Only about the upper 125 m of the formation are exposed along the northeast coast of Somerset Island.

Lithology

In the Garnier O-21 well, Mayr (1978) recognized three members in the Cape Crauford Formation, which he tentatively correlated with members A, B and C of that formation as described by Trettin (1969) in northwestern Baffin Island. The lowest member, Member A, is composed of interbedded dolostone, limestone and anhydrite. Dolostone predominates in Member B, whereas anhydrite is relatively uncommon. Member C consists of dolostone interbedded with anhydrite and siltstone. Equivalents of this last member occur in the coastal exposures of the formation, where they have been described in detail by Reinson (1978) and Miall and Kerr (1980). The succession in the coastal exposures is vertically and laterally variable, and consists mainly of laminated to thin bedded dolostone, dolomitic limestone, dolostone intraformational conglomerate, and stromatolitic dolostone, all of which are interbedded and interlaminated with gypsum (Fig. 5).

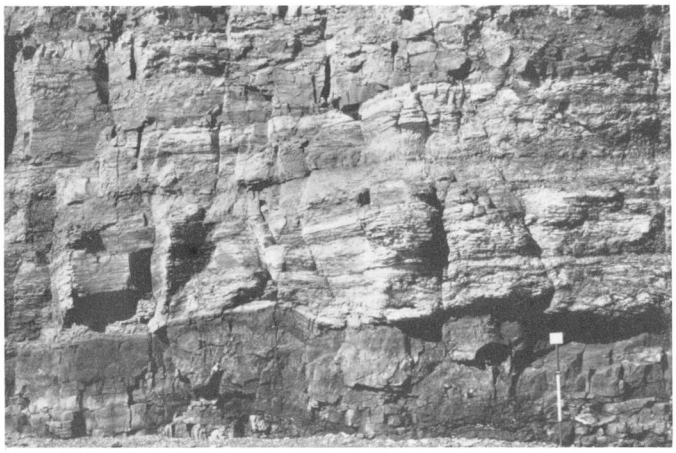

Figure 5. *Sea level exposure of the Cape Crauford Formation in northeastern Somerset Island (Section 35). Note sharp contact between lower carbonate unit and overlying gypsum-bearing unit. ISPG photo. 1981-3.*

Mayr (1978) suggested that a supratidal origin was most likely for members A and C of the Cape Crauford Formation in the Garnier O-21 sequence. Equivalents of the latter member were studied in Section 35 by Reinson (1978), who recognized a series of carbonate-evaporite cycles, which he interpreted as being the product of repeated progradation along a subsiding lagoonal-sabkha shoreline. No specific origin was determined by Mayr (*op. cit.*) for Member B of the Cape Crauford Formation in the Garnier O-21 well, as no original textures could be discerned in the dolostones. However, the relative scarcity of anhydrite in this member might suggest a temporary return to largely intertidal and possibly shallow subtidal conditions.

Age and correlation

The Cape Crauford Formation is entirely Silurian in age, as indicated by the recovery of Silurian fossils from the lower part of the formation and from the upper part of the Baillarge Formation in northwestern Baffin Island (Trettin, 1969). A Llandoverian (Early Silurian) age is indicated for much of the formation by two conodont collections recovered from the Garnier O-21 well (GSC loc. C-30875; 664.5-670.6 m and 295.7-313.9 m; see Appendix 3). According to Uyeno (in Mayr et al., 1980), the collections contain elements similar to those of two taxa known from the *celloni* Zone of Llandoverian age in the western Karawanken Alps in Austria.

The top of the Cape Crauford Formation appears to be at least as young as early Ludlovian in age. Conodonts collected aproximately 5 m above the contact between the Cape Crauford and Cape Storm formations (GSC loc. C-30089; see Appendix 3) have been reported by Uyeno (pers. comm., 1982) to range from about early Ludlovian (*siluricus* Zone) through earliest Pridolian in age. The actual age of the fauna probably falls within the lower part of this range, as the entire Cape Storm Formation is known to be no younger than about early late Ludlovian in age (see later section). In this report, the upper age boundary of the Cape Crauford Formation is tentatively equated with that of the Allen Bay Formation (Table 3).

Upper Silurian

Cape Storm Formation

Definition

The Cape Storm Formation was named by Kerr (1975) to encompass a unit composed predominantly of limestone and dolostone lying conformably between the Allen Bay and Douro formations in southwestern Ellesmere Island. Two members were recognized in the formation in its type area: a lower member consisting mainly of medium to thick bedded, resistant, variably dolomitized limestone; and an upper member characterized by thin bedded dolostone and lesser limestone. A Llandoverian to Ludlovian (Early to Late Silurian) age was assigned to the formation by that author.

The Cape Storm Formation has since been recognized on Cornwallis and Prince of Wales islands (Thorsteinsson, 1980), Devon Island (Morrow and Kerr, 1977; Thorsteinsson and Mayr, in press), and in the report area (Reinson et al., 1976; Miall and Kerr, 1977, 1980). In all of these areas, however, the formation appears to be confined in age to the Ludlovian (Thorsteinsson, 1980, p. 3). Consequently, Thorsteinsson and Mayr (*op. cit.*) have suggested that future field studies in the type area might indicate the desirability of reassigning the lower member of the Cape Storm Formation there to the underlying Allen Bay Formation.

History of study in the report area

Rocks now assigned to the Cape Storm Formation in the report area were originally included in Map unit 11 by Blackadar and Christie (1963). This map unit was correlated by them with the Read Bay Formation, as defined originally by Thorsteinsson and Fortier (1954), and Thorsteinsson (1958) on Cornwallis Island. Field work on Somerset and Prince of Wales islands by J.D. Dixon, S.R. Williams, and J.M. Savelle of the University of Ottawa later demonstrated that the lower part of Map unit 11 could be mapped as a separate formation. This stratigraphic interval was subsequently correlated with the Cape Storm Formation by Reinson et al. (1976).

On the basis of independent studies in northeastern Somerset Island, Jones and Dixon (1975) erected the Leopold Formation, which conformably overlies the Cape Crauford Formation in that area. A composite type section was designated by Dixon and Jones (1978) near Port Leopold and on Prince Leopold Island (Sec. 29; **Somerset Island North**), and the formation was subdivided into the Cape Seppings, Cape Clarence and Prince Leopold members in ascending stratigraphic order. The Leopold Formation was assigned a late Ludlovian to Pridolian age by Jones and Dixon (1977), who concluded that it represented a partial lateral facies equivalent of the Read Bay Formation and possibly the Somerset Island Formation in western Somerset Island.[1]

Mapping and stratigraphic studies by Reinson et al. (1976) and Miall and Kerr (1977) confirmed that the Cape Storm Formation in western Somerset Island, and the Leopold Formation in northeastern Somerset Island are the same rock-stratigraphic unit. It was acknowledged that the Cape Storm Formation might be markedly diachronous, becoming younger eastward, based mainly on available biostratigraphic evidence cited by Jones and Dixon (1977). However, Dixon and Jones (1978) disputed the application of the term Cape Storm Formation in the Port Leopold area, and pointed out what they considered to be appreciable differences in lithology between the Leopold Formation on one hand, and the Cape Storm Formation as developed in its type area and in western Somerset Island on the other hand. They concluded that the Leopold Formation was, therefore, a distinctively different lithostratigraphic unit, and that retention of its original name was warranted.

The lithological differences cited by Dixon and Jones (1978) are not considered great enough to justify the use of separate formational names at the level of detail employed in the present study. In this report, the name Cape Storm Formation will be applied throughout the report area to the stratigraphic interval situated between the Allen Bay or Cape Crauford formations and the Douro Formation (Table 3).

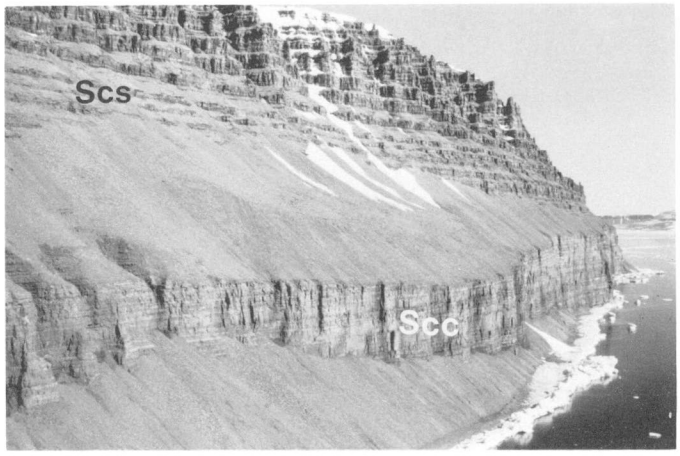

Figure 6. *Cape Crauford (Scc) and Cape Storm (Scs) formations, Cape Seppings area, northeastern Somerset Island. ISPG photo. 818-32.*

Distribution, contacts and thickness

The Cape Storm Formation is exposed continuously along the eastern flank of Boothia Uplift between northwestern Somerset Island and the Lost River area of northeastern Boothia Peninsula. A small outcrop area has also been recognized in the area south of Weld Harbour on the west flank of Boothia Uplift (**Boothia Peninsula North; Boothia Peninsula Central**), but the overall distribution of the formation in that area is not well established on the basis of present mapping. Extensive exposures of the Cape Storm Formation are also present in eastern Somerset Island between Cape Admiral M'Clintock and Fury Beach (Fig. 6), and on Prince Leopold Island off the northeast tip of Somerset Island (**Somerset Island North**).

The Cape Storm Formation is conformable, and with the underlying and overlying formations its contacts are generally readily discerned in areas of good outcrop. Miall and Kerr (1980, p. 13) placed the lower contact of the formation at the level where the "thick to massive, buff to yellowish dolomite of the Allen Bay Formation passes up abruptly into the thinner bedded, grey to greenish grey dolostone of the Cape Storm Formation". In eastern Somerset Island, where the Cape Storm Formation overlies the evaporitic Cape Crauford Formation, the contact is placed at the top of the stratigraphically highest continuous evaporite bed (Jones and Dixon, 1975, p. 400). The upper contact of the Cape Storm Formation is marked in most places by a fairly abrupt lithological change into the rubbly weathering limestones of the Douro Formation.

The Cape Storm Formation increases in thickness from south to north and from west to east in the report area. Near

[1]The term Read Bay Formation is used here in its restricted sense, in accordance with its redefinition by Miall and Kerr (1977). As will be discussed in a later section, the term Douro Formation will be employed throughout this report for the stratigraphic interval assigned by those authors to the Read Bay Formation.

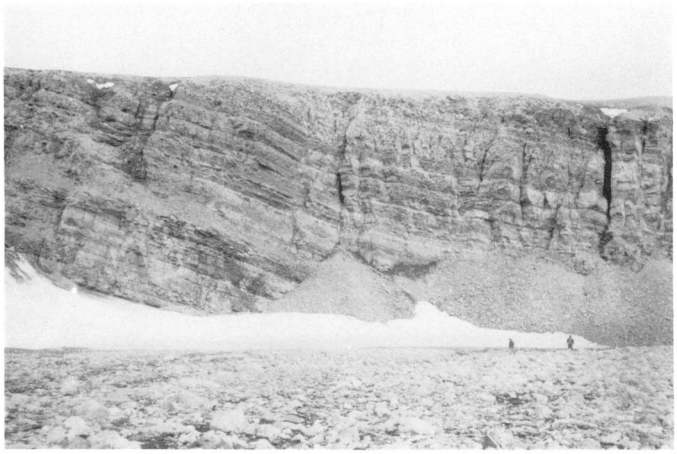

Figure 7. *Cape Storm Formation along Lang River, southern Somerset Island. ISPG photo. 818-48.*

Lang River in southern Somerset Island (Fig. 7), the formation ranges from about 125-145 m in thickness (A.D. Miall, unpubl. data). Thicknesses in excess of 170 and 224 m have been recorded farther north at Creswell Bay (Sec. 57) and Pressure Point (Sec. 21) respectively.[1] The thickest known sections of the formation occur in the Port Leopold-Prince Leopold Island area, where a thickness of at least 405 m was reported for this stratigraphic interval by Dixon and Jones (1978) from Section 29.

Lithology

In northwestern Somerset Island, the Cape Storm Formation consists mainly of dolostone and lesser limestone together with minor sandstone, siltstone and shale. The dolostone is coloured various shades of grey, buff-grey or brown, and is mainly horizontally laminated and thin, platy bedded. Grey, olive grey and brown limestone of similar aspect occurs mainly in the upper part of the formation. The proportionately minor rock types include orange, grey, or brown weathering, horizontally laminated or crosslaminated sandstones, green-grey siltstones, and dark grey to grey shales. Minor but notable associated features include desiccation cracks, ripple marks, solution collapse breccias, intraformational conglomerates, and rare evaporite (?) casts. Stromatolites are fairly common, and rare gastropods, ostracods and eurypterids have been recovered. Brachiopods (mainly *Atrypella*) and stromatoporoids are common in thin, Douro-type limestone interbeds that occur in the uppermost part of the formation.

Detailed descriptions of the Cape Storm Formation in the vicinity of Creswell Bay have been provided by Savelle (1978), who recognized that the sequence exposed at Section 57 can be subdivided into two parts: a lower part consisting of buff to light grey dolomitic sandstone, sandy dolostone and dolostone; and an upper part consisting of buff to medium grey sandy dolostone, dolomitic and calcareous sandstone, peloidal limestone, limestone and dolostone. Calcite pseudomorphs, gypsum molds, and vugs partially filled with gypsum were recorded in the lower part of the formation. Other features noted by Savelle included desiccation cracks, asymmetric ripples and small channels. A sparse fauna, including *Protathyris*, gastropods, ostracods, scolecodonts, thelodonts, ostracoderms and trace fossils was also observed.

Brief stratigraphic descriptions of the Cape Storm Formation in southern Somerset Island have also been provided by A.D. Miall (unpubl. data) from Section 52 and from a locality situated about 11 km south of Lang River. At both localities, the sequence consists mainly of green-grey, thin bedded, finely crystalline dolostone which locally contains green-grey shaly partings, thin shale seams and finely laminated dolomitic sandstones.

The lithology of rocks assigned herein to the Cape Storm Formation in the Port Leopold area of northeastern Somerset Island has been described in considerable detail by Jones and Dixon (1975) and Dixon and Jones (1978). A brief description of the main rock types and associated features is given below, based on the latter publication.

Dixon and Jones (1978) subdivided the succession into three members, described as follows in ascending stratigraphic order. The Cape Seppings Member (28 m thick) is composed primarily of dolostone, calcareous dolostone and dolomitic limestone together with minor sandy dolostone. Lenses, laminae and pods of gypsum are common throughout. The Cape Clarence Member (275 m thick) contains mainly dolomitic limestone, sandstone, dolostone and sandy dolostone together with other, proportionately minor lithologies. Stromatolites and stromatolitic limestone are reported to be very common throughout the member (Fig. 8). The Prince Leopold Member (102 m thick) is similar in lithology to the Cape Clarence Member, but in addition contains units of wavy bedded limestone and rubbly argillaceous limestone, similar to that found in the overlying Douro Formation.

A characteristic feature of the succession as a whole is a distinctive colour banding visible in the coastal cliffs of eastern Somerset Island and in air photographs. Jones and Dixon (1975, p. 400) attributed this feature to the alternation of grey limestones with buff to yellowish brown dolomitic units.

Figure 8. *Domal and digitate stromatolites in the Cape Storm Formation, Batty Bay area, northeastern Somerset Island. ISPG photo. 818-3.*

[1]A.D. Miall recorded a thickness of only 123 m for the Cape Storm Formation in Section 52, which is situated 7 km farther north along strike from Section 57. Some thickness reduction may, however, have been caused in the former section due to undetected faulting.

According to Dixon and Jones (1978, p. 416), the rocks in the Port Leopold area are either thin bedded or massive and unbedded, with planar bedding predominating. Associated features include sediment deformation structures, intraformational conglomerate, desiccation cracks, syneresis cracks, channels, ripple marks, crossbedding and crosslamination. A sparse fauna, including ostracods, gastropods, ostracoderms, trace fossils and orthoconic nautiloids was observed, whereas corals, bryozoans and eurypterids were reported to be very rare.

The lithological descriptions summarized above suggest that the Cape Storm sequences developed in northwestern, southern and northeastern Somerset Island are very similar in gross lithology. As a whole, this rock-stratigraphic unit is characterized by a lithologically variable succession of dolostones, limestones and associated clastics, and by a suite of sedimentary structures indicative of a predominantly intertidal environment of deposition. As has been emphasized by Dixon and Jones (1978, p. 421), the Port Leopold succession is distinguished by its relatively high siliciclastic and evaporitic content. These constituents are not, however, unusual in the Cape Storm Formation as developed elsewhere in the report area.

Age and correlation

The lower part of the Cape Storm Formation in the report area is notably poor in diagnostic conodont taxa, and, as a result, the lower age limit of the formation is difficult to define precisely. However, a maximum age for the formation, at least as it is developed in northeastern Somerset Island, is indicated by a conodont collection obtained by B. Jones from a level approximately 5 m above its base near Port Leopold (GSC loc. C-30089; see Appendix 3). The collection contained *Ozarkodina confluens* (Branson and Mehl) gamma morphotype of Klapper and Murphy (1975), the lower range of which is known to occur in direct association with *Polygnathoides siluricus* in the Roberts Mountains Formation in Nevada (see Thorsteinsson and Uyeno, in Thorsteinsson, 1980, p. 22). This evidence suggests that the lowermost Cape Storm Formation does not range downward below the *siluricus* Zone at that locality (Table 3).

Conodont studies from several localities distributed throughout Somerset Island (sections 20, 33, 57, 60, and North Elwin River locality; see Appendix 3) suggest that the *siluricus* Zone spans the entire Cape Storm Formation, in accordance with biostratigraphic observations made by Thorsteinsson and Uyeno (*op. cit.*) in other islands. *Ozarkodina douroensis* Uyeno has been recovered from the uppermost Cape Storm Formation on Somerset Island, and from the overlying Douro Formation in all parts of the report area (see later section). The range of this species, as it is presently understood, is apparently confined to the *siluricus* Zone, thus indicating that the Cape Storm Formation is entirely Ludlovian in age.

The lower age limit suggested above for the Cape Storm Formation in the report area is compatible with that determined by Thorsteinsson and Uyeno (*op. cit.*) on Griffith Island, but is slightly younger than that reported by Thorsteinsson and Mayr (in press) from Devon Island. Conodonts recovered from the uppermost Allen Bay Formation on Devon Island have been referred to the upper part of the *sagitta* Zone, implying an earliest Ludlovian age for the basal Cape Storm Formation in that area. This apparent age discrepancy might reflect a slight diachronism of the Allen Bay - Cape Storm contact, although further biostratigraphic studies will be required to confirm this relationship.

A final point to be considered here is the stratigraphic relationship between the Cape Storm and Douro formations in the report area. As was noted previously, Jones and Dixon (1977) inferred that rocks assigned by them to the Leopold Formation were largely a lateral facies equivalent of the Read Bay Formation (herein termed the Douro Formation) as developed in western Somerset Island. Citing biostratigraphic evidence available at the time, they concluded that the Leopold Formation was late Ludlovian to Pridolian in age. Other evidence then available suggested that the Ludlovian Read Bay Formation of western Somerset Island became progressively younger eastward, and that a substantial part of it passed laterally into the Leopold Formation in the area of northeastern Somerset Island.

Present biostratigraphic evidence does not in itself preclude the possibility of a major facies relationship between the Douro and Cape Storm formations. Mapping, however, does suggest that only a relatively minor facies change takes place between the lowermost and uppermost parts respectively of the Douro and Cape Storm formations in northeastern Somerset Island. The diachronism of the Cape Storm-Douro contact cannot be independently documented on the basis of presently available biostratigraphic data, but it seems likely that it involved a significantly shorter period of time than was previously thought (Table 3).

Douro Formation

Definition

The Douro Formation was named on Devon Island by Thorsteinsson (1963) for a predominantly rubbly weathering, grey limestone succession lying conformably between rocks now assigned to the Cape Storm and Devon Island formations. This stratigraphic interval was subsequently correlated by Thorsteinsson (1980) with the upper part of Member A of the Read Bay Formation, as described by Thorsteinsson (1958) on Cornwallis Island.

According to Thorsteinsson (1980, p. 4), the Douro Formation is now known to be widely distributed within the Arctic Archipelago. The distributive area of the formation extends as far south as Boothia Peninsula and possibly as far west as Victoria Island, and includes parts of Ellesmere, Cornwallis, Devon, Prince of Wales and Somerset islands.

History of study in the report area

During operations Franklin and Prince of Wales, the name Read Bay Formation was applied to a succession of predominantly grey or greenish grey limestone and dolostone lying stratigraphically between the resistant, light coloured dolostones of the Allen Bay Formation and the red weathering clastics of the Peel Sound Formation (McMillan, 1963; Norris, 1963; Thorsteinsson and Tozer, 1963; Blackadar, 1963a, b; Blackadar and Christie, 1963). This unit was mapped as Map unit 11 by Blackadar and Christie (*op. cit.*). Subsequent studies by the Geological Survey of Canada and the University of Ottawa later demonstrated that Map unit 11 contains several mappable units, including rocks now assigned to the Cape Crauford, Cape Storm and

Somerset Island formations. Miall and Kerr (1977) therefore excluded these units from the Read Bay Formation, and restricted the use of that term to a predominantly rubbly weathering, argillaceous limestone succession bounded below and above by the Cape Storm and Somerset Island formations respectively. However, Thorsteinsson (1980) later established that the redefined Read Bay Formation in the report area was the lithological and chronological equivalent of the type Douro Formation on Devon Island, and proposed that the latter name be used in preference. It is on this basis that the name Douro Formation has been adopted in the present report.

Distribution, contacts and thickness

The Douro Formation is widely distributed throughout Somerset Island and northeastern Boothia Peninsula. Unpublished lithological descriptions (V. Zay Smith Associates Ltd. and Veezay Geodata Ltd., 1973-1974; Dineley et al., 1975) suggest that the formation is also present along the western flank of Boothia Uplift north of Pasley Bay (**Boothia Peninsula Central**), although this was not confirmed during Operation Boothia mapping.

The lower contact of the Douro Formation is well defined at most localities on Somerset Island and northern Boothia Peninsula. The uppermost few tens of metres of the Cape Storm Formation are generally composed of planar bedded dolostones and limestones, which are commonly sparingly interbedded with thin limestones similar in aspect to those of the Douro Formation. The contact is marked by a fairly abrupt transition into a continuous succession of the rubbly weathering, fossiliferous limestones characteristic of the Douro Formation (Fig. 9). This type of transition is common in northwestern Somerset Island (e.g. Sec. 21), and in eastern Somerset Island near Batty Bay (Sec. 45; Narbonne, in Dixon and Jones, 1978). In southern Somerset Island and northern Boothia Peninsula, few if any Douro-type interbeds are present in the uppermost Cape Storm Formation, and the contact there is marked by an abrupt change in lithology. In northeastern Somerset Island, the interbedding of Douro and Cape Storm-type lithologies is more marked than in other areas, and the lowermost part of the Douro Formation appears to grade laterally into the uppermost part of the Cape Storm Formation in some areas.

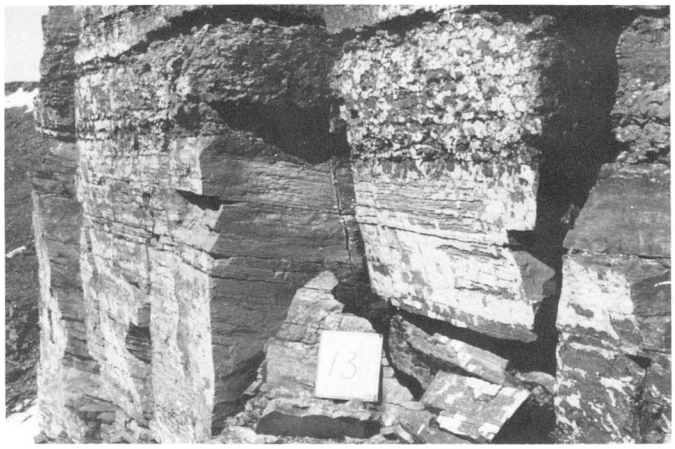

Figure 9. *Contact between the Cape Storm and Douro formations in northwestern Somerset Island. Note sharp change in bedding and weathering character at the contact. ISPG photo. 827-241.*

The Douro Formation maintains a fairly constant thickness throughout Somerset Island, but appears to thin slightly in the area of northern Boothia Peninsula. In the Pressure Point area (secs. 20, 21; **Somerset Island North**), the formation is approximately 235 m thick. In the Creswell River area (**Somerset Island South**), the formation is 209 m thick at Section 52 (Appendix 2), and 220 m thick at Section 57, 7 km to the south (Savelle, 1978). Narbonne (1981) reported that the Douro Formation ranges in thickness from 225-275 m near Fury Beach in southeastern Somerset Island. From there, the formation thins to a maximum of only 174.0 m in the Lost River area of northeastern Boothia Peninsula (Sec. 96).

Lithology

The lithology of the Douro Formation has been described in considerable detail by various authors from the University of Ottawa (Jones, 1974a; Jones and Dixon, 1976, 1977; Jones et al., 1979; Savelle, 1978; Narbonne, 1981). A recent paper by Narbonne and Dixon (1982) provides an excellent summary of the stratigraphy and sedimentology of this formation on Somerset Island. Additional lithological information, based on detailed sections measured by G.E. Reinson and A.D. Miall during Operation Boothia, is included in Appendix 2 of this report. The following account draws mainly on descriptions by Narbonne (*op. cit.*) and Narbonne and Dixon (*op. cit.*).

Approximately 80 per cent of the Douro Formation, as developed in the report area, is composed of a distinctive, rubbly weathering limestone (Fig. 10), of which two types have been recognized by Jones et al. (1979): rubbly argillaceous limestone, in which shale constitutes a significant proportion of the matrix; and rubbly, mottled, dolomitic limestone, which has a dolomitic matrix. The rubbly weathering character of these rocks has been attributed to differential weathering of irregular beds and lumps of dense limestone relative to the softer matrix of dolomite and/or shale.

Planar bedded, bioclastic and intraclastic limestone together constitute about 15 per cent of the Douro Formation. The bioclastic limestones contain abundant coarse sand to pebble sized fossils, of which the most common are brachiopods, gastropods and crinoid ossicles. The intraclastic limestones consist mainly of granule to pebble sized, spherical to blade shaped intraclasts.

A minor (2-3%) but notable part of the Douro Formation consists of small reefal mounds containing abundant sponges, corals and stromatoporoids. These mounds are composed of unbedded mudstone and wackestone, while their inter-reef areas contain lenses, tongues and channel fills of crinoidal packstone. Narbonne (1981) has recognized two distinct zones of reefal development in the Douro Formation of southeastern Somerset Island: a lower reefal zone situated about 70-100 m above the base of the formation, and an upper reefal zone located about 30-80 m below the top. The lower zone has only been observed in southeastern Somerset Island, but Narbonne notes that similar coral and sponge fossils have been observed in a comparable stratigraphic position in northwestern Somerset Island. The upper reefal zone has been recognized in the Pressure Point and Garnier Bay areas (**Somerset Island North**). In the latter area, it is represented by a very distinctive, richly fossiliferous unit (Jones and Dixon, 1977, p. 1437).

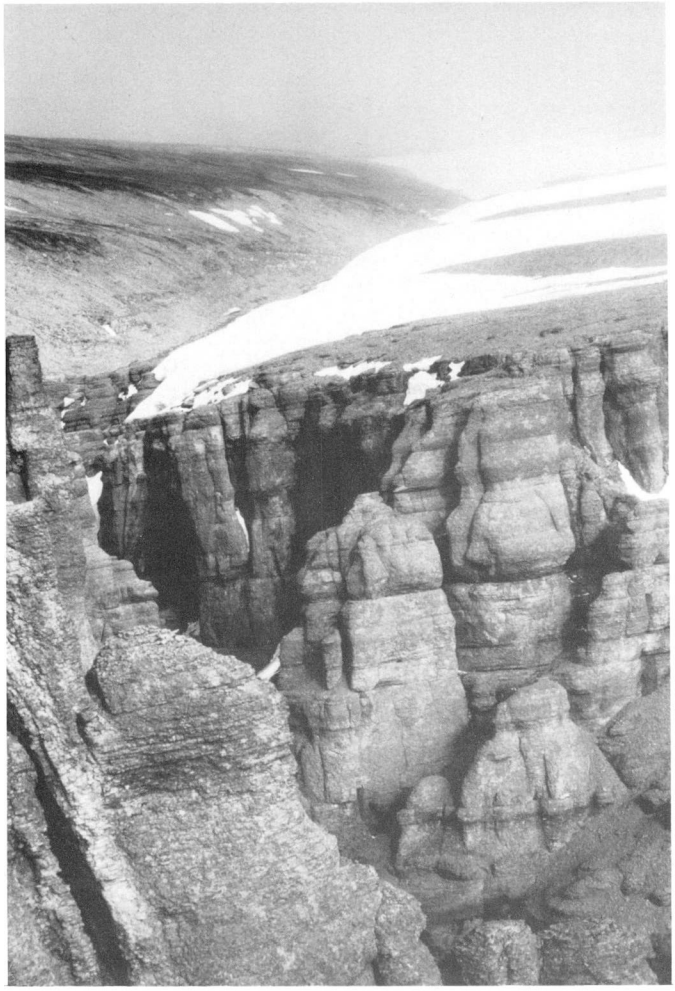

Figure 10. *Typical rubbly weathering character of the Douro Formation in northwestern Somerset Island. ISPG photo. 1981-6.*

The Douro Formation contains an abundant and diverse fauna and flora, including brachiopods, gastropods, crinoids, corals, bryozoans, sponges, stromatoporoids, trilobites, calcareous algae and trace fossils. From studies in northern Somerset Island, Jones and Dixon (1977) concluded that the lower part of the formation is dominated by brachiopods, whereas its upper part is dominated by corals. Narbonne (1981) reported that brachiopods constitute between 50 and 95 per cent of the total fauna, depending on stratigraphic position, and that about 70 per cent of the brachiopods are represented by the spiriferids *Atrypoidea* and *Protathyris*. For a more complete description of the fauna and flora of this formation, see Jones (1974a, b; 1979), Jones and Dixon (1977), Dixon (1979), Savelle (1978, 1979) and Narbonne (1981).

Narbonne and Dixon (1982) concluded that the bulk of the Douro Formation was deposited on a broad carbonate shelf under low energy, subtidal conditions. The bioclastic and intraclastic limestones are interpreted by these authors as reflecting the influence of storms, in accordance with observations made by Jones and Dixon (1976). In view of its stratigraphic position between the predominantly intertidal Cape Storm and lower Somerset Island formations, the Douro Formation in gross aspect is representative of the deepest stage of a transgressive-regressive cycle (Gibling and Narbonne, 1977).

Age and correlation

Although macrofossils are very abundant in the Douro Formation, they have not generally proved to be useful in dating the formation more precisely than Late Silurian, Ludlovian or Pridolian (see, for example, macrofossil identifications in Appendix 3). However, a more precise age for bryozoans that occur throughout the formation at Fury Point has been inferred by Bolton (in Narbonne, 1977), who assigned them to a Ludlovian age.

Without exception, conodonts from the Douro Formation indicate a Ludlovian (*siluricus* Zone) age throughout the report area. This age assignment is based largely on the occurrence of *Ozarkodina douroensis* Uyeno (Uyeno, 1980) throughout the Douro Formation in the report area. As was discussed by Thorsteinsson and Uyeno (in Thorsteinsson, 1980), the upper and lower ranges of this species (described originally as *O.* n. sp. B by Klapper and Murphy, 1975) fall within the range of *Polygnathoides siluricus*, as determined by Klapper and Murphy (1975) in the Roberts Mountains Formation in Nevada.

The base of the Douro Formation is known to fall within the *siluricus* Zone in the report area, based on the recovery of *O. douroensis* from the underlying Cape Storm Formation. This species has been recorded from the lowermost Douro Formation in northwestern Somerset Island (Sec. 20; GSC loc. C-48106; see Appendix 3), and from the lower part of the formation in northeastern Somerset Island (GSC loc. C-45648), eastern Somerset Island (GSC loc. C-48729) and southern Somerset Island (Sec. 60; GSC loc. C-37657).

The uppermost part of the Douro Formation also appears to fall within the *siluricus* Zone. *O. douroensis* has been reported by Thorsteinsson and Uyeno (in Thorsteinsson, 1980, p. 24) from the upper 1.82 m of the formation in northeastern Boothia Peninsula (Sec. 97; GSC loc. C-26655). This species has also been recovered from 0.7-7.7 m below the upper Douro contact in north-central Somerset Island (Sec. 25; GSC loc. C-48546). At both localities, conodonts recovered from the lowermost Somerset Island Formation suggest a late Ludlovian (*latialata* Zone) age (see later section). Thus, present conodont evidence supports an earlier conclusion by Thorsteinsson and Uyeno (*op. cit.*) that the contact between the Douro and Somerset Island formations is approximately correlative with the boundary between the *siluricus* and *latialata* Zones (Table 3). This upper age limit is slightly younger than that inferred by Thorsteinsson and Mayr (in press) for the contact between the Douro and Barlow Inlet formations on Devon Island (Table 3).

Present mapping, together with stratigraphic observations reported by Miall and Kerr (1977) and Miall et al. (1978), suggest that at least part of the Somerset Island Formation passes laterally eastward into the Douro Formation. Available biostratigraphic data, however, are not yet refined enough to provide independent documentation of the diachronism. Clearly, the mixed carbonate and clastic sediments of the Somerset Island Formation spread eastward with time away from Boothia Uplift, but the length of the time period involved remains in doubt. There is evidence to suggest that, in terms of the present biostratigraphic control, the age of the contact between the two formations may not vary significantly from west to east. Conodonts from the uppermost Douro Formation at two localities in north-central Somerset Island (GSC loc. C-45727, C-45728; and C-48721; see Appendix 3) have been referred to the *siluricus* Zone, in accordance with those found in a similar stratigraphic position in areas adjacent to Boothia Uplift (Sec. 21, GSC

loc. C-48121; Sec. 97, GSC loc. C-26655). It therefore appears that sedimentation of the Somerset Island Formation encroached eastward into north-central Somerset Island in less time than was previously thought.

Somerset Island Formation

Definition

The Somerset Island Formation was named by Miall et al. (1978) and comprises a mixed carbonate and clastic succession that forms a transitional sequence between the Read Bay (Douro) and Peel Sound formations. The type section was designated along a tributary of the Creswell River in southern Somerset Island (Sec. 42; see Appendix 2). Two members were defined in the formation: a Lower member composed of laminated, planar bedded dolostone, limestone, and subordinate nodular limestone; and an Upper member characterized mainly by interbedded, laminated, grey, micritic carbonate and red siltite units.

The Somerset Island Formation has been mapped only on Somerset Island and northern Boothia Peninsula, and has not been recognized on adjacent islands.

History of study in the report area

Strata now assigned to the Somerset Island Formation were included by earlier workers in the upper part of the Read Bay Formation and the lower part of the Peel Sound Formation, as defined originally in the report area by Thorsteinsson and Tozer (1963) and other authors (see McMillan, 1963; Blackadar and Christie, 1963; Kerr and Christie, 1965; Dineley, 1966; Brown et al., 1969). In accordance with earlier observations made by R. Thorsteinsson and M.R. Gibling, Reinson et al. (1976) noted that a transitional sequence was present between the typical rubbly weathering limestones of the Read Bay (Douro) Formation and the coarse clastics representative of most of the Peel Sound Formation. Miall and Kerr (1977) described the unit in detail following the completion of Operation Boothia mapping in 1976 (see stratigraphic sections in Appendix 2), and the Somerset Island Formation was formally named by Miall et al. (1978).

The stratigraphy, biostratigraphy and sedimentology of the Somerset Island Formation has been studied in detail by several authors in addition to those cited above. A major stratigraphic and sedimentological study of this formation and the overlying Peel Sound Formation was undertaken by M.R. Gibling of the University of Ottawa (Gibling, 1978), details of which were subsequently published by Miall and Gibling (1978). Additional stratigraphic sections of the Somerset Island Formation were measured and described by Jones and Dixon (1977) and Savelle (1978). Vertebrate collections, derived partly from the formation, were described by Dineley (1968) and the Broad and Dineley (1973). Further vertebrate and conodont collections from the Somerset Island Formation were reported on by Thorsteinsson and Uyeno (in Thorsteinsson, 1980). Analyses of the regional tectonic and depositional framework that prevailed during sedimentation of the Somerset Island and Peel Sound formations were published by Miall and Gibling (1978), Gibling and Narbonne (1977) and Thorsteinsson (1980).

Distribution, contacts and thickness

The Somerset Island Formation is widely distributed throughout the central part of Somerset Island, north of Creswell Bay (**Somerset Island North; Somerset Island South**). Small outcrop areas are also present in the Cape Garry area of southern Somerset Island and in northeastern Boothia Peninsula. Unpublished lithological descriptions by Dineley et al. (1975) suggest that the formation is also present on the west side of Boothia Uplift, north of Pasley Bay (**Boothia Peninsula Central**).

The lower contact of the Somerset Island Formation is placed at the base of the stratigraphically lowest planar bedded dolostone or limestone unit (Miall et al., 1978, p. 182). This contact is readily recognizable throughout western Somerset Island and northeastern Boothia Peninsula, owing to the lithological contrast between the dominantly planar bedded carbonates and siltstones of the Somerset Island Formation and the rubbly bedded, argillaceous and mottled limestones of the Douro Formation. The contact is particularly conspicuous in the Pressure Point area of northwestern Somerset Island, where the differing weathering characteristics of these two rock types has resulted in the formation of a well defined bench area (Jones and Dixon, 1977, p. 1430). In central and eastern Somerset Island, however, the contact is less easily recognized and mapped, due to the interbedding of Douro- and Somerset Island-type lithofacies, as at Fury Point (Sec. 82, **Somerset Island South**; see Appendix 2). By definition, the locally thick interbeds of nodular, bioclastic limestone of Douro aspect, which occur above the stratigraphically lowest planar bedded carbonate, are included in the Somerset Island Formation.

The contact between the Lower and Upper members of the Somerset Island Formation is placed at the level of the first appearance of abundant siltstones in the section (Miall and Gibling, 1978, p. 88). This horizon had earlier been used to mark the boundary between the Read Bay and Peel Sound formations, as defined originally by Thorsteinsson and Tozer (1963). Due to lateral facies changes between the two members in an east-west direction, and to lesser extent in a north-south direction, the stratigraphic position of this contact varies throughout the report area (Miall and Gibling, *op. cit.*). In areas close to Boothia Uplift, siltstones occur progressively lower in the section, and the Lower member is replaced laterally westward by the Upper member (Miall et al., 1978, p. 184).

As defined, the Somerset Island Formation ranges in thickness from 150 m near Boothia Uplift in northwestern Somerset Island (Sec. 20) to more than 400 m in the central areas of the island. The type section (Sec. 42; **Somerset Island North**) totals 291.5 m in thickness (98.1 m for the Lower member, 193.4 m for the Upper member). A map illustrating the distribution and thickness of the formation and its constituent members is reproduced in Figure 11. In general, the formation thickens markedly away from Boothia Uplift. The maximum original thickness of the formation in the eastern part of the report area is unknown, as possibly substantial thicknesses of strata have been removed from that area by present day erosion. This general eastward thickening has been attributed by Miall et al. (1978, p. 184) to slower subsidence in areas close to Boothia Uplift, and to lateral facies changes of the Upper member westward into the Peel Sound Formation (Fig. 12).

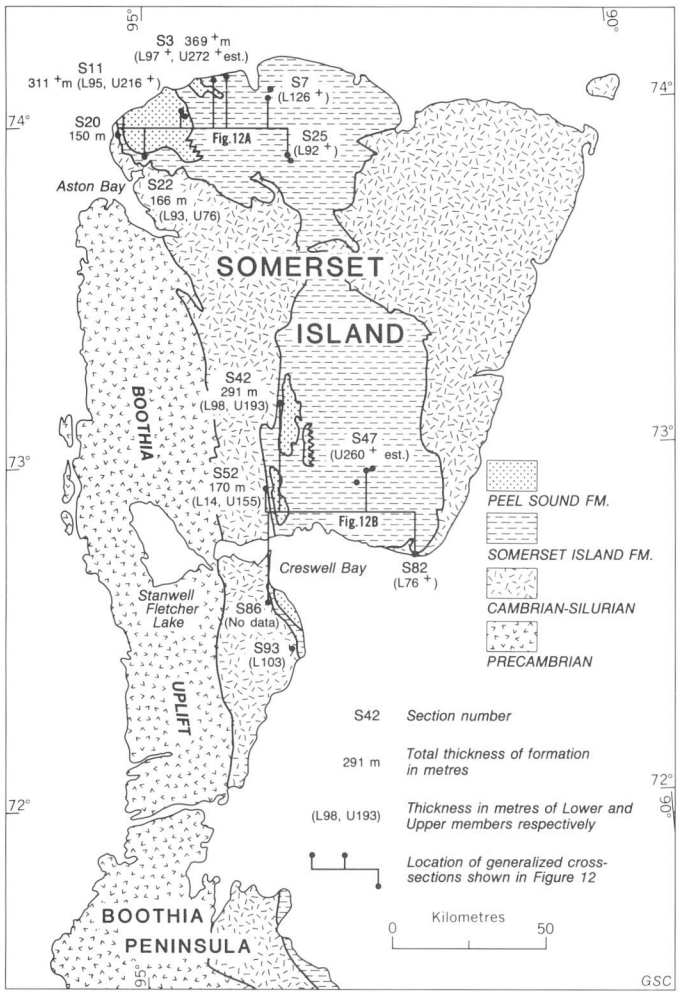

Figure 11. *Distribution and thickness of the Somerset Island Formation in the report area (modified from Miall et al., 1978).*

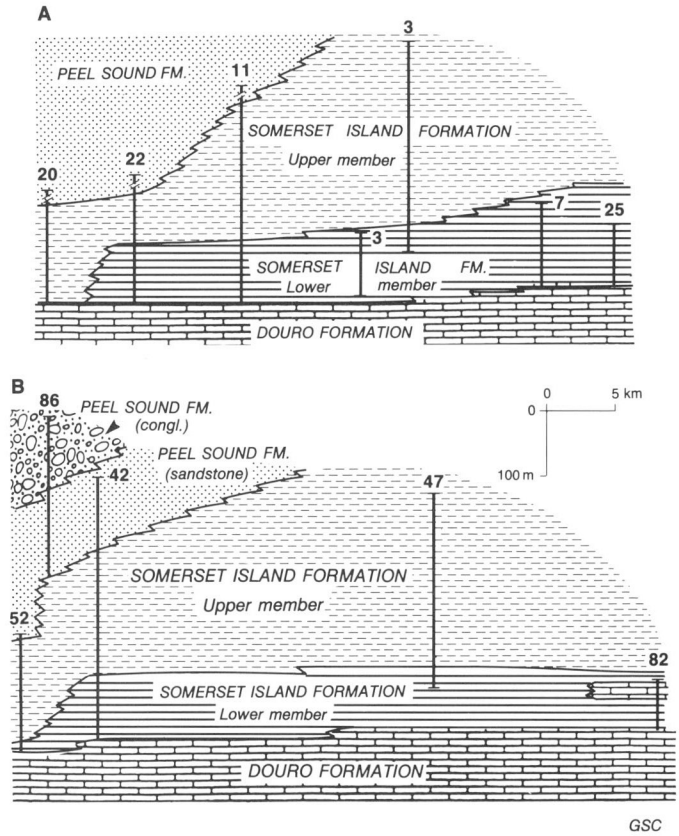

Figure 12. *Generalized stratigraphic cross-sections through the Somerset Island and Peel Sound formations on Somerset Island. Lines of section are shown in Figure 11. Lithological descriptions of formations and members are discussed in the text. Note the unit of Douro-type lithology in the Lower member of the Somerset Island Formation in Section 82 (modified from Miall et al., 1978).*

Lithology

The Somerset Island Formation comprises several lithofacies, detailed descriptions of which have been given by Miall et al. (1978), Gibling (1978) and Miall and Gibling (1978). The following lithological descriptions have been summarized from these three sources.

The Lower member of the Somerset Island Formation is composed dominantly of finely crystalline, grey, green-grey or buff to yellowish brown dolostone and limestone. These rock types are largely finely laminated, thin to medium bedded, and planar bedded (Fig. 13). Dolostone predominates in the Lower member in the western part of the report area, whereas limestone is more common in the east, as in Section 25 (**Somerset Island North;** see Appendix 2). Minor but notable associated features include oscillation ripple marks, desiccation cracks and rare evaporite casts. Oncolites and small domal stromatolites are locally abundant. The Lower member contains a sparse fauna, consisting mainly of ostracods, vertebrate remains and gastropods, together with rare brachiopods, nautiloids and trace fossils.

Subordinate rock types in the Lower member include those typically found in the underlying Douro Formation. Bioclastic carbonates, composed of abundant fossil fragments set in a dolomitic matrix, and rubbly argillaceous limestone occur in minor proportion in areas adjacent to Boothia Uplift, and form thicker and more numerous interbeds in the Lower member in areas to the east (see secs. 25, 80, 82, Appendix 2). These rocks contain a comparatively rich fauna, including brachiopods (chiefly *Atrypoidea*), corals, stromatoporoids, crinoids, gastropods and trilobites.

The Upper member of the Somerset Island Formation incorporates planar bedded carbonates and relatively rare bioclastic carbonates, similar to those found in the lower member (Fig. 14), but contains in addition a significant proportion of quartzose siltstones and dolosiltites together with subordinate sandstones. The siltstones range through various shades of green, grey, purple, red, and mottled green and red. They are generally thin- to medium-bedded, and are locally sandy. Preliminary thin section analysis by A.D. Miall has demonstrated that a complete gradation exists between quartzose siltstone and dolosiltite. The latter rock type is composed of silt-sized rhombic dolomite grains, some of which appear to have a detrital origin (Miall et al., 1978, p. 183). The sandstones are generally red, greenish or grey, and are either horizontally laminated or small-scale crosslaminated.

Figure 13. Thin, planar bedded carbonates of the lower Somerset Island Formation in northwestern Somerset Island. ISPG photo. 1981-4.

Figure 14. Strata of the Upper member of the Somerset Island Formation, East Creswell River, southern Somerset Island. Laminated dolostone with desiccation cracks is overlain by thin lenses of bioclastic limestone showing scoured bases. ISPG photo. 818-18.

Associated features in the Upper member include desiccation cracks, ripple marks, gypsum nodules and rare halite casts. Bedded gypsum, and desiccation cracks infilled with gypsum were reported by Gibling (1978, p. 40-41) from Section 79 (**Somerset Island South**).

Miall et al. (1978) and Miall and Gibling (1978) concluded that the Lower member of the Somerset Island Formation accumulated in a predominantly intertidal and shallow subtidal setting. The laminated carbonates characteristic of this member suggest deposition in tidal carbonate mudflats, whereas the fossiliferous, rubbly weathering limestones probably accumulated under locally developed subtidal conditions. The bioclastic limestones appear to have been deposited by storm activity or in tidal channels.

Carbonate mudflat sedimentation persisted during deposition of the Upper member of the formation, but, during this period, sedimentation under high intertidal and supratidal conditions became progressively more important. The siltstones of the Upper member were interpreted by Miall et al. (1978) to be the product of fluvial, sheet-flood sedimentation in a supratidal setting, possibly under arid or semi-arid conditions. Facies transition analyses reported on in detail by Miall and Gibling (1978) indicated the presence of several types of regressive carbonate-siltstone cycles, which were interpreted by them to reflect upward transitions from intertidal carbonate mudflat deposits into high intertidal and supratidal siltstone deposits. They also considered that the sandstone units, which usually appear high in the upper member, represent alluvial sheet-flood deposits that accumulated as distal equivalents of the fluvial sandstones of the lower Peel Sound Formation.

Age and correlation

The Somerset Island Formation has yielded a generally sparse conodont fauna, suggesting that much of it can be equated with the *latialata* Zone of late Ludlovian age. *Pedavis latialata* has not, however, been recovered from the formation itself. It has, therefore, been necessary to rely on certain other conodont species that are known to occur in association with the zonal name bearer in other areas.

The lowermost part of the Somerset Island Formation appears to fall within the range of the *latialata* Zone throughout the report area, based on conodont recoveries

from sections located in northern Boothia Peninsula, southern Somerset Island and north-central Somerset Island (Appendix 3). Thorsteinsson and Uyeno (in Thorsteinsson, 1980, p. 26) report the occurrence of *Pedavis* sp. aff. *P. thorsteinssoni* in the basal beds of the Somerset Island Formation in Section 97 (**Boothia Peninsula North;** GSC loc. C-26653). This species is known to occur in association with *P. latialata* in the lower Barlow Inlet Formation at Goodsir Creek on Cornwallis Island. *Ozarkodina* n. sp. H has been recovered from 21.0-27.3 m above the base of the Somerset Island Formation in Section 25 (**Somerset Island North;** GSC loc. C-48555), and has also been reported by Uyeno (1980, p. 52) from a level 33.5 m above the base of the formation in Section 57 (**Somerset Island South;** GSC loc. C-30342). This species is also known from the Barlow Inlet Formation at Goodsir Creek, where it has been found stratigraphically above the first occurrence of *P. latialata* (Uyeno, unpubl. rept., 1977).

Evidence from several localities suggests that much of the preserved thickness of the Somerset Island Formation in north-central Somerset Island is also late Ludlovian (*latialata* Zone) in age. *Ozarkodina* n. sp. H has been recovered from several spot localities within the area in which the formation is mapped, and *O.* n. sp. A, which is known to occur in association with *P. latialata* in the Barlow Inlet and Devon Island formations elsewhere, has been recovered from rocks presently mapped as part of the Somerset Island Formation near Cunningham Inlet (see Appendix 3).

As no diagnostic conodonts have been recovered from the uppermost part of the Somerset Island Formation, its upper age limit must be inferred from vertebrate collections recovered by Dineley (1968) from Section 17 in northwestern Somerset Island (NMC Cat. nos. 10385, 10386).[1] The fossil locality was stated by Dineley to be situated stratigraphically within the Peel Sound Formation as then defined. Present mapping, however, now places this locality within the uppermost Somerset Island Formation. The fossil collections contained the osteostracan *Hemicyclaspis murchisoni* Egerton, which is known to occur at the level of the *Synorisporites tripapillatus* assemblage zone (lower Downtonian) in the Downton Castle Sandstone Formation in Great Britain (D.L. Dineley, pers. comm., 1982). As was discussed by Thorsteinsson and Uyeno (in Thorsteinsson, 1980, p. 27), the bases of the Downtonian and Pridolian stages are generally considered to be equivalent, although some problems remain to be resolved in this correlation. Thus, the vertebrate collections from Section 17 suggest that the uppermost Somerset Island Formation is about early Pridolian in age at that locality (Table 3).

Mapping and stratigraphic work suggest that at least part of the Upper member of the Somerset Island Formation is laterally equivalent to the lowermost part of the Peel Sound Formation (Fig. 12). The contact between the two formations therefore becomes younger eastward. As this contact is only preserved in the vicinity of Boothia Uplift, no estimate can be made of precisely how long Somerset Island Formation sedimentation persisted in the eastern part of the report area.

The Somerset Island Formation is correlative with parts of three different formations that overlie the Douro Formation on neighboring islands. Thorsteinsson and Uyeno (in Thorsteinsson, 1980, p. 27) have cited evidence suggesting that the formation is correlative with the lower part of the lower member of the Peel Sound Formation as defined in eastern Prince of Wales Island (Table 3). The formation is also correlative with the lower part of the Barlow Inlet Formation on Cornwallis Island and Devon Island proper (Table 3), and with the lower part of the Devon Island Formation in northwestern Devon Island. It should be noted, however, that the lowermost part of the last two formations may correlate with the uppermost *siluricus* Zone (Thorsteinsson and Mayr, in press), and thus be slightly older than the basal Somerset Island Formation.

Upper Silurian to (?)Lower Devonian

Peel Sound Formation

Definition

The Peel Sound Formation is the youngest Paleozoic rock unit preserved in the report area. Its type section (Fig. 15) was designated on the east flank of the Cape Anne Syncline in northwestern Somerset Island by Thorsteinsson and Tozer (1963, p. 121), who described the formation as a "sequence of predominantly red weathering clastics, comprising siltstones, sandstones and conglomerates, with calcareous or dolomitic beds near the base. . .". These authors placed the lower contact of the formation at the base of the stratigraphically lowest siltstone unit, and recognized that the succession could be grossly subdivided into a lower, predominantly sandstone unit, and an upper, polymict conglomerate unit. As was discussed previously, Miall and Kerr (1977) later revised the lower contact of the Peel Sound Formation stratigraphically upward in the report area, thereby separating the dominantly coarse clastic rocks of that formation from the mainly carbonate rocks of the underlying succession.

Figure 15. *Type section of the Peel Sound Formation in northwestern Somerset Island (Sec. 11). Dashed line marks the position of the contact between this formation and the underlying Somerset Island Formation. View is toward the west. ISPG photo. 827-25.*

[1]NMC refers to National Museum of Canada.

The regional extent of the Peel Sound Formation includes Somerset Island, northwestern Boothia Peninsula, eastern Prince of Wales Island, and certain smaller islands situated in Peel Sound. As presently defined, the formation directly overlies the Douro Formation in the last two areas, whereas it is underlain by the Somerset Island Formation in the report area (Table 3). On Prince of Wales Island, rocks of the Peel Sound Formation pass laterally westward into the dominantly dolomitic Drake Bay Formation (Thorsteinsson, 1980, p. 14, 15; see also Blackadar and Christie, 1963; Mayr, 1978).

History of study in the report area

A detailed historical account of the study of the Peel Sound Formation on Somerset Island and adjacent areas has been given by Thorsteinsson (1980, p. 10, 11), who cites stratigraphic, biostratigraphic and sedimentological contributions made by a large number of workers. Two additional major contributions to the study of this formation in the report area have been made by Gibling (1978) and Miall and Gibling (1978).

Studies of the Peel Sound Formation have contributed to the reconstruction of the tectonic history of Boothia Uplift. Recent syntheses of the Late Silurian to Early Devonian history of that structural feature have been published by Thorsteinsson (1980), Miall and Gibling (1978), and Gibling and Narbonne (1977).

Definition, distribution and contacts

The Peel Sound Formation occupies three principal outcrop areas adjacent to Boothia Uplift on Somerset Island. The formation is preserved in the core of the Cape Anne Syncline in the northwestern part of the island, and in two areas situated to the north and south of Creswell Bay in the southern part. Small, fault bounded outliers of the formation are also present in central Somerset Island. Additional outliers occur in the area west and northwest of Stanwell Fletcher Lake (**Somerset Island North; Somerset Island South**), where the formation rests with profound unconformity on the crystalline rocks of the Precambrian Shield. Unpublished lithological descriptions by Dineley et al. (1975) suggest that outcrops of the Peel Sound Formation are also present in the area north of Pasley Bay (**Boothia Peninsula Central**), although this was not confirmed by Operation Boothia mapping.

The lower contact of the Peel Sound Formation with the Somerset Island Formation is placed at the base of the stratigraphically lowest crossbedded sandstone unit (Miall et al., 1978, p. 182). Individual sandstones are of limited lateral extent, but appear to occur in approximately the same stratigraphic position in most areas. The upper contact of the Peel Sound Formation is nowhere preserved.

As presently defined, the Peel Sound Formation attains a maximum preserved thickness of about 600 m in the Cape Anne Syncline in northwestern Somerset Island. At and near Section 86 in the Cape Garry area of southern Somerset Island, the total preserved thickness of the formation is in the order of about 243 m. Elsewhere, only partial sections of the formation have been recorded.

Lithology

Detailed lithological descriptions of the Peel Sound Formation in the report area have been given by Miall and Kerr (1977), Gibling (1978) and Miall and Gibling (1978). These descriptions centre mainly on the sequence developed in the Cape Anne Syncline, where four members were recognized in the formation by Dineley (1966). Miall and Kerr (1977) subsequently revised the definitions of the four members, which are described below in ascending stratigraphic order.

Member 1 (60-400 m thick): consists of interbedded sandstone and siltstone (Fig. 16). The sandstones typically weather red to red-brown, and less commonly shades of grey or green. They characteristically display an abundance of sedimentary structures, including trough and planar crossbedding, horizontal lamination, small-scale cross-lamination, and ripple marks. The siltstones are dominantly red, although green or grey varieties, with or without red mottling, are also fairly common. A complete grain size gradation exists between the siltstones and red-brown to purple mudstones. Both of these lithologies may be finely laminated or massive and unlaminated. Facies transition analyses reported in detail by Miall and Gibling (1978) have been used to demonstrate that the sandstones and siltstones of this member are largely arranged into a series of fining-upward cycles, each characterized by an erosional base. The same authors concluded that the succession was deposited mainly in a braided river environment.

Member 2 (280 m thick): is composed of oligomict conglomerate, which consists mainly of dolostone and quartzite clasts together with subordinate chert and quartz clasts. The clasts range up to 23 cm in size, and are set in a dolomitic or quartz sand matrix. Their origin has been attributed to both lower Paleozoic and Proterozoic sources. Subordinate lenses of crossbedded, ripple-marked or horizontally laminated sandstone are also present within the sequence. Member 2 was interpreted by Miall and Gibling (1978) as having been deposited in a proximal, braided river or alluvial fan environment.

Figure 16. *Fluvial sediments in Member 1 of the Peel Sound Formation, Cape Anne area, northwestern Somerset Island. ISPG photo. 818-52.*

Member 3 (240 m thick): consists mainly of trough crossbedded, medium- to coarse-grained quartz sandstone and pebbly sandstone together with thin conglomerates. The clast types found in this member include, in addition to dolostone and quartzite, crystalline rocks from the Precambrian Shield. Miall and Gibling (1978) inferred that the sequence was deposited in a fluvial setting, and suggested that it may represent the deposits of tributary streams flowing outward from Boothia Uplift. At one locality (Sec. 9), giant crossbeds, up to 6 m in thickness, were recorded in a sequence of well sorted, virtually pebble-free medium- to coarse-grained sand (Fig. 17). According to Miall and Gibling (*op. cit.*), these may have originated either from eolian dunes or from large bedforms in a major, northward flowing, trunk river.

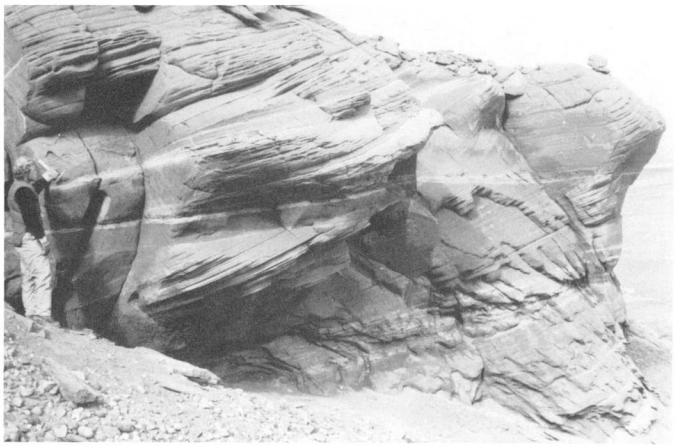

Figure 17. *Giant crossbeds in Member 3 of the Peel Sound Formation, Cape Anne Syncline, northwestern Somerset Island. ISPG photo. 818-58.*

Member 4 (120 m thick): consists of a monotonous sequence of vaguely bedded, horizontally stratified, polymict conglomerate containing minor thin lenses of crossbedded, horizontally laminated or ripple-marked sandstone (Fig. 18). The conglomerates contain at least ten clast types, ranging up to 30 cm in size. About 60-70 per cent of these are composed of Aston Formation quartzites, and about 15 per cent are composed of igneous and metamorphic rocks. The remaining clasts consist mainly of dolostone, most of which was likely derived from the Hunting Formation. Miall and Gibling (1978) have suggested that Member 4 originated in a proximal braided river or alluvial fan environment, similar to that inferred for Member 2.

The Peel Sound Formation in southern Somerset Island cannot be similarily subdivided into four members. North of Cape Garry (secs. 86, 89; **Somerset Island South**), a two-fold subdivision is apparent. The lower part of the formation (127 m thick at Section 86) is composed mainly of white, pink, greenish or red, variably silty sandstone. Horizontal thin bedding and crossbedding are almost equally common. Thin units of purple and green siltstone and mudstone are relatively rare. The upper part of the formation (estimated to be about 116 m thick in the vicinity of Sec. 86) contains polymict conglomerate, in which the majority of clasts are composed of quartzite, igneous rocks, metamorphic rocks, and dolostone. However, unlike Member 4 of the Peel Sound Formation in northwestern Somerset Island, the upper part of the formation near Cape Garry contains a significant proportion of crossbedded sandstone and pebbly sandstone. Gibling (1978) has suggested that this conglomeratic sequence was deposited in a more distal braided river environment than that interpreted for the polymict conglomerates exposed near Cape Anne.

The Peel Sound outliers that occur near Stanwell Fletcher Lake contain purple and red, poorly sorted, pebbly and silty sandstone with interbedded siltstone. These sequences are contained within hollows in the crystalline rocks of the Precambrian Shield, and have been assigned a fluvial origin by Miall and Kerr (1977).

Paleocurrent data published by Miall and Gibling (1978, p. 112-114) indicate an overall easterly direction of transport of the Peel Sound sediments away from Boothia Uplift. The giant crossbeds of Member 3 deviate from this pattern, however, in that they are oriented toward the northwest.

Stratigraphic relationships of members

Miall and Kerr (1977) and Gibling (1978) have recorded a series of lateral facies relationships among the four members of the Peel Sound Formation, on the basis of

Figure 18. *Polymict conglomerate with sandstone lenses, in Member 4 of the Peel Sound Formation, Cape Anne Syncline, northwestern Somerset Island (Sec. 10). ISPG photo. 1981-5.*

mapping and stratigraphic studies in the Cape Anne Syncline area of northwestern Somerset Island (Fig. 19). Member 1 is interpreted as grading in part laterally eastward into the siltstones, carbonates and minor sandstones of the Somerset Island Formation, which thickens markedly in the same direction. The conglomerates of Member 2 are interpreted as passing eastward mainly into the sandstones of Member 1, and to a lesser extent into the pebbly sandstones and conglomerates of Member 3. According to Miall and Gibling (1978, p. 93), the latter transitions occur over a distance of less than 10 km, and over as little as 2-3 km in some cases. The polymict conglomerates of Member 4 are interpreted as being partly younger than, and partly laterally equivalent to the pebbly sandstones of Member 3 in the eastern parts of the Cape Anne Syncline where the complete Peel Sound sequence is developed.[1] Farther west, however, Member 3 is apparently missing, and Member 4 is interpreted as resting with local unconformity on Member 2. Miall and Kerr (1977) attributed these stratigraphic relationships involving Member 4 to the effects of syndepositional tectonics, whereby uplift was active in the west while deposition of members 3 and 4 was occurring in the east.

Similar vertical and lateral stratigraphic relationships cannot be demonstrated outside the Cape Anne Syncline area. Near Cape Garry in southern Somerset Island, the upper conglomeratic unit appears to rest conformably on the lower sandstone unit, and, owing to the limited areal extent of the exposures, no lateral variations could be observed in this sequence. The presence of polymict conglomerates in the upper part of the Cape Garry sequence is suggestive of a correlation with Member 4 of the Peel Sound Formation, as developed near Cape Anne, although it cannot be conclusively demonstrated that these two units are of the same age. Miall (1983) suggested that correlations based on the first appearance of polymict conglomerate in the sequence are probably unreliable, as variations in local source area geology could result in that rock type appearing earlier in some areas than in others.

The precise stratigraphic relationship between the outliers near Stanwell Fletcher Lake and sequences of the Peel Sound Formation elsewhere is unknown. The fact that the outliers rest directly on the Precambrian Shield suggests, however, that they might be correlative with or younger than the polymict conglomerates developed farther east, as it was only during deposition of the conglomerate sequence that large areas of the Shield became exposed.

Age and correlation

Despite the recovery of extensive vertebrate collections from the Peel Sound Formation on Somerset Island, its age range must mainly be inferred from more complete biostratigraphic data available from equivalent strata on Prince of Wales Island. Complications have arisen, however, because of differing interpretations of the stratigraphy and correlation of the upper Peel Sound Formation on both islands. As a result, the total age range of the formation is currently being debated.

A brief review of Peel Sound stratigraphy on Prince of Wales Island is pertinent to the present discussion. Detailed accounts have been given by Blackadar and Christie (1963), Miall (1969, 1970a, b) and Thorsteinsson (1980).

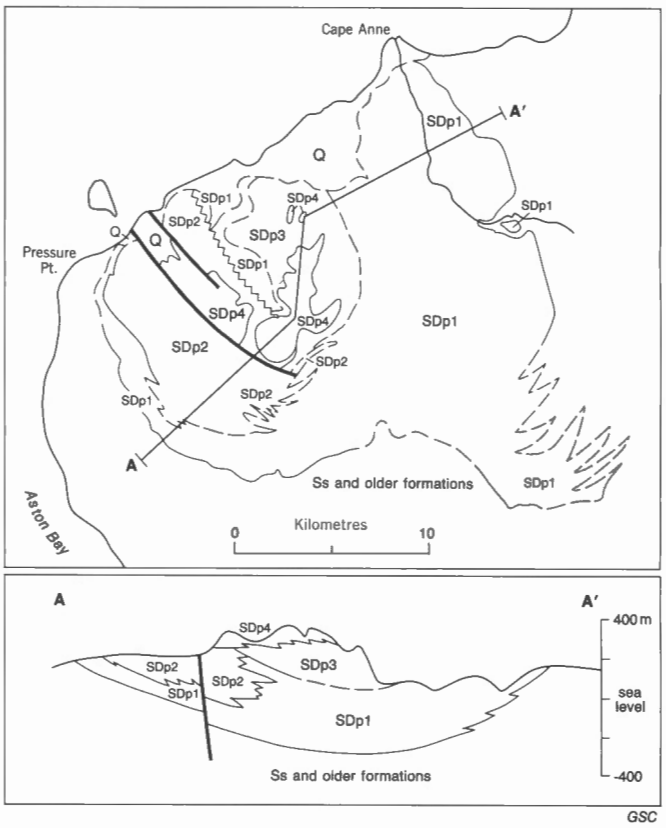

Figure 19. *Distribution of the four members of the Peel Sound Formation in northwestern Somerset Island. SDp = Peel Sound Formation, Ss = Somerset Island Formation (modified from Miall and Kerr, 1977).*

On Prince of Wales Island, the Peel Sound Formation is divisible into two members, both of which pass laterally westward into the predominantly carbonate rocks of the Drake Bay Formation. The Lower member is lithologically variable, and consists mainly of sandstone and conglomerate, together with subordinate interbedded limestone, dolostone and siltstone. The last three rock types are restricted to the lower half (approximately) of the Lower member, whereas oligomict conglomerate, conglomeratic sandstone and sandstone are characteristic of the upper half. According to Miall (1969), the Upper member of the Peel Sound Formation contains five facies belts, all of which parallel Boothia Uplift. The easternmost facies belt consists of coarse, polymict conglomerate, together with minor lenses of sandstone and conglomeratic sandstone. The remaining four facies belts are listed in order from east to west as follows: conglomerate-sandstone facies, sandstone facies, sandstone-carbonate facies, and carbonate facies.[2] Miall (*op. cit.*) concluded that this lateral sequence represents a continuum of sedimentary environments, ranging from alluvial fans in the east to a carbonate platform in the west.

Thorsteinsson (1980) correlated the polymict conglomerates, that occur in the upper Peel Sound Formation on both flanks of Boothia Uplift, on the basis of gross lithological similarity and stratigraphic position. On similar

[1]This interpretation differs from that proposed by Thorsteinsson (1980), who concluded that the base of Member 4 is marked by a major regional unconformity. This topic will be discussed in detail in the next section.
[2]The carbonate facies has now been excluded from the Peel Sound Formation, and included in the Drake Bay Formation.

grounds, he correlated the upper half of the Lower member of the Peel Sound Formation on Prince of Wales Island with members 1 through 3 of that formation in northwestern Somerset Island.

According to Thorsteinsson and Uyeno (in Thorsteinsson, 1980, p. 27), the upper part of the Lower member of the Peel Sound Formation on Prince of Wales Island is probably no younger than about early Pridolian in age. This age assignment is based on the association of the trilobite *Hemiarges bigener* Bolton with the conodont *Ozarkodina confluens* gamma morphotype of Klapper and Murphy (1975), at a level 318 m stratigraphically above the base of the Lower member. An early Pridolian age for the lower Peel Sound Formation in northwestern Somerset Island is also suggested, but not proven, by the recovery of the osteostracan, *Hemicyclaspis murchisoni* Egerton, from beds presently correlated with the upper part of the Upper member of the underlying Somerset Island Formation in Section 17 (see earlier discussion). Other vertebrate fossils collected from the lower three members of the Peel Sound Formation in the same area (Dineley, 1968; Broad and Dineley, 1973) have not proven diagnostic, and hence it cannot be conclusively demonstrated that this stratigraphic interval is confined in age to the early Pridolian. However, the correlation proposed by Thorsteinsson (1980) is accepted here, as it seems to be the most reasonable in terms of the available evidence (Table 3).

The age of the polymict conglomerates found in the upper Peel Sound Formation on Somerset and Prince of Wales islands is currently being debated. Two alternative ages are shown in Table 3, the older of which is favored by Miall (1983), and the younger of which is favored by Thorsteinsson and Uyeno (in Thorsteinsson, 1980).

According to Thorsteinsson and Uyeno (in Thorsteinsson, 1980, p. 27, 28), fossil collections from Miall's (1969, 1970a) sandstone-carbonate facies provide the only evidence for the age of the Upper member of the Peel Sound Formation on Prince of Wales Island. This facies yielded the conodont *Pelekysgnathus serratus serratus* Jentzsch, which was assigned a late Lochkovian age by Walliser (Thorsteinsson, 1980, p. 28). On the basis of detailed field observations by R. Thorsteinsson, along laterally continuous stream canyon and sea cliff exposures, Thorsteinsson and Uyeno (*op. cit.*) accepted earlier interpretations by Blackadar and Christie (1963) and Miall (*op. cit.*) that the series of facies belts recognized in the Upper member are correlative. They therefore inferred a similar age for the apparently laterally equivalent polymict conglomerate facies developed in easternmost Prince of Wales Island, and correlated this stratigraphic interval with the late Lochkovian (*pesavis* Zone) coarse clastics of the Snowblind Bay Formation in eastern Cornwallis Island (Table 3). This evidence, together with field observations of the lower contact of the polymict conglomerates on both Prince of Wales and Somerset islands, led Thorsteinsson (1980) to conclude that a major regional unconformity is probably present at that stratigraphic level on both sides of Boothia Uplift. This unconformity was considered by him to mark the commencement of a second period of renewed diastrophism that affected the whole of Boothia Uplift during Early Devonian time.

A somewhat different interpretation has been proposed by Miall and Gibling (1978) and Miall (1983) on the basis of field studies on both Somerset and Prince of Wales islands (Miall, 1969, 1970a, b; Miall and Kerr, 1977; Gibling, 1978). As was noted previously, these authors contend that, while Member 4 appears to rest unconformably on Member 2 in the western part of the Cape Anne Syncline, the same member also appears to form part of a gradational sequence in areas to the east where the complete Peel Sound succession is present (Fig. 19). The unconformity at the base of Member 4 in the west was, therefore, considered by them to be of local rather than regional significance.

Similar stratigraphic relationships have been inferred by Miall (1969, 1970a) in the case of the lower and upper members of the Peel Sound Formation in easternmost Prince of Wales Island. Studies of vertical changes in clast composition at certain localities led him to conclude that the contact between the two members is gradational in most areas. An exception to this occurs in northeastern Prince of Wales Island, where an angular unconformity has been mapped between rocks assigned by Thorsteinsson (1980) to the Douro Formation and the Upper member of the Peel Sound Formation. However, Miall (1983) has asserted that the tectonism in that area was probably very limited in areal extent, in view of the apparently gradational relationships recorded by him at the base of the Upper member elsewhere.

The interpretation that the Peel Sound sequence is internally conformable on either side of Boothia Uplift implies that the polymict conglomerates would probably not be younger than about middle or possibly late Pridolian in age, provided that an early Pridolian age is accepted for the underlying succession in both areas (Table 3). If this interpretation is correct, then the polymict conglomerates exposed in easternmost Prince of Wales Island could not be considered a direct lateral facies equivalent of the sandstone-carbonate facies farther west. It was noted previously that the apparent lateral equivalence of these two facies is based on observations from laterally continuous exposures. Throughout northern Prince of Wales Island, the strata in these exposures appear to be essentially flat-lying. However, Miall (1983) has suggested that a gentle, almost imperceptible westerly regional dip is implied by the presence of beds as young as late Pragian in age in westernmost Prince of Wales Island. If correct, this would imply that the polymict conglomerates in the easternmost part of the island represent only the lowermost, preserved portion of the Upper member in that area, and that progressively higher stratigraphic levels are preserved in a westerly direction. Accordingly, Miall (*op. cit.*) has suggested that the late Lochkovian fossil locality is in fact situated at a significantly higher stratigraphic level than that represented by the polymict conglomerate sequence to the east.

Clearly, further field work will be required to determine which of the two alternative interpretations discussed above is correct. Until more refined biostratigraphic control becomes available from the Upper member of the Peel Sound Formation on Prince of Wales Island, the stratigraphic problems of that member will go unresolved.

Upper Cretaceous

Kanguk Formation

Definition, distribution and thickness

The Kanguk Formation was named in the Kanguk Peninsula area of Axel Heiberg Island by Souther (1963). At that locality, the formation is composed mainly of silty shale and minor sandstone, and contains tuffaceous and bentonitic beds near its base. The Kanguk Formation is best known

from the Sverdrup Basin area, but the presence of widely scattered outcrops of the formation in areas to the south indicates that it once covered large parts of the Arctic Archipelago.

Only a single, small, fault-bounded outlier of the Kanguk Formation has been identified in the report area. The outlier is located about 2.5 km north of Creswell Bay (UTM 15X VL 462700E, 8077300N; **Somerset Island South**), where it was first studied by Dixon et al. (1973). Only about 15 m of the formation are visible, and neither of its contacts is exposed.

Lithology

According to Dixon et al. (1973), the exposure is composed predominantly of black fissile shale. The upper 3 m of the sequence contain thin interbeds of black limestone, from which abundant microfossils, fish scale fragments, and *Inoceramus* fragments have been recovered. The limestones are locally characterized by ripple marks and parallel lamination with low-angle truncations.

Dixon et al. (1973) inferred that the sequence was deposited in a nearshore, possibly lagoonal environment.

Age and correlation

The most abundant microfossils in the sequence are algal and fungal remains and phytoplankton, which occur in association with rare pollen and spores from higher plants. A Senonian (Late Cretaceous) age was assigned to the microflora by W.S. Hopkins (in Dixon et al., 1973). This age is consistent with the Santonian or Campanian age inferred for the Kanguk Formation on Devon Island on the basis of invertebrate and dinoflagellate collections (J.W. Wall and N.S. Ioannides, in Thorsteinsson and Mayr, in press).

Lower Tertiary

Eureka Sound Formation

Definition, distribution and thickness

Troelsen (1950, p. 78) proposed the name Eureka Sound Group for a succession of sandstones, shales and lignitic coals exposed in central Ellesmere Island and Axel Heiberg Island. This name was later downgraded to formational status by Tozer (1963, p. 92, 93). The type section of the formation is situated along Ariaksak Creek on Axel Heiberg Island (Souther, 1963, p. 444).

Several fault-bounded outliers of the Eureka Sound Formation are present on Somerset Island and northwestern Boothia Peninsula. The most prominent of these occurs north of Stanwell Fletcher Lake (**Somerset Island North; Somerset Island South**). Smaller outliers are present west of that lake, southeast of Cunningham Inlet (**Somerset Island North**), and on the western side of Wrottesley Inlet (**Boothia Peninsula North**). The exposures in northwestern Boothia Peninsula represent the southernmost reported occurrence of the Eureka Sound Formation in the Arctic Archipelago.

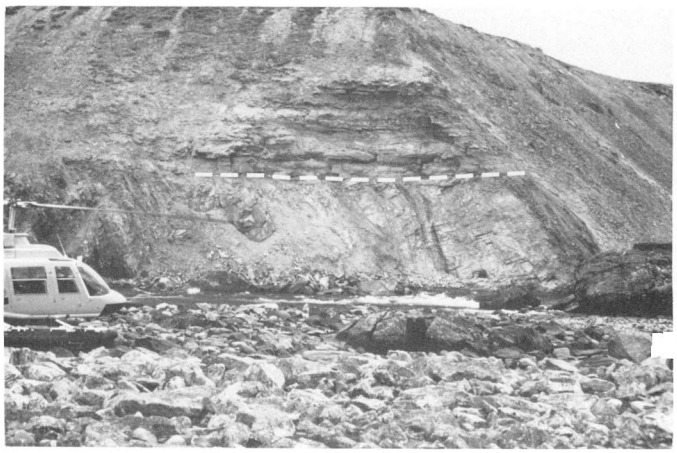

Figure 20. *Nonconformable contact between Eureka Sound Formation and gneisses of the Precambrian Shield, Stanwell Fletcher Lake area, southwestern Somerset Island. Contact marked by dashed line. ISPG photo. 827-127.*

The large outcrop area north of Stanwell Fletcher Lake was studied by Dineley and Rust (1968). While noting that the sequence could be broadly correlated with the Eureka Sound Formation, they assigned it the name Idlorak Formation, mainly because of the large distance between their study area and the closest outcrops of the Eureka Sound Formation known at the time. Miall and Kerr (1977) subsequently reassigned this sequence and the other occurrences noted above to the Eureka Sound Formation.

Dineley and Rust (*op. cit.*) estimated that the total preserved thickness of the sequence exposed north of Stanwell Fletcher Lake is about 300 m. At this locality, the formation rests nonconformably on crystalline rocks of the Precambrian Shield (Fig. 20). No thickness estimates are available for the Eureka Sound Formation elsewhere in the report area.

Lithology

The following stratigraphic succession was recorded by Dineley and Rust (1968) north of Stanwell Fletcher Lake:

1. 0-10 m: a thin basal conglomeratic layer overlain by a predominantly coarse grained arkosic sandstone sequence containing thin, plant-bearing siltstones.

2. 10-70 m: interbedded siltstone and shale. The shale contains abundant specimens of Lingula.

3. 70-300 m: a crossbedded sandstone sequence, containing thin, inextensive conglomerates, and reworked vertebrate remains (figs. 21, 22).

Paleocurrent evidence from the sandstones indicated a northern source for the sediments. This fact, combined with lithological evidence, led Dineley and Rust (*op. cit.*) to conclude that the faults bounding the present outcrop area were not active during of deposition. They considered the sequence to be regressive in nature, and attributed its origin to a prograding delta. A resemblance between the upper sandstone sequence and the deposits of certain modern braided river environments was noted by Miall and Kerr (1977).

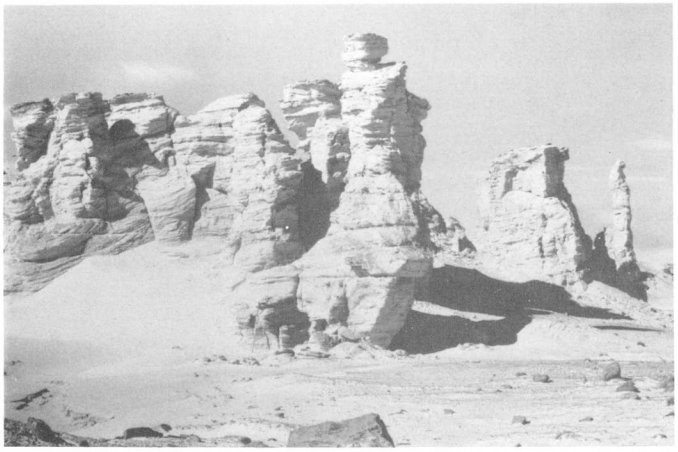

Figure 21. Outcrops of the Eureka Sound Formation, Stanwell Fletcher Lake area, southwestern Somerset Island. ISPG photo. 818-68.

Figure 22. Crossbedding in the Eureka Sound Formation, Stanwell Fletcher Lake area, southwestern Somerset Island. ISPG photo. 818-71.

Hopkins (1971) has described exposures of the Eureka Sound Formation southeast of Cunningham Inlet (**Somerset Island North**). At this locality, the formation is composed mainly of fine- to medium-grained, crossbedded sandstone containing poorly preserved plant remains. Subordinate pebble conglomerates and carbonaceous siltstones are also present. Similar rock types have been recorded in other outliers of the Eureka Sound Formation elsewhere in the report area (J.Wm. Kerr and A.D. Miall, unpubl. data).

Age and correlation

Palynomorphs recovered from the Eureka Sound Formation in the area southeast of Cunningham Inlet were recently re-evaluated by D.J. McIntyre, who assigned them an Early Tertiary (Middle to Late Paleocene) age (see Appendix 3). As the samples were randomly collected, it is not known whether this age is representative of the total age range of the formation at that locality. This age is consistent with the Maastrichtian to middle Eocene age range indicated for the Eureka Sound Formation in other parts of the Arctic Archipelago (West et al., 1975).

Abraided vertebrate fragments and silicified plant stems, resembling those known from Middle to Upper Devonian formations on islands to the north, have been reported by Dineley and Rust (1968) from the Eureka Sound Formation north of Stanwell Fletcher Lake. The fragments do not appear to have been transported very far, and are considered to represent evidence for the presence at one time of formations of that age on Somerset Island. Carboniferous miospores and megaspores have been recovered from shale chips from the Eureka Sound Formation near Wrottesley Inlet in northwestern Boothia Peninsula (W.S. Hopkins, unpubl. rept., 1976), suggesting that sediments of that age were also present at one time in the report area.

Intrusive rocks

Proterozoic intrusions

Diabase and gabbro intrusions cut the Aston and Hunting formations and the crystalline rocks of the Precambrian Shield in the report area. A particularly dense network of intrusions occurs in the area south of Aston Bay (**Somerset Island North**), where a series of narrow, steeply dipping dykes, thick sills (including one exceeding 183 m in thickness) and plugs has been emplaced (Fig. 23). Petrographic descriptions and chemical analyses of these rocks have been published by Blackadar (1967, p. 29-31).

The dykes intruding the Precambrian Shield throughout Boothia Peninsula and western Somerset Island have been mapped by Blackadar (1967; map sheets 2-1967 and 3-1967). These intrusions mainly strike between N45°W and N70°W, while a small number strike about N70°E (Blackadar, 1963b, p. 147). They represent the youngest intrusive event to affect the Precambrian Shield, and are presumed to be of late Proterozoic age (Kerr and de Vries, 1977).

In the area south of Aston Bay, two distinct trends of intrusions are present. The dominant set, represented by a large number of narrow dykes traversing both the Aston and Hunting formations, strikes in a northeasterly direction approximately between N40°E and N65°E. These were emplaced during the Franklin Igneous Event, dated by Christie and Fahrig (1983) at about 750 Ma. A few of the dykes strike toward the northwest, paralleling the majority of those found on the Shield. It is not clear whether these date from the same period of intrusion as the northeast trending dykes.

Figure 23. Dykes intruding the Hunting Formation, northwestern Somerset Island. ISPG photo. 827-11.

Numerous thick sills and plugs occur in the Aston Formation. One of the plugs, situated at UTM 15X VM 446100E, 8165500N, was found to be truncated by the lower contact of the Hunting Formation. It was emplaced during the Mackenzie Igneous Event, dated between 1260 and 1190 Ma by Patchett et al. (1978).

Kimberlite diatremes

Blackadar (in Blackadar and Christie, 1973, p. 13) described a "basic intrusion" situated in lower Paleozoic carbonates about 40 km north of Creswell Bay (**Somerset Island North**). The rocks of this intrusion were later demonstrated by Mitchell and Fritz (1973) to be kimberlites. A description of the mineralogy and petrology of the rocks of this intrusion (diatreme) was later published by these authors and by Clark and Mitchell (1975). Mitchell (1975) provided detailed information on the geology, magnetic expression and structural control of the diatreme and two others located near by.

In the period since the above-cited studies were carried out, a number of kimberlite diatremes have been identified on Somerset Island, where they occupy a broad belt trending approximately northeast-southwest (Mitchell, 1976). The most prominent of these is the series of Batty diatremes, located approximately 25 km northwest of Batty Bay (**Somerset Island North**). Other diatremes include the Elwin Bay diatreme, situated immediately south of Elwin Bay (Fig. 24), the Ham, Nord, Ouest and Jos diatremes, situated in north-central Somerset Island, and the Creswell diatreme, located about 9 km north of Creswell Bay. The mineralogy and petrology of these diatremes have been discussed in detail in a series of papers dating from 1976 on (Mitchell, 1977, 1978a, b, 1979; Mitchell and Clark, 1976; Mitchell and Meyer, 1980).

Claims were staked over the diatremes in 1973 as part of a diamond prospecting program that included the construction of a mill on the main Batty diatreme. No commercial quantities of diamonds were recovered.

The age of the kimberlite diatremes remains an open question. As of the time of writing, no reliable radiogenic ages have been obtained from these rocks, although work is currently in progress (R.H. Mitchell, pers. comm., 1982). The diatremes are known to intrude the Somerset Island Formation, and they therefore postdate the Late Silurian. Kerr (1980) has suggested that this intrusive event might be related to the Cretaceous-Tertiary Eurekan Rifting Episode (as defined by Kerr, 1977), but this cannot be proved on the basis of available evidence.

Figure 24. *Kimberlite diatreme at Elwin Bay, northeastern Somerset Island. The diatreme intrudes the Cape Storm Formation at this locality. ISPG photo. 827-185.*

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APPENDIX I

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11	This report	75-RAE-9B5, 9B6, 9B7, 9B8, 9A, 9, 17
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13	M.R. Gibling, unpublished section	G74A
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18	M.R. Gibling, unpublished section	G74C
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APPENDIX 2

STRATIGRAPHIC SECTIONS

All available stratigraphic sections measured on Somerset Island and northern Boothia Pennisula have been numbered consecutively from north to south and plotted on the accompanying series of geological maps. An index to these sections is provided in Appendix 1.

The Siluro-Devonian stratigraphic sections described herein were measured during Operation Boothia by G.E. Reinson in 1975 (sections designated as 75-RAE) and A.D. Miall in 1976 (sections designated as 76-MLA). The Cambro-Ordovician sections measured as part of this operation were published by Miall and Kerr (1980). Other GSC sections measured in the area prior to Operation Boothia are described or illustrated in separate reports (see References).

Unpublished stratigraphic sections measured by geologists from the University of Ottawa (J.D. Dixon, B. Jones, M.R. Gibling, G.M. Narbonne and J.M. Savelle) are available from the Department of Geology, University of Ottawa, Ottawa, Ontario, Canada, K1A 6N5.

In the following stratigraphic sections, the term "siltstone", as used in the descriptions of the Peel Sound and Somerset Island formations, implies only a field grain size observation. Preliminary petrographic studies by A.D. Miall suggest that many of the siltstones present in these formations are in fact dolosiltites, and are composed predominantly of silt-sized dolomite rhombs in association with variable proportions of quartz silt. Since the distinction between quartzose siltstones and dolosiltites is difficult from direct field observation, the term "siltstone", as applied below, encompasses these two end members and all gradations in between.

SECTION 3. West of Cunningham Inlet (Field sections 76-MLA-45 and 46). Section 76-MLA-45 commences on the east side of an unnamed stream, 6.8 km west of Cunningham Inlet, continues north across the core of an anticline, then continues farther north up the east wall of a stream canyon. This section is poorly exposed. Section 76-MLA-46 was measured on the east wall of an unnamed stream canyon, 11.5 km west of Cunningham inlet. Precise correlation between the two sections is uncertain. Taken together, they constitute Section 12 of Miall and Gibling (1978).

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	Field section 76-MLA-45		
	SOMERSET ISLAND FORMATION Upper member (incomplete)		
10	**Dolostone:** grey, buff weathering; laminated, platy bedded, with ripple marks; resistant; trace fossils	2.0	312.0
9	**Siltstone:** parts sandy, as in Unit 6	33.0	310.0
8	**Sandstone:** green-grey, very fine grained; laminated; rare mud-lined laminae and ripple marks	3.0	277.0
7	**Siltstone and shale:** silty shale; green	17.0	274.0
6	**Siltstone:** parts sandy; red to green, parts mottled; platy weathering, rubbly	11.0	257.0
5	**Dolostone, siltstone and sandstone:** dolostone – buff weathering, platy weathering; siltstone – slightly dolomitic, pink, finely laminated; and sandstone – red, fine grained, with parting lineations	111.0	246.0
4	**Dolostone:** grey weathering; slabby weathering; with intraclast breccia and ripple marks	5.0	135.0
3	**Dolostone and siltstone:** dolostone – buff weathering, platy weathering; siltstone - slightly dolomitic, pink, finely laminated	90.0	130.0
	Lower member (incomplete)		
2	**Dolostone:** buff weathering; platy weathering; felsenmeer only	30.0	40.0
1	**Dolostone:** slightly nodular; platy weathering; abundant trace fossils	10.0	10.0

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	Field section 76-MLA-46		
	SOMERSET ISLAND FORMATION Lower member (incomplete)		
8	**Limestone:** rubbly; gastropods, ostracods and rare nautiloids	18.7	96.7
7	**Limestone:** massive; abundant stromatoporoids and solitary corals	0.5	78.0
6	**Dolostone:** recessive; buff; finely planar laminated; argillaceous partings; rare desiccation cracks; rare trace fossils; ostracods	24.5	77.5
5	**Dolostone:** mottled; slightly rubbly weathering; abundant trace fossils; sharp upper contact	15.0	53.0
4	**Dolostone:** buff; finely planar laminated; argillaceous partings; rare desiccation cracks; rare trace fossils; ostracods	26.0	38.0
3	**Dolostone:** medium grey; slightly wavy or platy bedded; laminated; with oscillation ripples	4.5	12.0
2	**Dolostone:** medium grey; massive bedded, finely laminated; fish fossils	0.5	7.5
1	**Dolostone:** medium grey; slightly wavy or platy bedded; laminated	7.0	7.0

SECTION 6. West of Cunningham Inlet (Field section 76-MLA-47). This section commences on the south side of a small tributary stream, 13 km west of Cunningham Inlet and 4.7 km south of the north coast of Somerset island.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	SOMERSET ISLAND FORMATION (undivided) (incomplete)		
25	**Siltstone:** sandy; parts ripple laminated; lenses of very fine grained sandstone	5.3	37.5
24	**Sandstone:** pink to red weathering; fine grained; abundant climbing ripples; sharp, slightly channelled base	0.4	32.2
23	**Siltstone:** purple	1.8	31.8
22	**Sandstone:** silty; red; very fine grained; faintly bedded; sharp lower contact, gradational upper contact	1.2	30.0
21	**Siltstone:** purple	0.4	28.8
20	**Sandstone:** silty; red; very fine grained; faintly bedded	0.2	28.8
19	**Siltstone:** purple	0.7	28.2
18	**Sandstone:** silty; red; very fine grained; faintly bedded	0.2	27.5
17	**Siltstone:** purple	2.6	27.3
16	**Sandstone:** grey; convolute laminae	0.2	24.7
15	**Siltstone:** purple	3.9	24.5
14	**Sandstone:** finely laminated and ripple marked; sharp lower contact, gradational upper contact	0.2	20.6
13	**Siltstone:** purple	0.7	20.4
12	**Sandstone:** silty; red; very fine grained; abundant ripple marks; sharp upper and lower contacts	0.2	19.7
11	**Siltstone:** purple and red	0.2	19.5
10	**Siltstone:** purple	1.4	19.3
9	**Sandstone:** finely laminated and ripple marked; 2 cm thick unit of red, hard siltstone at base	0.4	17.9
8	**Siltstone:** purple	1.6	17.5
7	**Sandstone:** finely laminated and ripple marked	0.2	15.9
6	**Siltstone:** purple	3.2	15.7
5	**Sandstone:** finely laminated and ripple marked; sharp base	0.2	12.5
4	**Siltstone:** purple; fossil fish fragments	1.8	12.3
3	**Sandstone:** pink weathering, very fine grained; laminated and ripple-marked; interbedded with mudstone, silty, purple	0.8	10.5
2	**Mudstone:** silty; purple	0.9	9.7
1	**Sandstone:** silty; very fine grained; interbedded with silty mudstone green-grey weathering	8.8	8.8

SECTION 7. Cunningham Inlet (Field sections 76-MLA-51 and 52). Section 76-MLA-51 commences at the base of a prominent NW-SE trending escarpment in a tributary canyon 3.5 km SE of Cunningham Inlet, and continues upstream to an interpreted flexure. It begins again north of the flexure and climbs the west canyon wall. There appears to be no significant stratigraphic break across the flexure. Section 76-MLA-52 starts 1.3 km farther upstream. The base of Section 76-MLA-52 appears to be at about the same stratigraphic level as the top of Section 76-MLA-51.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	Field section 76-MLA-52		
	SOMERSET ISLAND FORMATION Lower member (incomplete)		
14	**Dolostone:** grey, buff weathering; finely laminated; slabby to platy weathering; rare large stromatoporoid colonies, smooth-shelled brachiopods, ostracods and trace fossils	6.0	330.0
13	**Dolostone:** grey, buff weathering; finely crystalline; rubbly weathering; a few smooth-shelled brachipods, stromatoporoids and crinoid fragments	14.4	324.0
12	**Dolostone:** grey, buff weathering; finely laminated; slabby to platy weathering; rare smooth-shelled brachiopods, ostracods and trace fossils	13.6	309.6
11	**Dolostone:** grey, buff weathering; finely crystalline; rubbly weathering; a few smooth-shelled brachiopods, stromatoporoids and crinoid fragments	16.0	296.0
	Field section 76-MLA-51		
10	Covered interval: felsenmeer siltstone as in Unit 9	10.0	280.0
9	**Siltstone:** medium to dark grey, buff weathering; finely laminated; slabby to blocky weathering	51.0	270.0
8	**Siltstone:** as in Unit 9, with oscillation ripple marks	1.0	219.0
7	**Siltstone:** as in Unit 9	11.0	218.0
6	**Shale:** dolomitic; finely laminated; "papery" weathering	0.3	207.0
5	**Limestone:** very argillaceous; laminated; slightly rubbly; rare solitary corals; appears to be transitional Douro-like lithology	2.7	206.7
	Flexure		
	DOURO FORMATION (incomplete)		
4	**Limestone:** argillaceous, with abundant thin shaly partings; rubbly; ripple laminated; trace fossils and brachiopods; interbeds on 1-2 m scale of bioclastic limestone, massive bedded, containing crinoidal debris, solitary and compound corals	104.0	204.0
3	**Limestone:** argillaceous, with abundant thin shaly partings; rubbly; ripple laminated; trace fossils and brachiopods; lenses of bioclastic limestone, with crinoid debris	89.0	100.0
2	**Shell bed:** massive bedded; consisting of large brachiopods	0.5	11.0
1	**Limestone:** argillaceous; rubbly; brachiopods and stromatoporoids	10.5	10.5

SECTION 10. Pressure Point (Field section 75-RAE-15). The section is situated in the Cape Anne Syncline, in butte-like hills of conglomerate and sandstone.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	PEEL SOUND FORMATION Member 4 (incomplete)		
46	**Conglomerate:** polymictic; clast – supported, bimodal; matrix – sandstone, red-brown, coarse grained, well sorted; clasts – diabase, dolostone and quartzite, well rounded, average diameter 12 cm; unstratified; inversely graded in lower part, normally graded in upper part	8.7	198.2
	Member 3 (incomplete)		
45	**Sandstone:** red-brown, weathering same, coarse grained, fining upward to fine grained; low-angle crossbedded to planar bedded; passing upward to fine, planar, red and buff-yellow interlaminae; poorly sorted near base, becoming well sorted upwards	8.8	189.5
44	**Conglomerate:** as in Unit 46, except ungraded	2.2	180.7
43	**Sandstone:** deep blood red, weathering same, with rare yellow-buff layers; fine grained; fine planar laminae; well sorted; friable	0.6	178.5
42	Covered interval	5.0	177.2
41	**Siltstone:** green-grey, weathering same with reddish stain; platy laminated	0.2	117.6
40	**Sandstone:** red-brown, weathering same; fine grained; platy laminated; well sorted	0.2	117.4
39	Covered interval	5.0	177.2
38	**Sandstone:** red-brown, weathering same; medium to coarse grained; medium bedded, low-angle crossbedded; poorly sorted; friable; largely inaccessible	9.0	172.2
37	Covered interval	12.0	163.2
36	**Sandstone:** red-brown, weathering same, medium to fine grained; medium scale low-angle crossbedded to planar bedded; poorly sorted; friable	2.0	151.2
35	**Conglomerate:** as in Unit 46, except ungraded and polymodal, with medium to coarse grained, poorly sorted sand matrix	1.5	149.2
34	**Sandstone:** as in Unit 43	0.6	147.7
33	Covered interval	12.0	147.1
32	**Sandstone:** red, weathering same, coarse grained grading to fine grained upward; medium-scale tangential and trough crossbedded, sets decreasing in scale upward; poorly sorted	2.1	135.1
31	**Sandstone:** red-brown, weathering same; coarse grained; large-scale trough crossbeds, each with pebble layer at base; unit truncated by overlying unit	2.1	133.0
30	Covered interval	5.3	130.9
29	**Sandstone:** red-brown, weathering same; fine to medium grained; medium-scale trough cross-bedded, sets decreasing in scale upward; poorly sorted	5.6	125.6
28	**Sandstone:** red-brown, weathering same; coarse grained; medium-scale, high-angle crossbeds; poorly sorted	2.1	120.0

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
27	**Sandstone:** red-brown, weathering same; fine to medium grained; very large scale trough crossbedding, some with coarse grained residuals at their bases, passing upward into planar laminae; unit top scoured by overlying crossbeds	6.5	117.9
26	Covered interval	15.0	111.4
25	**Sandstone:** as in Unit 29, except small-scale trough crossbedded	1.1	96.4
24	Covered interval	5.6	95.3
23	**Sandstone:** as in Unit 29, except grain size varies from medium to coarse grained	2.6	89.7
22	**Sandstone:** as in Unit 27	3.0	87.1
21	Covered interval	13.5	84.1
20	**Sandstone:** red-brown, weathering same; coarse grained; medium-scale, low-angle trough crossbedding; poorly sorted; approximately 20% feldspar grains	1.0	70.6
19	Covered interval	7.5	69.6
18	**Sandstone:** red-brown, weathering same; medium to coarse grained, fining upward; large-scale trough crossbedding, sets decreasing in scale upward, with pebble and boulder lags at base and occasionally within set; poorly sorted, becoming better sorted upward	2.0	62.1
17	**Sandstone:** as in Unit 18, except unit coarsens upward and scale of crossbedding sets increases upward; gradational upper contact	2.2	60.1
16	**Sandstone:** identical to Unit 18; gradational upper contact	4.0	57.9
15	**Siltstone:** red-brown, weathering same; very thin to thin bedded	0.3	53.9
14	**Sandstone:** as in Unit 28	0.5	53.6
13	**Sandstone:** as in Unit 27	9.2	53.1
12	**Sandstone:** as in Unit 18	5.0	43.9
11	Covered interval	8.0	38.9
10	**Sandstone:** red-brown, weathering same; fine to medium grained; fining upward; tangential cross-sets less than 25 cm thick at base, sets decreasing in scale upward, passing into small trough cross-sets at top; poorly sorted; rare cobbles and pebbles	1.3	30.9
9	**Sandstone:** as in Unit 10	3.0	29.6
8	Covered interval	4.1	26.6
7	**Sandstone:** red-brown, weathering same; coarse grained at base, fining upward to fine grained; trough crossbedding, basal sets 30 cm amplitudes and 50 cm lengths, decreasing to 10 cm amplitudes and 25 cm lengths upward; poorly sorted, with floating cobbles and pebbles in lower part	2.5	22.5
6	**Sandstone:** as in Unit 7, except basal part very coarse to coarse grained	3.7	20.0
5	**Sandstone:** red-brown, weathering same; fine to medium grained; large-scale, high-angle planar crossbedded; well sorted; friable; sharp upper contact	1.6	16.3
4	Covered interval	10.5	14.7
3	**Sandstone:** red, weathering same; medium grained; small-scale trough crossbedding increasing in scale upward; becomes interlaminated with yellow-buff sandstone in upper part; well sorted	1.0	4.2
2	**Sandstone:** red, weathering same; very fine grained; homogeneous; recessive; moderately well sorted	1.2	3.2
1	**Sandstone:** red, weathering same; fine to medium grained; low-angle planar crossbedding at base, passing rapidly upward to small-scale trough crossbeds; well sorted; resistant	2.0	2.0

SECTION 11. Cape Anne River (Field sections 75-RAE-17, 9, 9A, 9B8, 9B7, 9B6 and 9B5). This is a composite section measured east of the axis of the Cape Anne Syncline, along the river draining into Cape Anne proper. The beds dip westward at a very low angle: as a result, a number of isolated subsections were measured and tied in stratigraphically by tracing beds from a helicopter. Section 75-RAE-9 is situated at the type section of the Peel Sound Formation.

Field section 75-RAE-17

PEEL SOUND FORMATION
Member 1
(incomplete)

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
178	**Sandstone:** red, weathering olive-green to red; fine to medium grained, fining upward to very fine grained; medium bedded with shallow trough crossbeds, becoming thin bedded and mature upward; occasional feldspar grains	0.6	343.8
177	**Sandstone:** as in Unit 178	0.7	343.2
176	Covered interval	0.5	342.5
175	**Sandstone:** red-green, weathering same; very fine grained; very thin platy-like beds becoming thicker upward; laminated to very low-angle crosslaminated; mature	0.6	342.0
174	**Sandstone:** red-brown, weathering same; fine grained; small-scale, shallow trough crossbeds; recessive; sharp upper contact	0.9	341.4
173	Covered interval	1.5	340.5
172	**Sandstone:** red and green variegated, weathering olive-red to red-grey; medium grained; thin to medium bedded, trough crossbedded	0.9	339.0
171	Covered interval	1.3	338.1
170	**Sandstone:** red-grey, weathering rusty-brown; fine grained; distinctly laminated to thin bedded	0.6	336.8
169	Covered interval	1.2	336.2
168	**Sandstone:** red-grey, weathering red and olive-green on bedding planes; medium grained, fining upward; planar crossbeds with ripple marked surfaces, becoming planar laminated upward with ripple marked surfaces; mature	1.1	335.0
167	**Sandstone:** as in Unit 168	0.4	333.9
166	Covered interval	3.6	333.5
165	**Sandstone:** red-brown; fining-upward cycle: lower part medium to coarse grained with mud clasts, medium to thick bedded, and trough crossbedded; grades upward into sandstone, fine grained, very thin bedded, ripple crosslaminated	2.5	329.9
164	**Sandstone:** red, weathering red and olive-green on bedding planes; fine grained; very thin to thin planar bedded; friable	1.3	327.4
163	**Sandstone:** purple-red, weathering same; very fine grained; very thin bedded with small-scale ripple crosslaminae; mature; friable	0.9	326.1
162	**Sandstone:** as in Unit 163, except with patchy red and green variegated weathering colours	0.6	325.2

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
161	Covered interval	3.4	324.6
160	**Sandstone:** red-brown, weathering same; fine to coarse grained; small-scale crossbedding; poorly sorted; subangular; friable	0.6	321.2
159	Covered interval	3.0	320.6
158	**Sandstone:** red and green variegated, weathering same; fine to medium grained; variable bedding, including parallel lamination and small-scale trough and planar to low-angle crosslamination; mud clasts and mud pebbles	1.1	317.6
157	Covered interval	1.7	316.5
156	**Sandstone:** as in Unit 158	3.0	314.8
155	Covered interval	2.0	311.8
154	**Sandstone:** red-grey, weathering red and olive-green; very fine grained in base coarsening upward to fine to medium grained in upper part; small-scale trough and tangential crosslaminae in lower part, grading up to medium-scale trough crossbeds at top of unit; abundant mud clasts in upper part	1.5	309.8
153	**Sandstone:** purple-red, weathering same; silty to very fine grained; platy laminated; recessive	0.3	308.3
152	**Sandstone:** dark red-grey, weathering red and olive-green; medium grained, apparent slight coarsening upward; planar laminae at base, followed upward by ripple crosslaminae, followed upward by medium-scale trough crossbeds	2.8	308.0
151	**Sandstone:** red-grey, weathering rusty-brown; fine grained; very thin bedded; well sorted. Interbedded with **siltstone:** sandy; identical colour; very thin platy bedded	0.4	305.2
150	**Sandstone:** rusty-brown, weathering same, with olive-green bedding plane surfaces; fine to medium grained at base, grading upward to fine grained; thin bedded, with low-angle tangential crossbeds, grading upward to medium bedded, with high-angle tangential crossbeds; mud clasts in upper part of cycle	0.6	304.8
149	**Sandstone:** as in Unit 150	2.1	304.2
148	**Sandstone:** as in Unit 150	3.0	302.1
147	**Sandstone:** red-grey, weathering rusty-brown; fine grained; medium- to thick-bedded; well sorted. Interbedded on 0.4-0.5 m scale with **siltstone:** sandy, identical colour, very thin platy bedded.	2.8	299.1
Field sections 75-RAE-9, 9A			
146	Covered interval (estimated)	10.0	296.3
145	**Sandstone:** purple-grey, weathering buff pink-grey; fine grained; thick bedded; planar laminated to low angle crosslaminated; well sorted	2.0	286.3
144	Covered interval	0.8	284.3
143	**Sandstone:** red-brown, weathering same; fine grained; very thin platy beds constituting large trough crossbed sets, 0.5 m in amplitude and 4.0 m in length; mature	1.5	283.5
142	Covered interval	5.3	282.0
141	**Sandstone:** red-brown, weathering same; medium grained, coarsening upward to coarse grained; laminated to very thin bedded; platy; becoming crosslaminated upwards	4.9	276.7
140	Covered interval	6.0	271.8
139	**Sandstone:** red, weathering same; coarse grained; laminated to very thin bedded; moderately sorted; subangular	1.3	265.8
138	Covered interval	1.5	264.5
137	**Sandstone:** variegated olive-green and red, weathering same; medium grained; laminated; medium-scale low-angle crossbeds; mature	1.0	263.0
136	Covered interval	1.5	262.0
135	**Sandstone:** red, weathering orange-grey; fine to medium bedded, with small crosslaminae at base and occasional trough crossbeds, 10 cm in amplitude and 25 cm in length, in middle	3.6	260.5
134	**Siltstone:** purple, weathering purple-grey; thick to massive bedded; blocky to "cube-like" weathering pattern	0.6	256.9
133	**Siltstone:** sandy; red-brown, weathering same; very thin bedded, platy; contains sand, fine to medium grained; rubbly and friable, recessive unit	0.5	256.3
132	**Sandstone:** red-brown, weathering same; medium grained, becoming finer grained upward; thin bedded with low-angle crosslaminae, becoming very thin bedded and planar laminated upward	2.0	255.8
131	**Sandstone:** as in Unit 132, except entirely small-scale trough crossbedded, sets 10 cm in amplitude and 25 cm in length	0.5	253.8
130	**Sandstone:** red-brown, weathering same; fine to medium grained; very thin bedded to platy; rubbly; recessive	0.3	253.3
129	**Sandstone:** red-brown, medium to coarse grained; trough crossbeds about 10 cm in amplitude, 30 cm in length; submature	0.3	253.0
128	**Sandstone:** as in Unit 130	0.4	252.7
127	**Sandstone:** red, weathering orange-grey; medium grained; interbedded planar laminae and crosslaminae; mature	1.1	252.3
126	**Siltstone:** as in Unit 133	2.0	251.2
125	**Sandstone:** as in Unit 127	1.5	249.2
124	Covered interval	0.9	247.7
123	**Sandstone:** buff-grey to red, weathering pink-grey; medium grained, fining upward; small-scale crosslaminated at base, to planar laminated in upper part	1.9	246.8
122	Covered interval	1.1	244.9
121	**Sandstone:** red, weathering red-brown with olive-green bedding planes; medium to coarse grained at base, grading to coarse grained with mud clasts in middle, then grading back to medium grained at top; large-scale trough crossbeds (0-1.0 m), convolute laminae (1.0-1.5 m), medium-scale crossbeds, decreasing in scale upward (1.5-3.0 m), medium-scale trough crossbeds, 20 cm thick (3.0-4.3 m)	4.3	243.8
120	**Sandstone:** red, weathering red-brown; medium grained near base, fining upward to middle, then grading upward to coarse grained at top; thick bedded at base, medium bedded in middle, thick bedded at top; low angle tangential to trough crossbeds, 10 cm in amplitude and 1 m in length; resistant	5.9	239.5
119	**Sandstone:** red; fine grained; platy. Interbedded with **siltstone:** sandy, green-grey, platy; recessive	1.1	233.6
118	**Sandstone:** wine to olive-green, weathering pink-grey; medium grained; medium bedded; well sorted; resistant	0.8	232.5
117	**Siltstone:** as in Unit 133	0.4	231.7

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
116	**Sandstone:** red-brown, weathering same; fine grained to silty; thin bedded, becoming very thin bedded and platy upward, laminated; submature; resistant at base, becoming recessive upward	1.8	231.3
115	**Sandstone:** brown, weathering rust; medium grained near base, fining upward to fine grained; thin to medium bedded; planar crosslaminated	0.8	229.5
114	**Siltstone:** as in Unit 134	0.4	228.7
113	**Siltstone:** as in Unit 133	0.2	228.3
112	**Siltstone:** as in Unit 134	0.6	228.1
111	**Sandstone:** red-brown, weathering same; fine- to coarse-grained, fining upward; thick bedded at base, becoming thin bedded upward; entirely trough crossbedded, amplitude 10 cm, length 25 cm, decreasing in scale upward; resistant; 0.3 m thick siltstone unit at base contains ostracoderm fragments; gradational upper contact	1.4	227.5
110	**Siltstone:** as in Unit 134	1.9	226.1
109	**Sandstone:** red-brown, weathering same; coarse grained at base grading upward to siltstone; low-angle crossbeds grade upward into low angle crosslaminae; ostracoderm fragments	1.3	224.2
108	**Siltstone:** as in Unit 134	0.4	222.9
107	**Siltstone:** wine-red, weathering reddish-grey; interbedded with fine grained sandy beds; thin bedded; poorly exposed; ostracoderm debris in scree	2.8	222.5
106	Covered interval	0.8	219.7
105	**Sandstone:** olive-buff to pink-grey, weathering buff-yellow with pink zones; very fine grained; very thin to thin bedded; partially covered.	2.5	218.9
	SOMERSET ISLAND FORMATION Upper member (incomplete)		
104	**Siltstone:** sandy; red, weathering wine; medium bedded	2.3	216.4
103	**Siltstone:** purple with red specks, weathering same; thin to medium bedded; conchoidal-blocky fracturing alternates with resistant ledge-like weathering	3.6	214.1
102	**Siltstone:** purple-grey, weathering same; medium bedded near base, becoming platy to thin bedded upward	3.6	210.5
101	**Siltstone:** purple-grey with red specks; medium to thick bedded; uneven conchoidal to sharp triangular fracturing; resistant	3.5	206.9
100	**Siltstone:** olive-green with wine specks, weathering same; thin bedded; rubbly; recessive	0.7	203.4
99	**Siltstone:** "eye-ball"-like red and olive-grey colour pattern; thick bedded; fractured, resistant. Interbedded with **siltstone:** red; very thin bedded; conchoidal to blocky fractured; recessive	8.3	202.7
98	**Siltstone:** brown-red, weathering wine with patchy colour pattern; thin bedded; blocky, uneven fracture	2.2	194.4
97	**Siltstone:** green-grey and pink, weathering rusty greenish-red; thin bedded; faintly laminated	1.7	192.2
96	**Siltstone:** wine-red with green flecks, weathering same; thin to medium bedded; blocky-conchoidal fracture; recessive	1.1	190.5
95	**Siltstone:** light olive-green with red specks, weathering patchy light green and rusty-wine; medium to thick bedded	1.7	189.4
94	**Siltstone:** as in Unit 96, except purple, weathering rusty-brown	1.7	187.7
93	**Siltstone:** light green, weathering orange-green; thin to medium bedded; conchoidal fracturing; gradational upper contact	0.3	186.0
92	**Siltstone:** variegated red and olive-green with olive-green bedding planes; thin bedded, with alternating red and olive-grey laminae, becoming slightly platy in upper part; gradational upper contact	2.4	185.7
91	**Siltstone:** pink-grey, weathering wine-red; thick bedded; floating quartz sand	1.4	183.3
90	**Siltstone:** red-brown, weathering wine-red; medium bedded	1.7	181.9
89	**Siltstone:** light olive-grey, weathering same; thick bedded; resistant	0.3	180.2
88	**Siltstone:** red, weathering variegated green and red; thick bedded; floating quartz sand grains	0.8	179.9
87	**Siltstone:** as in Unit 88, except sand-free and becomes thin bedded and recessive upward	1.9	179.1
86	**Siltstone:** red, weathering olive-green; thick bedded; resistant; tops of some beds contain large vugs suggesting evaporitic solution and/or penecontemporaneous porosity formation	5.4	177.2
	Field section 75-RAE-9B8		
85	**Sandstone:** very calcareous, red-green variegated, weathering orange-red, bedding planes coloured lime green with red patches; medium grained; medium to thick bedded, thinning upward	2.6	171.8
84	**Sandstone:** as in Unit 85; interbedded with siltstone; purple-grey; medium bedded	3.2	169.2
83	Covered interval	3.3	166.0
82	**Sandstone:** as in Unit 85	1.0	162.7
81	**Sandstone:** as in Unit 85; poorly exposed	5.0	161.7
80	**Limestone:** green-grey, weathering dark brown-grey; micritic; medium bedded; "lumpy"; hard; rare vugs	0.5	156.7
79	**Sandstone:** red-brown, weathering same; thin bedded; laminated	0.4	156.2
78	Covered interval	3.3	155.8
77	**Siltstone:** olive-grey, weathering same, with red and green bedding planes; thin bedded; laminated	0.5	152.5
76	**Siltstone:** purple-grey, weathering same; thick to massive bedded; cubic to blocky fracture; recessive. Interbedded with **siltstone:** red-green; massive bedded; with conchoidal to "loaf-like" weathering pattern	12.0	152.0
75	**Sandstone:** variegated red and green, weathering pink-green; fine grained; thin bedded, becoming medium bedded upward	1.3	140.0
74	**Siltstone:** sandy; pink-grey, weathering red; very thin bedded to platy laminated; fine, distinct laminae marked by dark partings	0.9	138.7
73	**Sandstone:** variegated red and green, weathering orange; fine grained; medium bedded	0.8	137.8
72	**Sandstone:** as in Unit 73, except very thin to platy bedded	0.7	137.0

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
71	**Limestone:** brown-grey mottled, weathering light grey in lower part with alternating olive-green and "lumpy" dark brown layers in upper part; micritic; medium bedded, irregular bedding planes at base, becoming thin, irregularly bedded upward; "lumpy" texture	3.9	136.3
70	**Limestone:** silty; olive-grey, weathering light grey, becoming dark grey upward; micritic; laminated; on weathered surface some laminae completely bleached out; gradational upper contact	3.2	132.4
69	**Limestone:** olive-grey, weathering green-grey; micritic; thin bedded; floating quartz sand grains; irregular fracturing	3.7	129.2
68	**Limestone:** as in Unit 69, except medium bedded	0.6	125.5
67	**Siltstone:** variegated red and green, weathering same; thick bedded; cubic to blocky fracture pattern; rubbly; recessive	2.0	124.9
66	**Limestone:** sandy; light olive-grey with red flecks and streaks, weathering orange-grey to green-grey; micritic; medium bedded; ostracoderms	1.5	122.9
65	**Siltstone:** purple-grey, weathering same; massive bedded; cubic fracturing; recessive	1.3	121.4
64	**Limestone:** very sandy; green-grey, weathering same; micritic; thin to medium bedded; sand content decreases upward; resistant cliff-former	3.7	120.1
63	**Siltstone:** red and green mottled, weathering same; medium to very thin, variably bedded	1.7	116.4
62	**Limestone:** silty, brown-grey, weathering buff-green; micritic; very thin to thin bedded; resistant	1.3	114.7
61	**Limestone:** silty, olive-grey, weathering same; micritic; massive bedded; cubic to blocky fracturing; recessive	0.9	113.4
60	**Limestone:** olive-grey with red specks, weathering buff-green; micritic; medium bedded; irregular fracture; slightly recessive	1.3	112.5
59	**Limestone:** brown-grey, weathering olive-grey; micritic; thin, slightly wavy bedded, becoming thick bedded upward; resistant ridge-former	1.7	111.2
Field section 75-RAE-9B7			
58	**Limestone:** dark green-grey, weathering olive-grey, becoming lighter in colour downward; micritic; medium bedded	1.2	109.5
57	**Limestone:** light buff-grey, weathering light grey; micritic; thin bedded, faintly laminated; gradational upper contact.	1.0	108.3
Field section 75-RAE-9B6			
56	Covered interval (estimated)	25.0	107.3
55	**Siltstone:** olive-green and red variegated, weathering same; very thin to thin bedded; cliff-former	2.4	82.3
54	Covered interval	0.8	79.9
53	**Limestone:** silty; lime green, weathering dark green; micritic; medium bedded becoming thin bedded upwards	1.7	79.1
52	**Siltstone:** yellow-green, weathering orange-grey; thin bedded	2.8	77.4
51	**Limestone:** as in Unit 53	1.5	74.6
50	**Limestone:** medium to dark-grey, weathering same; micritic; thin bedded; grading downward into "lumpy", thin bedded, grey-brown, "clotted" limestone	1.7	73.1
49	Covered interval	0.8	71.4
48	**Limestone:** light-grey at base; micritic; thin bedded; grades upward to limestone, grey-brown, with "lumpy" bedding (Douro-like lithology)	2.5	70.6
47	**Limestone:** as in Unit 48	2.0	68.1
46	**Limestone:** yellow-buff, weathering light green; micritic; thick to massive bedded; conchoidal fracture; recessive	1.1	66.1
45	**Limestone:** light green-grey, weathering dark green-grey; micritic; medium to thick bedded; conchoidal fracture; occasional ostracods	2.5	65.0
44	**Limestone:** dark brown-grey, weathering same; thin irregular bedding; dense, clotted texture	1.3	62.5
43	**Limestone:** as in Unit 45	1.0	61.2
42	**Limestone:** silty; medium grey, weathering light olive-grey; micritic; very thin bedded; laminated	1.5	60.2
41	**Limestone:** silty; red and green variegated, weathering same; micritic; medium bedded; conchoidal fracture; slightly recessive. Interbedded with **siltstone:** purple-grey; massive bedded; cubic to blocky fracturing; recessive	4.5	58.7
40	**Siltstone:** purple-grey; cubic fracturing as in Unit 41	1.0	54.2
39	**Limestone:** as in Unit 41, with ostracods and ostracoderm fragments	2.6	53.2
38	**Limestone:** silty, green-grey, weathering light olive-grey; micritic; thin bedded; distinctly laminated	0.7	50.6
37	**Limestone:** silty; green-grey with streaks of red, weathering reddish green; micritic; thick bedded; conchoidal fracture	0.8	49.9
36	**Limestone:** as in Unit 38	1.1	49.1
35	**Siltstone:** olive-green, red, streaky-laminated, weathering same; thick bedded	0.2	48.0
34	Covered interval	0.9	47.8
33	**Limestone:** dark green-grey, weathering olive-green with red patches; micritic; medium bedded; resistant	0.6	46.9
32	Covered interval	3.0	46.3
31	**Limestone:** as in Unit 33	0.4	43.3
30	Covered interval	0.7	42.9
29	**Siltstone:** olive-green, weathering variegated red and green; medium bedded, becoming distinctly laminated upward; intraclastic deformation near top of unit	2.6	42.2
28	**Siltstone:** olive-green with red streaks ("eye-ball" type), weathering same; thick bedded; scattered quartz sand grains; conchoidal fracturing; rare ostracods	0.8	39.6
27	**Limestone:** as in Unit 38	0.6	38.8
26	**Dolostone:** slightly calcareous; brown-grey mottled, weathering medium grey; micritic; thick bedded; resistant; gradational upper contact	0.7	38.2
25	Covered interval	1.4	37.5
24	**Limestone:** silty; olive-green; medium to thick bedded at base, wavy laminated upward; floating quartz sand grains throughout; dark brown micritic interlayers near top	1.1	36.1

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
23	**Siltstone:** green-grey with red mottling, weathering light olive-brown; medium bedded; conchoidal fractures	1.3	35.0
22	**Siltstone:** buff-grey, weathering light grey; thin bedded	0.6	33.7
21	**Limestone:** dark-brown, micritic; platy laminated; alternates with silty, light buff-grey, very thin bedded **limestone**	0.9	33.1
Field section 75-RAE-9B5			
20	Covered interval (estimated)	3.0	32.2
19	**Limestone:** dark brown-grey, weathering same; micritic; very platy to shale-like	1.6	29.2
18	Covered interval	0.5	27.6
17	**Limestone:** brown-grey, weathering medium grey; micritic; thin "lumpy" bedded; clotted texture; hard; possible stromatoporoid fragments	0.2	27.1
16	**Limestone:** as in Unit 19	1.5	26.9
15	**Limestone:** dark brown-grey, becoming green-grey and olive-grey upward; micritic; medium bedded, becoming thin bedded with distinct bedding planes upward; gradational upper contact	3.9	25.4
14	Covered interval	2.0	21.5
13	**Limestone:** dolomitic; light brown-grey; micritic; faintly laminated; grades upward into light olive-grey, distinctly laminated **siltstone**	2.0	19.5
12	Covered interval	1.3	17.5
11	**Limestone:** silty; light olive-grey, weathering same; micritic; very thin, platy bedded	1.4	16.2
10	**Limestone:** silty; brown-grey, weathering buff-grey; micritic; wavy-laminated; small calcite-crystal filled vugs; gradational upper contact	1.2	14.8
9	**Siltstone:** wine-red with green mottling, weathering same; medium bedded; blocky to conchoidal fracturing; recessive	4.9	13.6
8	**Siltstone:** green, weathering olive-grey; medium bedded; resistant	1.1	8.7
7	**Siltstone:** purple, with vein-like red streaks, weathering same; massive bedded; cubic to blocky weathering pattern; recessive	0.7	7.6
6	**Limestone:** dolomitic; brown-grey, weathering olive-grey; micritic; thin, irregular bedded; passes upward into light grey, micritic, regularly bedded, **limestone** with abundant ostracods	2.0	6.9
5	**Siltstone:** light green, weathering olive-grey; thick bedded; rare ostracods, (?)worm-burrows	0.5	4.9
4	**Siltstone:** red-brown with green streaks, weathering rusty red and green; medium bedded; cubic-fracture; slightly recessive	1.4	4.4
3	**Siltstone:** olive-green, weathering olive-grey; medium to thick bedded; "turtle"-weathering pattern, blocky fracturing; ostracoderm debris; gradational upper contact	1.5	3.0
2	**Siltstone:** purple, weathering wine-grey with green patches; thick bedded; cubic-blocky fracture pattern; recessive	0.6	1.5
1	**Siltstone:** wine-red, weathering wine-grey; medium bedded; irregular fracture; variably resistant	0.9	0.9

SECTION 20. South Pressure Point (Field section 75-RAE-6). The section is located on the west limb of the Cape Anne Syncline, 4 km due south of Pressure Point. The Lower member of the Somerset Island Formation is absent due to westward thinning and lateral replacement by the Upper member.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	PEEL SOUND FORMATION Member 1 (incomplete)		
116	**Sandstone:** deep blood red, weathering pinkish red; fine grained; medium to thick bedded; mature	3.0	509.6
115	**Sandstone:** light olive-grey, weathering rusty green, becoming redder upward; medium grained, fining upward; medium bedded; mature	5.9	506.6
114	**Siltstone:** light grey mottled with red, weathering same; thin to medium bedded	3.6	500.7
113	Covered interval	3.0	497.1
112	**Siltstone:** pink, weathering rusty brown; thin bedded; wavy to crosslaminated; minor medium grained, floating quartz sand	0.7	494.1
111	**Sandstone:** olive-green and red, weathering rusty green; medium to coarse grained; medium bedded	0.5	493.4
110	**Siltstone:** light grey, with anastomosing red pattern, weathering light grey; medium bedded; blocky and friable	0.3	492.9
109	**Siltstone:** sandy; orange-red, weathering orange; medium bedded	0.3	492.6
108	Covered interval	7.0	492.3
107	**Sandstone:** silty; light grey, weathering olive-grey; coarse grained; thick bedded; sand contained in siltstone matrix; ostracoderm debris	2.1	485.3
106	Covered interval	4.7	483.2
	SOMERSET ISLAND FORMATION Upper member		
105	**Siltstone:** mottled green and red, weathering same; medium to thick bedded	2.9	478.5
104	**Siltstone:** brown-red, weathering same; medium to thick bedded, high-angle crossbedding; minor floating quartz sand; medium grained; abundant ostracoderm debris	0.9	475.6
103	Covered interval	2.3	474.7
102	**Sandstone:** light grey, weathering buff-olive; medium to coarse grained; thick bedded; submature, some mud fragments and siltstone lenses; resistant; some ostracoderm debris	0.5	472.4
101	**Siltstone:** mottled green and rusty-brown, weathering same; thick bedded	3.1	471.9
100	**Siltstone:** light grey with red streaks, weathering same; medium bedded; recessive; blocky and rubbly weathering	0.6	468.8
99	**Siltstone:** sandy; purple to wine-red, weathering rusty-brown; medium bedded; dense and resistant; abundant ostracoderm fragments	1.6	468.2
98	Covered interval	2.1	466.6
97	**Siltstone:** sandy; lime-grey with red bands, weathering orange; very thin to thin bedded, laminated, crosslaminated and ripple marks	3.2	464.5
96	**Limestone:** with brown mottles in olive-green clayey matrix; thin bedded, becomes very thin bedded upward; brown patches may be stromatoporoids; gradational upper contact	2.1	461.3

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
95	**Limestone:** wine-red to olive-grey, weathering olive green; micritic; thin bedded to very thin bedded, platy, becoming medium bedded upward with conchoidal fracture	1.2	459.2
94	**Siltstone:** olive-green with patchy red mottling, and alternating olive-green and rusty brown colour banding, weathering same; medium bedded; very resistant	2.5	458.0
93	**Siltstone:** banded light olive-green and rusty red, weathering red-stained; thick bedded; rare floating quartz sand grains; abundant ostracoderms	3.3	456.5
92	**Siltstone:** light buff-grey to light olive-grey, weathering olive-brown to olive-grey; medium to thick bedded; minor floating quartz sand grains; abundant well preserved ostracoderms and ostracoderm debris	2.0	452.2
91	**Siltstone:** rusty red with olive-green mottling, weathering same; medium bedded; minor floating quartz sand; some ostracoderm debris	1.5	450.2
90	**Siltstone:** rusty red, weathering same; medium bedded; blocky	0.8	448.7
89	**Siltstone:** light grey, weathering olive-grey, becoming olive-grey with red laminae and red weathering zones upward; medium bedded; resistant; rare ostracoderm debris	2.8	447.9
88	**Dolostone:** light olive-grey, with red streaks and pink-grey patches, weathering olive-green to light rusty brown; fine grained or microcrystalline; medium bedded; rare ostracoderm debris; peculiar unit	3.2	445.1
87	**Siltstone:** purple-grey, weathering pinkish green; thin to medium bedded; crinkly laminae	2.3	441.9
86	**Limestone:** silty; greenish grey, weathering olive-grey to buff-grey; micritic; medium bedded; resistant	0.5	439.6
85	**Siltstone:** mottled light olive-grey and red, weathering olive-green; medium bedded; floating quartz sand grains; highly resistant	0.5	439.1
84	**Limestone:** light green with pinkish mottling, weathering olive-green; micritic; medium bedded; resistant	0.4	438.6
83	**Siltstone:** mottled olive-green and rusty red, weathering rusty brown; medium bedded; highly resistant	0.4	438.2
82	**Siltstone:** mottled olive-green and rusty red, weathering rusty brown; thin bedded; recessive, friable unit; some ostracoderm fragments	0.7	437.8
81	**Siltstone:** as in Unit 82, except green colour dominates upward; also becomes medium bedded and resistant upward; ostracoderm fragments and ostracods	1.0	437.1
80	**Siltstone:** deep rusty red, weathering same; medium bedded; very hard and dense	0.4	436.1
79	**Siltstone:** reddish grey with olive-green lenses, weathering rusty reddish grey; thin bedded, laminated, some beds platy; rare fusilinids (?) near top of unit	3.9	435.7
78	**Limestone:** dark green-grey, weathering light olive-grey; micritic; thin bedded; some ostracods(?)	0.6	431.8
77	**Siltstone:** dark rusty red, weathering reddish brown; medium bedded; dense and hard	0.8	431.2
76	**Siltstone:** as in Unit 78	0.3	430.4
75	**Siltstone:** wine-red, weathering rusty purple; thin bedded, with well marked bedding planes	0.8	430.1
74	**Siltstone:** medium green-grey, weathering light olive-grey; thin bedded; minor interbedded, red-streaked siltstone as in Unit 73	1.9	429.3
73	**Limestone:** light olive-grey, weathering rusty grey; microcrystalline; medium bedded. Interbedded with **siltstone:** red and green mottled or purple-red streaky laminated. Both lithologies contain ostracoderms	2.5	427.4
72	**Siltstone:** purple-red with olive-green patches, weathering light rusty brown; thin to medium bedded; some sand-rich zones near top of unit	2.2	424.9
71	**Siltstone:** rusty purple, weathering rusty red; thin to medium bedded; blocky-type weathering	2.0	422.7
70	**Siltstone:** lime-green, weathering olive-green; medium bedded, laminated; quartz sand laminae locally present; near top of unit streaky red laminae increase in abundance and red weathering stain predominates; abundant ostracoderms	1.8	420.7
69	**Siltstone:** red, streaky laminated with green, weathering rusty red and green; thin bedded; highly fractured; slightly recessive	0.4	418.9
68	**Dolostone:** slightly calcareous; light brown-grey to reddish grey, weathering light orange-grey; microcrystalline; medium to thick bedded, with conchoidal fracturing and faint laminae; desiccation cracks; rare quartz sand grains; ostracods common	7.1	418.5
67	Covered interval	7.7	411.4
66	**Limestone:** light olive-grey with purple banding, weathering same; micritic; thin to medium bedded, irregular bedding planes; resistant	0.3	403.7
65	**Siltstone:** pinkish grey, weathering same; thin bedded; rubbly weathering	0.9	403.4
64	**Limestone:** as in Unit 66	1.2	402.5
63	**Siltstone:** light brown-grey, weathering pinkish grey; very thin bedded to highly laminated, platy bedded; green partings between laminae; fairly resistant	3.1	401.3
62	**Limestone:** light olive-grey, weathering rusty grey; micritic; thin to medium bedded, with "lumpy" or rubbly bedding planes; some ostracods(?)	1.2	398.2
61	**Limestone:** pinkish grey, weathering grey with rust staining; microcrystalline; thin to medium bedded	2.1	397.0
60	**Limestone:** sandy; light grey to light yellow-grey, weathering medium grey; finely crystalline; thin to medium bedded; ridge-former	2.5	394.9
59	**Sandstone:** yellow-brown, weathering tan to rusty yellow; very fine to fine grained; calcareous matrix; medium bedded; pin-point intergranular porosity; recessive; ostracods(?)	1.4	392.4
58	**Limestone:** silty; brown mottling consisting of bulbous stromatoporoid fragments in light olive-grey micritic matrix, weathering rusty-brown; medium bedded; classified as wackestone to packstone; ostracods and corals	0.7	391.0
57	**Boundstone-grainstone:** reefoid and stromatoporoidal; framework of rock consists of large *in situ* cabbage-head stromatoporoids, colonial corals, ostracods, brachiopods and bulbous stromatoporoids; olive-grey clayey limestone forms interstitial material; thin biostromal layer	0.4	390.3

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
56	**Limestone:** mottled with brown clotted zones of grainstone (consisting of pellets, ostracods, crinoids, coral and stromatoporoid fragments in a micritic matrix) surrounded by olive-grey, clayey, micritic material; weathering rusty brown	1.5	389.9
55	**Limestone:** sandy; brown-grey, weathering light grey; finely crystalline; thin bedded; sand grains delineate fine laminae; ostracods common	0.3	388.4
54	**Limestone:** as in Unit 56, except silty olive-grey matrix surrounds brown clotted packstone-grainstone fabric	0.7	388.1
53	**Stromatoporoid packstone-grainstone:** bulbous stromatoporoids, crinoids, corals, ostracods and brachiopods in a matrix of olive-grey to brown-grey, clayey micrite	0.4	387.4
52	**Limestone:** dolomitic, silty to sandy; light brown-grey to light olive-grey, weathering buff-brown to red-buff; finely crystalline; thick bedded, laminated and crosslaminated, with rip-up clasts, intraformational conglomeratic lenses, and stylolites; common ostracods and corals replaced by red-stained chert	3.3	387.0
51	Covered interval	3.7	383.7
50	**Limestone:** dark olive-grey to green-grey, weathering medium grey to light grey; micritic; medium bedded, laminated with some ripple crosslamination and rip-up clasts	2.1	380.0
49	Covered interval	3.9	377.9
48	**Limestone:** dark olive-grey, weathering grey; micritic; medium bedded; minor ostracods	1.0	374.0
47	Covered interval	1.5	373.0
46	**Limestone:** silty; light green-grey, weathering buff-grey; micritic; thin to medium, rubbly bedded; very abundant ostracods	3.6	371.5
45	**Limestone:** medium green-brown to green-grey, weathering olive-grey; micritic; medium to thick bedded; resistant unit; abundant ostracods	2.1	367.9
44	**Siltstone:** alternating pink-grey and green-grey, weathering olive-grey; thin bedded to very thin bedded, rubbly bedding planes, laminated with trough crosslaminae near top; becomes sandy near top of unit; recessive	2.5	365.8
43	**Limestone:** mottled with dark brown, dolomitic, micritic lumps surrounded by green-grey, clayey, micritic limestone; weathering light olive-grey with brown patches; medium bedded; hard, resistant	0.9	363.3
42	**Limestone:** silty; light brown-grey to green-grey, weathering buff to olive-grey; micritic; thick bedded; conchoidal fracturing	0.9	362.4
41	**Siltstone:** olive-grey to pink-grey, weathering light grey; very thin to thin bedded, wispy laminated; gradational upper contact	0.4	361.5
40	**Limestone:** light olive-grey, weathering light grey; thin to medium bedded; abundant ostracods; gradational upper contact	0.9	361.1
39	**Siltstone:** rusty red, weathering same; thin bedded; gradational upper contact	0.2	360.2
38	**Limestone:** silty; medium olive-grey, weathering dark olive grey; thin to medium bedded, distinctly laminated, with mud cracks, rip-up clasts and worm burrows; becomes lighter in colour upward	8.5	360.0
37	**Limestone:** silty; mottled wine-red and olive-grey, weathering rusty brown; medium bedded; resistant	1.3	351.5
36	**Limestone:** silty; very light green-grey, weathering buff-grey; micritic; medium to thick bedded; resistant	3.0	350.2
35	**Dolostone:** sandy; medium olive-grey, weathering rusty grey, finely crystalline; medium bedded	2.4	347.2
34	**Limestone:** silty; light green-grey, weathering same; micritic; very thin bedded to platy laminated; recessive	1.3	344.8
33	**Limestone:** sandy; light green-grey, weathering olive-grey with rusty staining; medium bedded; floating quartz sand grains; medium grained	1.1	343.5
32	**Siltstone:** red-brown, weathering rusty brown; medium bedded; friable and blocky-type weathering	0.4	342.4
31	**Limestone:** dolomitic; dark green-grey, weathering medium brown-grey; finely crystalline; thin bedded, wispy laminated; gradational upper contact	0.3	342.0
30	**Siltstone:** reddish grey, weathering same; thin to medium bedded	1.2	341.7
29	**Limestone:** clayey and earthy; light green-grey, weathering yellowish grey to green-grey; platy laminated to very thin, platy bedded, with disrupted laminae, soft-sediment deformation; 20 cm thick bed of green-grey micritic intraclasts in middle of unit	0.55	340.5
28	**Limestone:** dark green-grey, weathering olive-grey; micritic; thin to medium bedded, faintly laminated; common calcite-filled voids and fractures; ostracods	2.3	339.95
27	**Siltstone:** mottled, patchy olive-green and red on fresh surface, weathering rusty brown; thin to medium bedded; hard and resistant	0.35	337.65
26	**Limestone:** dolomitic; dark brown-grey, weathering medium grey; micritic; medium bedded. Interbedded with **limestone:** light grey, friable. Common ostracods	5.1	337.3
25	Covered interval	2.5	332.2
24	**Siltstone:** light green-grey, weathering olive-grey; medium bedded, with green planar clayey partings	0.5	329.7
23	**Siltstone:** light green-grey, weathering patchy, rusty brown; very thin bedded, fissile and platy. Interbedded with very thin lenses of **sandstone** and **conglomerate:** rust to red, containing coarse grained quartz sand and pebbles up to 2.5 cm in diameter	0.8	329.2
	DOURO FORMATION		
22	**Limestone:** light green-grey, weathering olive-grey; micritic to finely crystalline; thin to very thin bedded upward, "lumpy" bedding planes; *Atrypella* and corals	0.9	328.4
21	**Limestone:** slightly dolomitic; medium grey-brown, weathering olive-grey; micritic; thin to medium bedded; irregular bedding planes; abundant *Atrypella*; gradational upper contact	1.9	327.5
20	**Limestone:** as in Unit 21 but with fewer *Atrypella*; gradational upper contact	1.2	325.6
19	**Limestone:** slightly dolomitic; light to medium grey-brown, weathering buff-grey; micritic; thin to medium bedded; sharp, jagged, rubbly weathering; fossils in part silicified, including crinoids, rare trilobites, ostracods, corals and brachiopods	57.5	324.4
18	Covered interval	30.0	266.9

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
17	**Limestone:** medium brown-grey, weathering buff-grey; micritic to medium crystalline; thick bedded to massive; abundant crinoidal ossicles and some brachiopods	1.0	236.9
16	**Limestone:** dark brown-grey, weathering medium grey; micritic to finely crystalline; thin bedded, irregular bedding planes	3.0	235.9
15	**Limestone:** as in Unit 17	1.5	232.9
14	**Limestone:** light grey, weathering buff grey; micritic; thin bedded with rubbly, irregular bedding planes; clay content gives unit earthy appearance; rare brachiopods, rare silicification of fossils	35.8	231.4
13	**Limestone:** medium-brown, weathering light grey-brown with rusty patches; finely crystalline; medium bedded, irregular bedding planes; abundant crinoid ossicles form medium- to coarse-grained crystals	11.0	195.6
12	**Limestone:** dolomitic; brown-grey, weathering buff-brown; thin to medium bedded, irregular and pitted bedding planes; very abundant silicified brachiopods and corals	3.0	184.6
11	**Limestone:** dolomitic, clayey; medium brown-grey, weathering brown-grey; thin, rubbly bedded. Interbedded with **limestone:** brown grey, medium rubbly bedded; rare visible crinoids and brachiopods	43.5	181.6
10	**Coquinid crinoidal limestone:** buff-white crinoidal segments in a brown-grey micritic matrix; some clayey partings along irregular bedding planes	0.4	138.1
9	**Limestone:** dark grey, weathering light grey; micritic with calcareous clay partings around lumps of micrite; thin bedded, rubbly and irregular bedded interbeds of crinoidal packstone (as in Unit 10)	46.2	137.7
	CAPE STORM FORMATION (incomplete)		
8	**Limestone:** dolomitic, silty; medium grey, weathering buff-grey; micritic; platy laminated; very thin to thin planar bedded	9.0	91.5
7	Covered interval	15.0	82.5
6	**Dolostone:** calcareous and silty; medium grey, weathering medium grey and light rusty grey, very fine grained; thin to very thin bedded, well defined bedding planes	1.0	67.5
5	Covered interval	38.5	66.5
4	**Dolostone:** highly calcareous, silty; light pink-grey, weathering olive buff-grey; finely crystalline; thin to medium bedded, faintly laminated, with wispy laminae of olive-grey clayey material; resistant	1.0	28.0
3	Covered interval	18.0	27.0
2	**Dolostone:** very silty; dark grey, weathering olive-grey; very thin bedded, laminated. Grades upward into **dolostone:** silty; light grey; laminated, micro-crosslaminated and ripple marked; scattered grey bands	8.0	9.0
1	**Dolostone:** calcareous; dark grey, weathering olive-grey; finely crystalline; thin to medium bedded, well defined bedding planes; abundant ostracods, some of which are recrystallized to sparry calcite	1.0	1.0

SECTION 21. South Pressure Point (Field section 75-RAE-1). The section is located on the west limb of the Cape Anne Syncline, 12 km due south of Pressure Point. The Lower member of the Somerset Island Formation is missing due to westward thinning and lateral replacement by the Upper member.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	SOMERSET ISLAND FORMATION Upper member (incomplete)		
31	**Siltstone:** greenish grey, weathering same; medium bedded, well developed bedding planes; scattered ostracods	1.0	490.0
30	**Siltstone:** olive grey, weathering same; very thin to platy bedded, wispy laminated; floating grains	1.4	489.0
20	**Siltstone:** light buff grey, weathering light grey; medium to thick bedded; resistant	9.0	487.6
28	**Siltstone:** red, weathering red with green patches; medium to thick bedded; resistant; gradational upper contact	0.5	478.6
27	**Siltstone:** calcareous; light green-grey, weathering same with pink staining; medium to thick bedded; abundant well rounded quartz sand grains	7.0	478.1
26	**Siltstone:** light grey, weathering green-grey with pink staining; thin to medium bedded, faintly laminated; resistant. Interbedded with **shale:** green-grey; fissile laminated to very thin bedded, platy	4.0	471.1
25	**Limestone:** light green-grey, weathering brown-grey to red-brown grey; fine to medium grained; thin to medium bedded, platy; clayey; scattered ostracods	7.5	467.1
24	Covered interval	3.5	459.6
	DOURO FORMATION		
23	**Limestone:** brown-grey, weathering dark green-grey; fine to medium crystalline; thin, "lumpy" bedding and irregular bedding planes; common *Atrypella*	1.0	456.1
22	Covered interval (estimated)	20.0	455.1
21	**Limestone:** brown, weathering light brown-grey; micritic; thin, "lumpy" bedding; minor *Atrypella*	26.5	435.1
20	**Limestone:** brown, weathering light brown-grey; medium crystalline; thin to medium, "lumpy" bedded; common *Atrypella*, abundant crinoid fragments; gradational upper contact	5.0	408.6
19	**Limestone:** brown grey, weathering buff-grey; micritic; thin to medium, "lumpy" bedded; rare *Atrypella* and trilobite fragments	18.0	403.6
18	**Limestone:** dark brown--grey, weathering buff-brown grey; fine to medium crystalline; thin, rubbly bedded, becoming thick, rubbly bedded upward; mottled; abundant crinoid fragments	9.0	385.6
17	**Limestone:** medium brown, weathering light grey; medium crystalline; medium, "lumpy" bedded; rubbly, pitted surface	0.6	376.6
16	**Limestone:** medium grey to grey-brown, weathering light grey; micritic; thin, "lumpy" bedded; rubbly, pitted surface; abundant gastropods, brachiopods (?*Atrypella* and ?*Dalmanella*), favositid corals	88.5	376.0
15	**Limestone:** dark grey, weathering medium grey; micritic; thin, "lumpy" to rubbly bedding; rare brachiopods	40.5	287.5
14	**Limestone:** dark grey, weathering medium grey; medium crystalline; thin, irregular bedding; clay partings on bedding planes	6.0	247.0

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
13	**Limestone:** as in Unit 14, except medium grey, weathering light olive-grey	17.5	241.0
	CAPE STORM FORMATION (incomplete)		
12	**Limestone:** light buff-grey, weathering light olive-grey; finely crystalline; thin, platy bedded; faintly laminated; minor quartz sand and silt; sharp upper contact	11.0	223.5
11	**Limestone:** as in Unit 12, with thin interbeds of **limestone:** dark grey, rubbly; abundant brachiopods (?*Atrypella*)	25.5	212.5
10	**Limestone:** silty; light pink-grey, weathering buff-grey; medium to thin bedded; resistant	36.0	187.0
9	Covered interval	26.5	151.0
8	**Limestone:** medium brown, weathering buff-brown; medium crystalline; abundant recrystallized gastropods, brachiopods and (?)ostracods, and large "pancake" stromatoporoid fragments parallel to bedding	3.5	124.5
7	**Dolostone:** silty; light buff-grey, weathering light grey; finely crystalline; thin to medium bedded, well defined bedding planes; laminated to crosslaminated	55.5	121.0
6	Covered interval	27.0	65.5
5	**Limestone:** as in Unit 8, except with "pancake" stromatoporoids, gastropods, and (?)ostracods	3.5	38.5
4	**Dolostone:** silty; as in Unit 7; platy and fissile	5.0	35.0
3	**Limestone (Stromatoporoid grainstone):** brown; thin to medium bedded; matrix of silty, tan dolostone; resistant; pancake stromatoporoids in lower part of unit, cabbage head types in upper part	9.5	30.0
2	**Dolostone:** silty; light buff-grey to light pink-grey, weathering light grey to olive-grey; finely crystalline; very thin to thin bedded; wispy laminated, platy; ostracoderms and gastropods	18.0	20.5
1	**Dolostone:** light brown-grey, weathering same; finely crystalline; thin to medium planar bedded, bedding well defined; brown colour bands up to 1 cm thick	2.5	2.5

SECTION 22. "Green Valley" (Field section 75-RAE-7). The section is located about 11 km northeast of the mouth of Aston Bay.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	PEEL SOUND FORMATION Member 1 (incomplete)		
110	**Sandstone:** light olive-grey, weathering same; coarse grained; medium bedded; tangential crosslaminae within planar beds; supermature	1.5	174.9
109	**Siltstone:** sandy; purple-grey, weathering yellowish brown; thin bedded; laminated; abundant medium grained quartz sand	0.9	173.4
108	**Sandstone:** rusty red, weathering rusty red with olive-green colouring on joints and bedding planes, becoming mottled with olive-grey upward; medium grained; medium bedded; well sorted	5.1	172.5
107	**Sandstone:** light olive-grey, weathering orange; fine to medium grained; medium to thick bedded; faintly crosslaminated; well sorted; hard, resistant	3.4	167.4
106	**Siltstone:** light olive-grey with red streaks, weathering rusty brown; thin, rubbly bedded; quartz sand content increases upward	1.2	164.0
105	**Sandstone:** light pink-grey, weathering rusty brown; medium to coarse grained; medium to thick bedded; planar laminated to low angle crosslaminated; submature with some feldspar grains	1.9	162.8
104	**Sandstone:** pink-grey, weathering rusty brown; very fine grained; medium bedded; wispy laminae marked by dark partings; mature; silica cemented	0.3	160.9
103	**Siltstone:** light grey with purple mottling, weathering wine-red; thin bedded; blocky fracture; floating medium grained quartz sand; recessive	0.4	160.6
102	**Sandstone:** light grey, weathering distinctive buff-grey; medium to coarse grained; thick bedded; mature; forms a distinct and traceable ridge	1.5	160.2
	SOMERSET ISLAND FORMATION Upper Member		
101	**Siltstone:** light olive-grey, streaked with red, weathering reddish brown; thin to medium bedded; floating coarse grained quartz sand; recessive	1.0	158.7
100	**Sandstone:** as in Unit 104	0.3	157.7
99	**Sandstone:** olive-grey, weathering light buff-grey; coarse grained; medium bedded; well rounded; olive-grey, slightly calcareous matrix	0.5	157.4
98	**Siltstone:** light olive-grey, with colour mottling of rusty red streaks and patches (blood-shot pattern); thin to medium bedded; quartz sand content increases upward; common ostracoderm fragments	0.7	156.9
97	**Sandstone:** buff-grey, weathering grey with red stains, medium grained; thin bedded; well sorted; poorly-cemented calcareous matrix; slightly recessive	1.1	156.2
96	**Siltstone:** light olive-grey, weathering green-grey; medium bedded; floating quartz sand; resistant; irregular fracturing; ostracoderm fragments	1.7	155.1
95	**Siltstone:** as in Unit 96, but with colour mottling of rusty red streaks and flecks on light olive-grey background	0.7	153.4
94	**Siltstone:** blood red, weathering rusty red; thin bedded; hard, resistant	0.2	152.7
93	Covered interval	1.5	152.5
92	**Siltstone:** as in Unit 94, except medium bedded, with floating quartz sand grains	0.7	151.0
91	Covered interval	1.4	150.3
90	**Siltstone:** as in Unit 92	1.0	148.9
89	Covered interval	1.1	147.9
88	**Siltstone:** reddish grey, weathering yellow-brown; medium bedded; conchoidal fracture	1.7	146.8
87	**Siltstone:** olive-buff-grey, red banding, weathering same; medium bedded; floating quartz sand grains	3.6	145.1
86	Covered interval	1.5	141.5
85	**Siltstone:** sandy; lime-grey with red bands, weathering orange; very thin bedded, laminated, ripple marked and trough crosslaminated	2.3	140.0

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
84	**Dolostone:** calcareous; brown mottled with olive-green clayey matrix; thin bedded, becoming very thin bedded upward; brown patches may be stromatoporoids; gradational upper contact	2.3	137.7
83	**Siltstone:** olive-green with patchy and streaky red colour mottling, becoming olive-green and red colour banded in upper part, weathering same; medium bedded; floating quartz sand grains	4.7	135.4
82	**Siltstone:** green and red motttled, weathering same; medium bedded; blocky to conchoidal fracture	5.2	130.7
81	**Siltstone:** rusty red, weathering same; medium bedded, blocky; floating quartz sand grains	1.1	125.5
80	**Siltstone:** green and red variegated, mottled appearance, weathering rusty green; medium bedded with indistinct bedding planes; irregular fracture	1.0	124.4
79	**Dolostone:** silty; purple-grey, weathering same; medium to thick bedded; some interbeds contain abundant floating quartz sand grains; blocky or cube-like fracturing; gradational upper contact	2.1	123.4
78	**Dolostone:** light olive-grey, weathering buff-green, becoming reddish upward; finely crystalline; medium bedded; floating quartz sand grains; gradational upper contact	2.8	121.3
77	Covered interval	5.0	118.5
76	**Siltstone:** rusty brown, weathering dark chocolate brown; blocky weathering pattern characterized by 3 cm cube-like rubble; recessive	0.9	113.5
75	**Siltstone:** olive-green, variegated, with red streaks and in places purple tinged with red, weathering a variegated pink and light olive-green colour; medium bedded; irregular fracturing	3.9	112.6
74	**Siltstone:** sandy; rusty red, weathering rusty brown; medium to thick bedded; quartz sand content decreases upward; ostracoderm fragments	0.7	108.7
73	**Siltstone:** light green-grey with red flecks and streaks, weathering same; thin bedded; wavy laminated	0.8	108.0
72	**Siltstone:** reddish grey, weathering rusty brown-grey; thin bedded; rare floating quartz sand grains; blocky to conchoidal fracture	0.4	107.2
71	**Siltstone:** as in Unit 75	1.5	106.8
70	**Siltstone:** dark red, weathering rusty brown; thick bedded, becoming thinner bedded upward; hard, resistant	1.2	105.3
69	**Siltstone:** as in Unit 73, except with ostracoderm fragments	1.7	104.1
68	Covered interval	0.9	102.4
67	**Limestone:** silty; purple, weathering brownish purple; micritic; very thin bedded; laminated	0.8	101.5
66	Covered interval	2.2	100.7
65	**Siltstone:** as in Unit 75, except more calcareous	3.0	98.5
64	Covered interval	0.9	95.5
63	**Dolostone:** silty; banded red and green, weathering rusty brown; finely crystalline; medium bedded, with parallel and disrupted laminae; micritic intraclasts	0.6	94.6
62	Covered interval	1.9	94.0
61	**Limestone:** silty; medium green-grey, weathering brown-grey; micritic; thin bedded	0.3	92.1
60	**Limestone:** silty; lime-green, with purple bands 2 to 5 cm thick, weathering rusty brown with green colouration on bedding planes; medium to thick bedded; uneven fracture	0.7	91.8
59	Covered interval	0.6	91.1
58	**Limestone:** as in Unit 60	1.5	90.5
57	**Siltstone:** purple-grey, weathering rusty grey; medium bedded; irregular fracturing	1.4	89.0
56	**Dolostone:** very sandy; light olive-grey, weathering brown-grey; medium bedded	1.2	87.6
55	**Limestone:** silty; dark grey, weathering light grey; micritic; thin bedded; rare floating quartz sand grains	0.4	86.4
54	Covered interval	0.6	86.0
53	**Siltstone:** banded brown-red and green, weathering same with rust stains; thin, irregular bedded and wispy laminated at base, becoming medium bedded upward, with convolute and enterolithic laminae; rare ostracoderm fragments	2.5	85.4
	Lower member		
52	**Dolostone:** mottled light olive-grey and red, weathering rusty brown-grey to grey; medium bedded, becoming thin bedded upward; gradational upper contact	1.1	82.9
51	**Limestone:** slightly silty; olive-grey, weathering reddish grey with rare red banding; micritic; thin to medium bedded; rare ostracods	0.9	81.8
50	**Limestone:** dolomitic; mottled dark brown-grey with olive-green clayey matrix, weathering same; micritic; thin to medium bedded	0.5	80.9
49	**Limestone:** dolomitic; light olive-grey with purple-red flecks, weathering light grey; micritic; very thin to thin bedded	1.5	80.4
48	**Dolostone:** slighty calcareous; light olive-grey, weathering buff-grey; finely crystalline; thin bedded; gradational upper contact	1.0	78.9
47	**Limestone:** medium grey, weathering brown-grey; micritic; thin bedded with irregular but distinct bedding planes; common corals and stromatoporoid fragments; gradational upper contact	0.6	77.9
46	**Dolostone:** highly calcareous, silty; light brown to olive-grey, weathering light grey; micritic; thin to very thin bedded	1.6	77.3
45	Covered interval	4.0	75.7
44	**Grainstone-packstone:** highly fossiliferous, framework and grains of rock consist of brown fossil fragments, including stromatoporoids (cabbage head or pancake types in lower part of unit, bulbous types higher up), corals (?*Favosites limitarus* and ?*Syringopora*), crinoids, and brachiopods; matrix is limestone, clayey, green, micritic; medium bedded becoming thin bedded with faint laminae upward	4.9	71.7
43	**Limestone:** sandy; brown-grey, weathering light grey; micritic; thin bedded with faint laminae; gradational upper contact	0.7	66.8
42	**Limestone:** mottled brown-grey with olive-green matrix; stromatoporoids (forming brown-grey clots), occasional corals, rare ostracods and brachiopods	1.0	66.1
41	Covered interval	0.4	65.1
40	**Limestone:** as in Unit 42	1.2	64.7

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
39	**Limestone:** dolomitic, slighty silty; light brown-grey to light olive-grey, weathering buff-brown; micritic; thin to very thin bedded; laminated	4.9	63.5
38	**Limestone:** sandy; medium olive-grey, weathering light grey; micritic; medium bedded; recessive and rubbly, becoming more resistant and less sandy upward; abundant ostracods	2.1	58.6
37	**Limestone:** dark olive-grey, weathering grey; micritic; thin to medium "lumpy" bedded	1.2	56.5
36	**Limestone:** silty; light olive-grey, weathering light grey; micritic; thin to medium bedded; laminated	1.2	55.3
35	**Limestone:** light green-grey, weathering medium grey with purple flecks; micritic; thin to medium bedded; laminated; top 20 cm contains abundant ostracods, bounded by irregular bedding planes	1.8	54.1
34	Covered interval	1.5	52.3
33	**Limestone:** light green-grey, weathering light olive-grey; micritic; medium to thick bedded; abundant ostracods	1.1	50.8
32	Covered interval	1.5	49.7
31	**Dolostone:** calcareous, very silty; medium olive-grey, weathering grey to light brown with slightly mottled red interbeds; thin to medium bedded, with silt laminae evident on weathered surfaces; weathers variably rubbly and resistant, with rubbly "sausage-like" interbeds	1.4	48.2
30	**Limestone:** dark green-grey, weathering olive-grey; micritic; medium bedded; blocky to conchoidal fracturing; abundant ostracods	2.1	46.8
29	**Limestone:** dark brown mottling with green matrix; micritic; forms 0.5 m thick, hard, resistant bed. Grades upward into **limestone:** silty, light brown-grey, laminated	1.7	44.7
28	**Limestone:** dolomitic, silty; medium to light olive-grey, weathering light grey; thin bedded becoming very thin bedded upward; numerous quartz silt laminae and crosslaminae in upper part	1.1	43.0
27	**Limestone:** dark brown-grey, mottled with olive-green matrix, weathering same; thin to medium bedded; rubbly weathering; common stromatoporoids(?), brachiopods, and bryozoans	1.3	41.9
26	**Limestone:** dark brown-grey, weathering medium grey; micritic; clotted texture	0.3	40.6
25	**Limestone:** dark grey, weathering yellow-grey; micritic; conchoidal fracturing	0.4	40.3
24	**Limestone:** dolomitic, silty; light green-grey, weathering same; micritic; very thin to thin bedded, with wavy bedding planes	0.6	39.9
23	**Limestone:** as in Units 24, 25 and 26, except all in one unit	2.1	39.3
22	**Dolostone:** highly calcareous; medium olive-grey; weathering yellow-grey; micritic; medium bedded; conchoidal fracturing	0.5	37.2
21	**Dolostone:** highly calcareous; olive brown-grey, weathering brown-grey; micritic; thin bedded; distinctly laminated; gradational upper contact	0.4	36.7
20	**Dolostone:** calcareous; brown, weathering brown-grey; micritic; thick bedded becoming thinner bedded upward; micritic intraclastic layers recur through lower two-thirds of unit, indicating periodic reworking during deposition; hard, resistant	2.1	36.3
19	**Dolostone:** calcareous; very silty; light olive-grey-brown, weathering buff-grey-brown; wavy laminae, crosslaminae, and disturbed laminae in upper part, mud cracks and intraclasts aligned along bedding planes; silty and crinkly laminae weather out; gradational upper contact	1.5	34.2
18	**Dolostone:** calcareous; dark brown mottling with olive-grey matrix; mottling more pronounced on weathered surface; thick bedded; hexagonal colonial corals rare at base of unit	1.3	32.7
17	**Dolostone:** as in Unit 19	1.9	31.4
16	**Dolostone:** calcareous, silty; olive-grey, weathering buff-grey; micritic; medium to thick bedded; resistant	0.7	29.5
15	**Limestone:** light green-grey, weathering buff-grey; micritic; thin to medium bedded; conchoidal fracture; slightly recessive	1.0	28.8
14	**Limestone:** medium olive-brown, weathering light brown-grey; micritic; medium to thick bedded; laminated	1.3	27.8
13	Covered interval	3.1	26.5
12	**Dolostone:** calcareous, silty; light buff-grey, weathering light grey; thin to medium bedded; laminated; conchoidal fracturing in lower 0.5 m	3.0	23.4
11	**Dolostone:** light olive-brown, weathering same; micritic; thin bedded; wispy-laminated	1.4	20.4
10	**Limestone:** dark green-grey, weathering olive-grey, with "turtle" weathering pattern; micritic; thick bedded; upper 2 cm wispy-laminated with some green clay(?) partings; common ostracods	0.8	19.0
9	**Limestone:** dolomitic; light olive-grey, weathering buff-grey; micritic; medium bedded; floating quartz sand grains	0.5	18.2
8	**Limestone:** very silty; buff green-grey, weathering pale off-white to buff-grey; micritic; platy laminated to very thin bedded	1.1	17.7
7	**Limestone:** dolomitic, silty; olive-grey, weathering light dusty green; micritic; medium bedded. Two 15-20 cm thick interbeds of shaly, olive-grey **limestone** at base and middle of unit	2.9	16.6
6	**Limestone:** dolomitic; brown, weathering brown-grey; micritic; thin to very thin bedded; faintly laminated; vuggy with fenestral-fabric porosity	1.3	13.7
5	**Dolostone:** calcareous; olive-brown-grey, weathering light buff-brown-grey; thick bedded; wispy-laminated; rip-up clasts	0.5	12.4
4	**Limestone:** as in Unit 6, except without visible fenestral-fabric porosity	1.4	11.9
3	**Limestone:** olive-grey becoming lighter upward, weathering same; micritic; medium bedded, becoming thin bedded upward with blocky fracturing	7.5	12.4
2	Covered interval	1.5	3.0
1	**Dolostone:** slightly calcareous; medium brown-grey, weathering olive-brown-grey; micritic; medium bedded; base covered	1.5	1.5

Estimated 10 to 20 m of covered interval between Unit 1 and outcrop of Douro Formation.

SECTION 25. Cunningham River (Field sections 75-RAE-14, 16). This is a composite section, located on the Cunningham River about 30 km inland from Cunningham Inlet.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	SOMERSET ISLAND FORMATION Lower member (incomplete)		
	Field section 75-RAE-14		
71	**Limestone:** very sandy; light grey, weathering buff-grey; micritic; very thin platy bedded	3.0	302.0
70	**Limestone:** brown-grey, weathering same; micritic; thin bedded, with "lumpy" bedding planes	7.3	299.0
69	**Limestone:** dark brown-grey, weathering light brown-grey; micritic; very thin bedded, with "lumpy", irregular bedding planes	1.9	291.7
68	**Limestone:** brown-grey, weathering same; micritic; medium bedded, with irregular bedding planes; "lumpy" texture; stromatoporoid fragments	0.7	289.8
67	**Limestone:** as in Unit 69	3.3	289.1
66	**Limestone:** brown-grey, weathering buff-grey; micritic; thick bedded with irregular bedding planes	1.7	285.8
65	**Limestone:** as in Unit 69	7.5	284.1
64	**Limestone:** brown-grey, weathering rusty grey; grainstone consisting of micritic intraclasts in a porous, micritic matrix	0.4	276.6
63	**Limestone:** partially clayey; dark brown-grey; micritic; very thin bedded, with "lumpy", irregular bedding planes; recessive	1.3	276.2
62	**Limestone:** as in Unit 69	2.5	274.9
61	Covered interval (estimated)	13.0	272.4
60	**Limestone:** light grey-brown, weathering buff-grey; micritic; thin, irregular bedding; packstone to wackestone; fossiliferous zones contain *Favosites*, brachiopods, crinoids and (?)stromatoporoid fragments	10.0	259.4
59	Covered interval (estimated)	4.3	249.4
58	**Limestone:** very sandy; light grey, weathering orange-grey; micritic; paper thin, platy bedded; sand very fine grained	0.8	245.1
57	Covered interval	6.0	244.3
56	**Limestone:** silty; light buff-grey, weathering same; micritic; thin bedded, distinctly laminated.	0.4	238.3
55	Covered interval	0.7	237.9
54	**Limestone:** medium brown-grey, weathering buff-grey; micritic; thin to thick bedded, slightly "lumpy" bedding at base and top; scattered ostracods; GSC Locality C-48555	6.3	237.2
53	**Limestone:** silty; dark brown-grey, weathering buff-grey, becoming light grey upward; micritic; thin, irregularly bedded; conchoidal fracturing	2.0	230.9
52	**Limestone:** medium brown-grey, weathering buff-grey; micritic; thick bedded; dense	1.4	228.9
51	**Limestone:** silty; dark grey-brown, weathering light grey; micritic; very thin platy bedded; faintly to wispy laminated	1.1	227.5
50	**Limestone:** silty; brown-grey, weathering buff-grey; micritic; medium to thick bedded, bedding thinning upward; dense; common ostracods; gradational upper contact	4.5	226.4
49	**Limestone:** as in Unit 53	3.7	221.9
48	**Limestone:** silty; light buff-grey, weathering olive-grey; micritic; medium bedded; conchoidal fracture; ostracoderm debris in scree	2.4	218.2
47	Covered interval	1.0	215.8
46	**Limestone:** silty; olive-grey, weathering same; micritic; medium bedded; conchoidal fracture	3.9	214.8
45	Covered interval.	1.0	210.9
	DOURO FORMATION (incomplete)		
44	**Limestone:** brown-grey, weathering same; medium crystalline; thin to medium, "lumpy" bedded; abundant crinoid debris	0.7	209.9
43	**Limestone:** dark brown-grey, weathering buff-grey; micritic; very thin, irregular bedding; GSC Locality C-48546	7.0	209.2
42	Covered interval	3.9	202.2
41	**Limestone:** as in Unit 43	7.5	198.3
40	Covered interval	2.9	190.8
39	**Limestone:** medium brown-grey, weathering light brown-grey; micritic; thin bedded, with irregular, "lumpy", bedding planes	9.0	187.9
38	**Limestone:** medium brown, weathering same; medium to coarse crystalline; medium bedded, with irregular bedding planes; packstone-grainstone; resistant; crinoid debris	2.4	178.9
37	Covered interval	2.5	176.5
36	**Limestone:** as in Unit 39	7.0	174.0
35	**Limestone:** as in Unit 38, except contains corals	2.4	167.0
34	**Limestone:** as in Unit 39, except becomes very thin bedded upward	6.6	164.6
33	**Limestone:** as in Unit 39	9.7	158.0
32	Covered interval	2.0	148.3
31	**Limestone:** as in Unit 39, except thick bedded	9.6	146.3
30	**Limestone:** micritic; forms small lensoid pod 1.9 m in width; packstone; highly fossiliferous, containing *Syringopora* and other corals, brachiopods, and crinoid stems	1.9	136.7
29	Covered interval	15.0	134.8
28	**Limestone:** light brown-grey, weathering light grey; micritic; thin, irregular bedded; "lumpy" texture; slightly recessive	1.9	119.8
27	**Limestone:** brown-grey, weathering same; micritic; thin, "lumpy" bedded; abundant crinoid fragments; gradational upper contact	0.5	117.9
26	**Limestone:** as in Unit 28; gradational upper contact	0.9	117.4
25	**Limestone:** as in Unit 27, except also contains corals; gradational upper contact	3.4	116.5
24	**Limestone:** slightly dolomitic; brown, weathering brown-grey; medium crystalline, becoming more micritic upward; thick, irregular bedding, becoming thinner bedded upward; moderately abundant crinoids; gradational upper contact	3.7	113.1

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
23	**Limestone:** brown-grey, weathering same; micritic; medium bedded, irregular bedding planes; orthocones, brachiopods (*Atrypella*), and crinoids	2.5	109.4
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22	**Limestone:** dark brown-grey, weathering medium brown-grey; micritic; thin bedded, becoming thick bedded upward; common crinoids	4.5	106.9
21	**Limestone:** brown-grey, weathering buff-grey; micritic; very thin to thin, "lumpy" bedding; "lumpy" texture; "mushroom" outcrop weathering pattern	15.0	102.4
20	**Limestone:** brown, weathering buff-grey; medium crystalline; medium bedded; crinoids. Interbedded with **limestone,** as in Unit 21	2.0	87.4
19	**Limestone:** clayey; medium grey, weathering light grey; micritic; very thin to thin bedded; rubbly, recessive. Interbedded with **limestone,** as in Unit 21. Common trilobite fragments in scree	7.7	85.4
18	Covered interval	3.0	77.7
17	**Limestone:** as in Unit 21, except has interbeds rich in *Favosites* and crinoids	5.2	74.7
16	**Limestone:** brown, weathering buff-grey; medium crystalline; medium bedded, with "lumpy" bedding planes; crinoids	1.1	69.5
15	**Limestone:** as in Unit 21	12.2	68.4
14	**Limestone:** as in Unit 21, except thin to medium bedded	3.0	56.2
13	**Limestone:** as in Unit 21	7.7	53.2
12	Covered interval	14.0	45.5
11	**Limestone:** brown-grey, weathering rusty buff-brown; medium crystalline; thin, "lumpy" bedding; rubbly	1.5	31.5
10	**Limestone:** as in Unit 11, except medium to thick bedded; resistant and cliff-forming	2.8	30.0
9	**Limestone:** brown-grey, weathering buff-grey; micritic; very thin to thin bedded, with irregular bedding planes; recessive; "lumpy" texture; "mushroom" weathering outcrop pattern	5.0	27.2
8	**Limestone:** as in Unit 16	1.2	22.2
7	Covered interval	3.9	21.0
6	**Limestone:** as in Unit 9	4.5	17.1
5	Covered interval	3.9	12.6
4	**Limestone:** clayey; medium grey, weathering light grey; micritic; very thin to thin bedded; rubbly, recessive	2.4	8.7
3	**Limestone:** dark grey, weathering light buff-grey; medium crystalline; thin to medium bedded; crinoids	1.0	6.3
2	Covered interval	3.8	5.3
1	**Limestone:** dark grey, weathering same, with light olive-grey, clayey matrix; thin bedded, "lumpy" to rubbly bedding	1.5	1.5

SECTION 33. Aston River Tributary (Field section 75-RAE-11). The section lies on the first creek north of the east fork of the Aston River, due east of Aston Bay.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	CAPE STORM FORMATION (incomplete)		
127	**Limestone** (poorly exposed): silty, dark brown-grey, weathering medium grey; micritic; rubbly outcrops	0.6	177.7
126	**Siltstone:** calcareous, sandy; light olive-grey, weathering buff-green; thin, platy bedded	1.1	177.1
125	Covered interval	1.2	176.0
124	**Limestone:** dark grey, weathering medium grey; micritic; thin to medium bedded with "lumpy", irregular bedding planes; brachiopods	2.1	174.8
123	**Limestone:** dark mottled grey, weathering green-grey-brown; micritic; thin to medium bedded, with "lumpy" bedding planes; clotted "lumpy" texture; abundant *Atrypella* and orthocones	1.1	172.7
122	**Limestone:** dolomitic; medium grey, weathering brown-grey; micritic; thin bedded with "lumpy" bedding planes; clotted texture	0.5	171.6
121	**Limestone:** silty; light grey, weathering olive-grey; micritic; thin to thick bedded, well defined, platy bedding planes; sharp upper contact	3.7	171.1
120	**Limestone:** medium grey, weathering dark green; micritic; thin, irregular bedding, becoming more platy bedded upward; becomes silty upward	2.6	167.4
119	**Limestone:** medium grey, weathering dark green-grey; micritic; thin, irregular bedding, "lumpy" texture	1.2	164.8
118	**Limestone:** medium brown-grey, weathering light brown-grey; micritic; thin bedded; dense, clotted texture, with vugs due to local recrystallization; thin-shelled brachiopods(?) and ostracods(?)	0.9	163.6
117	**Limestone:** very sandy; buff-grey, weathering buff-yellow; medium bedded	0.5	162.7
116	**Limestone:** as in Unit 119, except chocolate brown weathering	0.6	162.2
115	Covered interval	1.2	161.6
114	**Limestone:** as in Unit 119	0.9	160.4
113	**Limestone:** as in Unit 118	0.3	159.5
112	**Limestone:** as in Unit 117	0.6	159.2
111	**Siltstone:** calcareous, sandy; light grey, weathering buff-grey; very thin to thin bedded, with wispy laminae marked by black partings and smooth bedding planes	6.5	158.6
110	Covered interval	2.5	152.1
109	**Dolostone:** silty; dark grey, weathering light grey; finely crystalline; very thin bedded to platy laminated	0.9	149.6
108	Covered interval	4.6	148.7
107	**Sandstone** (poorly exposed): buff, weathering rusty orange; very fine to fine grained; very thin to thin bedded; well sorted	5.5	144.1
106	**Dolostone:** silty, banded dark grey and buff, weathering light grey; very thin to thin bedded; distinctly laminated	3.0	138.6
105	Covered interval	0.6	135.6

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
104	**Dolostone:** as in Unit 106	1.1	135.0
103	**Limestone:** sandy; dark brown-grey, weathering same; coarsely crystalline; thin bedded; vuggy and intercrystalline porosity	0.1	133.9
102	**Dolostone:** sandy; light yellow-grey, weathering buff-grey; fine grained; algal laminated with domal curvatures	0.2	133.8
101	**Sandstone:** dolomitic; yellow, weathering buff-grey; fine to medium grained; thin bedded	0.3	133.6
100	Covered interval	0.3	133.3
99	**Sandstone:** dolomitic; medium grey to buff, weathering same; fine grained; planar laminated	0.5	133.0
98	**Sandstone:** light brown, weathering same; fine to medium grained; very thin to thin bedded	0.4	132.5
97	**Sandstone:** dolomitic; dark brown, weathering light grey-brown; fine grained; very thin to thin bedded	0.6	132.1
96	**Sandstone:** orange, weathering buff-grey; fine to medium grained; medium bedded at base, becoming thin to thin platy bedded upward; well sorted	3.4	131.5
95	Covered interval	1.7	128.1
94	**Dolostone:** very sandy; dark grey, weathering buff-grey; micritic; wispy laminated	1.1	126.4
93	**Sandstone:** dolomitic; buff-grey, weathering orange-grey; fine grained; very thin to thin bedded at base, becoming medium bedded in middle, and thin again upward; gradational upper contact	2.2	125.3
92	**Dolostone:** sandy; dark grey, weathering same; thin bedded, well defined platy bedding planes; some ostracoderm debris	0.8	123.1
91	**Sandstone:** as in Unit 93, except medium bedded	0.7	122.3
90	**Dolostone:** dark grey, banded with light buff-grey, sandy layers; very thin to thin bedded; gradational upper contact	1.1	121.6
89	**Sandstone:** as in Unit 93	1.8	120.5
88	**Dolostone:** alternating light grey and dark grey; medium, thin and very thin bedded, with silty and wispy laminae and dark partings near top	2.6	118.7
87	**Shale:** silty; dark grey, weathering medium grey; platy bedded	0.9	116.1
86	Covered interval	0.6	115.2
85	**Sandstone:** brown, weathering "caramel", fine to very fine grained; thin bedded; friable	0.8	114.6
84	**Dolostone:** medium grey, weathering light grey; distinctly laminated to platy. Interbedded with **dolostone:** sandy, colour banded as in Unit 90, very thin to thin bedded, wispy laminated	2.4	113.8
83	Covered interval	0.6	111.4
82	**Sandstone:** buff-grey, weathering orange-grey; very fine to fine grained; thin bedded	0.6	110.8
81	**Dolostone:** silty; medium grey, weathering buff-grey; micritic; medium bedded becoming thin bedded upward, laminated	1.9	110.2
80	**Dolostone:** silty; buff to light brown, weathering light grey; micritic; very thin to massive bedded; silty laminated to wispy laminated; gradational upper contact	0.6	108.3
79	**Dolostone:** as in Unit 81; gradational upper contact	1.1	107.7
78	**Dolostone:** as in Unit 81, except weathering light brown; increased fine grained sand content	2.7	106.6
77	**Dolostone:** alternating light grey and medium grey; fine grained; thin platy to thick bedded, distinct bedding planes	1.3	103.9
76	**Dolostone:** silty; light brown-grey, weathering buff-brown-grey; fine grained; platy laminated to very thin bedded; eurypterids	1.1	102.6
75	**Sandstone:** (?)dolomitic; brown-grey, weathering brown; fine grained; thin to medium bedded, planar laminated to crosslaminated	1.8	101.5
74	Covered interval	1.2	99.7
73	**Dolostone:** as in Unit 76, except calcareous and with fenestral fabric	1.8	98.5
72	Covered interval	2.4	96.7
71	**Dolostone:** as in Unit 76; except with medium-coarse crystalline calcite zones	2.1	94.3
70	**Dolostone:** as in Unit 76, except unfossiliferous and with small laminated-fenestral vugs along bedding planes	0.6	92.2
69	**Dolostone:** silty; buff-brown, weathering same; fine grained; medium bedded; laminated; top 5 cm is dolostone, finely crystalline, vuggy (?pseudomorphs after gypsum)	1.5	91.6
68	**Dolostone:** silty; light grey, weathering very light grey; fine grained; thick bedded, distinctly laminated, becoming very thin bedded and platy laminated toward top	4.6	90.1
67	**Limestone breccia:** off-white to light grey; medium to coarsely crystalline; calcareous appearance; probably evaporite solution residual breccia	0.5	85.5
66	**Dolostone:** as in Unit 68	1.4	85.0
65	**Dolostone:** dark brown, banded, weathering medium brown; micritic; finely laminated to massive fabric; birds-eye porosity	0.5	83.6
64	**Dolostone:** silty; buff-brown, weathering same; thick bedded	0.2	83.1
63	**Dolostone:** silty; buff, weathering buff-brown; laminated to platy thin beds	0.5	82.9
62	**Dolostone:** as in Unit 65	0.3	82.4
61	**Dolostone:** silty; light grey, weathering yellow-grey; fine grained; medium bedded near base, becoming platy laminated upward; single thin bed contains ostracoderms	1.2	82.1
60	**Dolostone:** light grey, weathering same; thick bedded; dark grey mud clast grains in light grey, fine grained matrix; looks like a well-worked intraclastic **breccia**	0.5	80.9
59	**Dolostone:** as in Unit 63	0.6	80.4
58	**Dolostone:** light grey-brown, weathering medium brown; fine grained; laminated to platy laminated	0.9	79.8
57	**Dolostone:** light buff-grey, weathering buff-brown; fine grained with medium crystalline aggregate zones; thick bedded, becoming thin bedded to platy laminated in upper part	0.9	78.9
56	**Dolostone:** as in Unit 58	1.8	78.0
55	**Dolostone:** as in Unit 57	0.9	76.2
54	**Dolostone:** silty, shaly; medium grey, weathering same; very thin platy beds	0.7	75.3

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
53	**Dolostone:** silty; light buff-grey, weathering buff; micritic; medium bedded; conchoidal fracturing pattern	0.8	74.6
52	Covered interval	0.6	73.8
51	**Dolostone:** dark brown, weathering light brown; micritic; thin to medium bedded; dense	0.6	73.2
50	Covered interval	2.1	72.6
49	**Dolostone:** silty; light buff-grey, weathering yellow-grey; micritic; very thin to thin bedded; wispy laminated, with dark, carbonaceous partings	0.2	70.5
48	Covered interval	1.0	70.3
47	**Limestone:** very sandy; orange-grey, weathering grey-brown; thin bedded; abundant fine grained sand content; friable	0.5	69.3
46	Covered interval	0.6	68.8
45	**Dolostone:** as in Unit 49	3.0	68.2
44	Covered interval	1.2	65.2
43	**Sandstone:** dolomitic; buff, weathering buff-grey to orange; fine grained; thin bedded, becoming medium bedded at mid-unit, then thin bedded again at top; faint, low-angle crosslaminae, ripples and mudcracks on bedding planes; poorly exposed, rubbly outcrop	3.8	64.0
42	Covered interval	1.2	60.2
41	**Dolostone:** silty; light brown-grey, weathering light grey; micritic; very thin platy bedded, with faint laminae	1.1	59.0
40	**Dolostone:** medium brown, weathering buff-brown; micritic; medium bedded; dense, with calcite crystal-filled vugs; gradational upper contact	0.2	57.9
39	**Dolostone:** light grey, weathering medium grey-brown; micritic; thin bedded	2.0	57.7
38	**Dolostone:** silty; buff-grey, weathering light yellow-brown; medium to thick bedded, becoming thin bedded upward; planar laminated to crosslaminated; gradational upper contact	1.6	55.7
37	Covered interval	1.2	54.1
36	**Dolostone:** as in Unit 38	0.3	52.9
35	Covered interval	0.6	52.6
34	**Dolostone:** as in Unit 38	1.5	52.0
33	Covered interval	2.7	50.5
32	**Dolostone:** light buff-grey, weathering same, becoming light buff-brown upward; micritic; thin to very thin bedded; silt content increases upward	4.3	47.8
31	**Dolostone:** silty; buff-grey, weathering yellow-grey; thin platy bedded; laminated	0.2	43.5
30	**Dolostone:** medium brown, weathering dark brown; micritic; medium bedded; dense, with faint fenestral fabric	1.0	43.3
29	**Dolostone:** pink-grey, weathering brownish green-grey with colour banded to colour laminated pattern; thin bedded	0.3	42.3
28	**Dolostone:** light brown, weathering buff-brown; micritic; thick bedded near base, becoming thin bedded at top; numerous calcite-lined vugs in top 0.5 m	2.9	42.0
27	**Dolostone:** medium brown, weathering same; micritic; thick bedded; vuggy	0.7	39.1
26	**Dolostone:** light brown-grey, weathering brown-grey; micritic; distinctly laminated near base, becoming thick to massive bedded upward	3.4	38.4
25	Covered interval	2.2	35.0
24	**Dolostone:** silty; dark grey-brown, weathering light grey; micritic; very thin, platy bedded; laminated; rubbly outcrop	0.8	32.8
23	**Dolostone:** light brown, weathering same; micritic; massive bedded; dense	0.2	32.0
22	**Dolostone:** as in Unit 24	5.8	31.8
21	**Dolostone:** silty; light pink-grey, weathering buff-grey; micritic; thin bedded	1.1	26.0
20	Covered interval	1.8	24.9
19	**Dolostone:** as in Unit 21, except laminated to very thin platy bedded	1.0	23.1
18	Covered interval	1.0	22.1
17	**Dolostone:** silty; light grey, weathering light brown-grey; thin bedded; laminated with mudcracks on bedding planes; quartz sand laminae and lenses of fine grained sand	1.2	21.1
16	**Dolostone:** buff-brown, weathering buff-grey; micritic; medium bedded; faintly laminated; conchoidal fracture; upper part very vuggy with calcite-rind and botryoidal calcite infilling	2.4	19.9
15	**Dolostone:** medium grey, weathering light grey; micritic; massive to thick bedded; faintly laminated; "domal" fracturing indicates large scale stromatolitic layering	0.9	17.5
14	**Dolostone:** silty; medium grey, weathering light grey; thin bedded; laminated	1.0	16.6
13	Covered interval	2.7	15.6
12	**Dolostone:** buff-brown, weathering buff-grey; micritic; thick bedded; faintly laminated to homogeneous	0.7	12.9
11	**Dolostone:** as in Unit 14	1.4	12.2
10	**Dolostone:** light grey, weathering same; micritic; medium bedded; faintly laminated; large calcite-lined vugs up to 5 cm in diameter	0.3	10.8
9	**Dolostone:** silty; buff pink-grey, weathering light grey; micritic; very thin platy bedded; laminated	1.1	10.5
8	**Dolostone:** light grey, weathering buff-grey; micritic; thin to medium bedded; laminated to banded; bird's-eye structures and pseudo-enterolithic, contorted laminae	0.2	9.4
7	**Dolostone:** silty; light grey, weathering buff-grey; thin bedded; wavy laminated to ripple laminated	0.3	9.2
6	**Dolostone:** as in Unit 8	0.1	8.9
5	**Dolostone:** as in Unit 7	0.3	8.8
4	**Dolostone:** light grey-brown, weathering light grey; micritic; laminated throughout, becoming silty laminated upward; small, carbonaceous(?) grains mark laminae and are also dispersed throughout a 10 cm thick homogeneous bed in middle of unit	1.1	8.5
3	**Dolostone:** silty; light grey, weathering same; very thin platy bedded, faintly laminated, with planar and inclined ripple marks on bedding planes, and a few convolute laminae. Grades into **siltstone:** buff-grey, medium bedded and laminated	2.7	7.4

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
2	**Dolostone:** silty; light grey, weathering yellow-grey; very thin to thin bedded; faintly laminated, platy. Interbedded with **dolostone:** medium grey, very thin platy bedded, laminated	1.5	4.7
	ALLEN BAY FORMATION (incomplete)		
1	**Dolostone:** light brown-grey to light grey, weathering buff-yellow; finely crystalline; medium to thick bedded; base of this unit is a 0.6 m thick bed of coarsely crystalline dolostone	3.2	3.2

SECTION 42. Creswell River (Field section 76-MLA-61). This is the type section for the Somerset Island Formation, situated on an unnamed tributary of the Creswell River, 45 km north of Creswell Bay.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	PEEL SOUND FORMATION (undivided) (incomplete)		
71	Covered interval	21.0	401.0
70	**Sandstone:** pebbly; grey; coarse grained; abundant siltstone intraclasts, quartzite and dolostone pebbles, and rare solitary coral fragments up to 2 cm diameter; entirely trough crossbedded	1.5	380.0
69	**Sandstone:** red; planar laminae and medium-scale alpha crossbeds	3.1	378.5
68	**Siltstone:** red	0.9	375.4
67	Poorly exposed; lithology probably as in Unit 66	8.5	374.5
66	**Sandstone:** red; planar laminae and medium-scale alpha crossbeds	2.0	366.0
65	**Siltstone:** argillaceous; red; fish fragments	4.0	364.0
64	**Sandstone:** dolomitic; pale grey; fine grained; finely laminated; abundant argillaceous partings	1.0	360.0
63	**Sandstone:** fine grained; planar laminated, with rare trough crossbeds and a single alpha crossbed; unit contains "fish bed" containing whole and fragmented fish fossils; gradational upper contact	3.0	359.0
62	**Sandstone:** as in Unit 60	11.5	356.0
61	Dolomicrite, dark red; forms ripple laminated lenses with desiccation cracks and intraclasts	2.0	344.5
60	**Sandstone** and silty **sandstone** (poorly exposed): red; fine grained; platy to slabby weathering; abundant whole fish fossils	37.5	342.5
59	**Dolostone:** pink; platy weathering; ripple marks; green argillaceous partings; resistant; trace fossils	2.0	305.0
58	**Sandstone** (poorly exposed): red; very fine grained; laminated (red silty partings); fish fragments	11.5	303.0
	SOMERSET ISLAND FORMATION Upper member		
57	**Dolostone:** silty; finely laminated; ripple marks; abundant argillaceous partings; lenses of intraclasts with comminuted fossil fish debris	5.2	291.5
56	**Siltstone:** argillaceous; purple, mottled	4.5	286.3
55	**Sandstone:** buff, buff weathering; very fine grained; ripple marks; argillaceous partings and intraclasts; scattered pyrite crystals	3.8	281.8
54	**Dolostone:** silty; green to pink, with rare, slightly sandy lenses with parting lineation; platy weathering; desiccation cracks; gradational upper contact	3.0	278.0
53	**Siltstone:** purple and green	2.5	275.0
52	**Dolostone:** sandy and silty; platy weathering; faintly laminated; ripple marks at top; desiccation cracks	5.0	272.5
51	**Limestone:** argillaceous; medium grey, parts mottled; thinly laminated; rubbly weathering; horizontal trace fossils, small load casts; lenses of intraclast breccia with desiccation cracks at 260 m; resistant	11.5	267.5
50	**Dolostone:** platy to slabby weathering; ripple laminated; rare argillaceous partings; resistant; lenses of ostracod debris	6.0	256.0
49	**Dolostone:** silty; finely laminated; a few sandy streaks exhibiting ripple marks and parting lineation	4.5	250.0
48	**Siltstone:** green, mottled	1.0	245.5
47	**Dolostone:** silty; grey; abundant green argillaceous partings; papery to platy weathering; ripple marks; abundant ostracod debris	0.5	244.5
46	**Siltstone:** green, mottled	3.0	244.0
45	**Dolostone:** sandy; grey; finely laminated, platy to irregular weathering; abundant argillaceous partings	3.4	241.0
44	**Siltstone:** red	2.1	237.6
43	**Dolostone:** silty; grey; abundant green argillaceous partings; papery to platy weathering; ripple marks	0.5	235.5
42	**Siltstone:** purple and green mottled	2.2	235.0
41	**Dolomicrite:** grey; laminated	1.8	232.8
40	**Sandstone:** slightly dolomitic; very fine grained; finely laminated; rare argillaceous partings; vuggy; gradational upper contact	1.0	231.0
39	**Dolostone:** silty; pink; laminated; ripple marks; abundant angular dolostone intraclasts	1.7	230.0
38	**Siltstone:** green and purple; fossil fish fragments at base	4.6	228.3
37	**Dolostone:** silty; buff weathering; finely laminated; irregular weathering; green argillaceous partings; gradational upper contact	2.2	223.7
36	**Siltstone:** argillaceous; purple	3.0	221.5
35	**Siltstone** grading to **sandstone:** pink and green; very fine grained; finely laminated; coarser grained lenses exhibit parting lineation	19.5	218.5
34	**Siltstone:** purple, mottled	2.0	199.0
33	**Siltstone:** grey to pink; platy weathering	0.5	197.0
32	**Dolostone:** silty; grey; abundant green argillaceous partings; papery to platy weathering; ripple marks	2.0	196.5
31	**Siltstone:** red	4.6	194.5
30	**Dolostone:** as in Unit 32	1.7	189.9
29	**Siltstone:** red	1.1	188.2
28	**Dolostone:** as in Unit 32, becoming pink at top; gradational upper contact	2.0	187.1

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
27	**Siltstone:** slightly dolomitic; grey, platy weathering	1.2	185.1
26	**Dolostone:** as in Unit 32, with desiccation cracks; gradational upper contact	1.9	183.9
25	**Siltstone:** red	2.5	182.0
24	**Dolostone:** silty; grey; abundant green argillaceous partings; papery to platy weathering; ripple marks	2.5	179.5
23	**Siltstone:** red	2.5	177.0
22	**Siltstone:** slightly dolomitic; cream	0.5	174.5
21	**Sandstone:** very slightly dolomitic; very fine grained; planar laminated with parting lineation at base, becoming rippled at top; well sorted; gradational upper contact	1.5	174.0
20	**Dolostone:** grey; ripple marks; abundant green argillaceous partings	2.5	172.5
19	**Siltstone:** red and green mottled	3.0	170.0
18	**Dolostone:** sandy; grey; platy weathering	0.5	167.0
17	**Siltstone:** red	2.0	166.5
16	**Dolostone:** medium grey, buff weathering; laminated, platy weathering; argillaceous partings; lenses of ostracod debris	3.5	164.5
15	**Dolomicrite:** silty; pink and green; platy weathering; green argillaceous partings; fossil fish fragments	1.0	161.0
14	**Siltstone:** red, with grey dolomitic siltstone intraclasts, and **siltstone:** argillaceous, green and red mottled	5.0	160.0
13	**Dolostone:** cream-grey; parts mottled; very fine grained micaceous streaks; finely laminated; platy weathering; monotonous; ripple marks and desiccation cracks; rare vugs; rare ostracods and brachiopods; trace fossils on bedding planes	20.3	155.0
12	**Dolomicrite:** medium grey; slabby weathering, faintly bedded; gradational upper contact	24.0	134.7
11	**Dolostone:** as in Unit 13	7.7	110.7
10	**Mudstone** (poorly exposed): purple; recessive	4.9	103.0
	Lower member		
9	**Dolostone,** as in Unit 13; faint pink staining above 82 m	35.6	98.1
8	**Dolostone:** rubbly; abundant stromatoporoids and compound corals; sharp lower contact, gradational upper contact	1.7	62.5
7	**Dolostone:** as in Unit 13	14.8	60.8
6	**Dolostone:** sandy; buff weathering, platy weathering; rare smooth-shelled brachiopods	3.2	46.0
5	**Limestone:** bioclastic; rubbly weathering	2.4	42.8
4	**Dolostone:** sandy; buff weathering, platy weathering; rare smooth-shelled brachiopods	1.4	40.4
3	**Dolostone:** as in Unit 2, with very fine grained micaceous streaks; parts mottled; ripple marks and desiccation cracks, rare vugs; rare ostracods, brachiopods; trace fossils on bedding planes	19.0	39.0
2	**Dolostone:** cream-grey; finely laminated; platy weathering; monotonous	16.0	20.0
1	Covered interval (position of base estimated)	4.0	4.0

Unit 1 is underlain by rubbly, argillaceous limestones of the Douro Formation

SECTION 47. East Creswell River (Field sections 76-MLA-58, 59, and 15). These sections were measured in the vicinity of East Creswell River, approximately 13.5 km northwest of Fury Point. Section 76-MLA-58 is stratigraphically lowest, and is separated from Section 76-MLA-59 by a covered interval estimated to be 20 m thick. Helicopter tracing of the nearly flat-lying beds to the southwest showed that Section 76-MLA-15 rests stratigraphically on top of Section 76-MLA-59, with a probably negligible unmeasured interval in between.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	SOMERSET ISLAND FORMATION Upper member (incomplete)		
	Field section 76-MLA-15		
35	**Mudstone:** purple	0.9	126.5
34	**Siltstone:** mottled	1.4	125.6
33	**Dolostone:** silty; grey	1.4	124.2
32	**Siltstone:** red, mottled	0.8	122.8
31	**Mudstone:** silty; purple	5.9	122.0
30	**Dolostone:** silty;, grey; rare ostracods	0.1	116.1
29	**Siltstone:** red	1.0	116.0
28	**Dolostone:** silty and sandy; pale grey; desiccation cracks and rare oscillation ripple marks; gradational upper contact	4.5	115.0
27	**Siltstone:** red and grey mottled; finely laminated; desiccation cracks near top; grey parts commonly form rounded intraclasts in red matrix; gradational upper contact	3.5	110.5
26	**Dolostone:** silty; green-grey; laminated; with syneresis marks, desiccation cracks and rare oscillation ripples	10.0	107.0
25	**Mudstone:** purple; monotonous	7.9	97.0
24	**Dolostone:** as in Unit 28	1.6	89.1
23	**Siltstone:** pale grey, some mottled intervals; green shaly partings; finely laminated; gradational upper contact; recessive	8.5	87.5
22	**Dolostone:** as in Unit 28	1.5	79.0
21	**Limestone:** slightly nodular; vuggy; indeterminate shell debris; gradational upper contact	1.5	77.5
20	**Dolostone:** silty and sandy; pale grey; desiccation cracks and rare oscillation ripples; gradational upper contact	0.9	76.0
19	**Siltstone:** red and grey mottled; finely laminated; desiccation cracks near top; grey parts commonly form rounded intraclasts in red matrix; gradational upper contact	1.1	75.1
18	**Siltstone:** pale grey; finely laminated; green shaly partings; gradational upper contact		
	(Stratigraphic break appears negligible)		
	Field section 76-MLA-59		
17	**Dolostone:** ripple laminated; desiccation cracks; domal stromatolites at 70.2-70.3 m, ostracods and (?)eurypterids at 71.5 m	2.5	74.0
16	**Siltstone:** red and green mottled	5.9	71.5
15	**Dolostone:** silty; cream, buff weathering; platy weathering; green argillaceous partings; silt content decreases upward	2.1	65.6
14	**Siltstone** and **mudstone:** silty; red and green mottled	8.0	63.5
13	**Dolostone:** ripple laminated; gradational upper contact	10.0	55.5

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
12	**Dolostone:** vuggy; stromatolitic laminae; rare brachiopods and ostracods; sharp upper contact	1.0	45.5
11	**Dolostone:** silty; laminated; sharp upper contact	0.3	44.5
10	**Siltstone:** red and green mottled	1.2	44.2
	Lower member (incomplete)		
9	**Dolostone:** green-grey; platy weathering; abundant argillaceous partings; ostracods, gastropods, smooth-shelled brachiopods	1.6	32.6
8	Covered interval (estimated thickness)	20.0	31.0
Field section 76-MLA-58			
7	**Dolostone:** ripple laminated	1.9	11.0
6	**Limestone** and **dolostone:** bioclastic; scoured base	0.1	9.1
5	**Dolostone:** sandy; laminated; oncolites and stromatoporoids	0.4	9.0
4	**Dolostone:** sandy; ripple laminated	1.2	8.6
3	**Dolostone:** rubbly weathering; stromatolites	1.9	7.4
2	**Dolostone:** sandy; finely laminated	2.0	5.5
1	**Dolostone:** slabby weathering; resistant; rare ostracods and smooth-shelled brachiopods	3.5	3.5

SECTION 52. West Creswell River (Field section 76-MLA-14). The section is situated along the West Creswell River, 16 km north of Creswell Bay. A major north-south trending normal fault runs through the Allen Bay Formation. Some thickness reduction appears to have occurred in the Cape Storm Formation, also due to faulting. The overlying formations are undisturbed.

PEEL SOUND FORMATION (undivided)
(incomplete)

Scattered exposures of dolomitic siltstone and red sandstone showing parting lineation occur above Unit 43.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
43	**Sandstone:** red; planar laminated	1.0	922.5
42	**Sandstone:** red; coarse grained and pebbly; rounded quartzite and dolostone clasts up to 1 cm long; abundant trough crossbedding up to 20 cm thick; abundant comminuted fossil fish debris; sharp lower contact	2.0	921.5
	SOMERSET ISLAND FORMATION Upper member		
41	**Sandstone:** dark red, becoming grey upward; fining upward; fossil fish fragments; sharp, flat lower contact	5.5	919.5
40	**Dolostone** (silty) or **siltstone** (dolomitic): red, resistant; alternating dark red and grey laminae; finely laminated; rare green shaly partings; abundant desiccation cracks and intraformational pebbles	2.0	914.0
39	**Dolosiltite:** as in Unit 32; gradational upper contact	2.5	912.0
38	**Sandstone:** pale grey; fine grained; planar laminated and faintly trough crossbedded; fossil fish debris at base, abundant whole fish carapaces above	1.5	909.5
37	**Siltstone:** with rare sandy beds; very fine grained; finely laminated; small oscillation ripples; green shaly partings; gradational upper contact	4.0	908.0
36	**Sandstone:** grey and red, reddish weathering; fine grained; laminated to thin bedded, blocky weathering, ripple marks; abundant comminuted fossil fish debris	1.0	904.0
35	**Dolostone** (silty) or **siltstone** (dolomitic): alternating dark red and grey laminae; finely laminated; rare green shaly partings; abundant desiccation cracks and intraformational pebbles	15.5	903.0
34	**Dolostone:** silty; laminated; sharp, flat base	0.5	887.5
33	**Sandstone:** grey and red, reddish weathering; fine grained; laminated to thin bedded, blocky weathering, ripple marks; abundant comminuted fossil fish debris	2.0	887.0
32	**Siltstone:** rare sandy beds; very fine grained; finely laminated, small oscillation ripples; green shaly partings	5.5	885.0
31	**Mudstone:** silty; purple; recessive	3.5	879.5
30	**Dolostone** (silty) or **siltstone** (dolomitic): alternating dark red and grey laminae, finely laminated; rare green shaly partings; abundant desiccation cracks and intraformational pebbles	7.0	876.0
29	Covered interval	52.0	869.0
28	**Sandstone:** red; fine grained; slabby weathering	2.0	817.0
27	**Siltstone:** pink, purple and grey weathering; fine mottling corresponding to desiccation cracks; very fine (?)algal laminae; common fine sandy streaks	14.0	815.0
26	**Limestone:** grey; nodular; indeterminate shell debris; flat, possibly scoured lower contact, gradational upper contact	1.0	801.0
25	**Siltstone:** pink, purple and grey weathering; fine mottling corresponding to desiccation cracks; very fine (?)algal laminae; common fine sandy streaks	9.0	800.0
24	**Limestone:** grey; nodular; indeterminate shell debris	1.0	791.0
23	**Siltstone:** slightly dolomitic; pale grey, rare red mottling; laminated, oscillation ripples, occasional dolomicrite flasers; slightly micaceous; rare ostracods; gradational upper contact	23.0	790.0
22	**Siltstone:** grey and reddish mottled; laminated	3.0	767.0
	Lower member		
21	**Siltstone:** buff, buff weathering; faint fine laminae; occasional lenses of dolomite-lined vugs; recessive	14.0	764.0
	DOURO FORMATION		
20	**Limestone:** argillaceous; mottled; rubbly; very abundant brachiopods (smooth shelled, or with wide flat or stubby heavy ribs), crinoids, gastropods, ostracods	157.5	750.0
19	Inaccessible recessive interval; appears to be **limestone:** argillaceous, soft	12.5	592.5
18	**Limestone:** argillaceous; mottled; rubbly; very abundant brachiopods (smooth shelled, or with wide flat or stubby heavy ribs), crinoids, gastropods, ostracods	31.5	580.0
17	**Dolostone:** light buff weathering; a few stromatoporoid colonies	1.5	548.5

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
16	**Limestone:** argillaceous; green-grey; rubbly; abundant brachiopods and crinoid ossicles; *Howellella*(?) sp., *Protathyris* sp., GSC locality C-60526	6.0	547.0
	CAPE STORM FORMATION		
15	**Dolostone:** as in Unit 9; common beds 2-3 cm thick of **limestone:** bioclastic, medium grey, with abundant gastropods and ostracods	14.0	541.0
14	**Dolostone:** grey, mottled; rubbly	1.0	527.0
13	**Dolostone:** as in Unit 9	13.0	526.0
12	**Dolostone:** and interbedded dolomitic **sandstone:** as in Unit 10	2.0	513.0
11	**Dolostone:** as in Unit 9	44.0	511.0
10	**Dolostone,** with interbedded dolomitic **sandstone:** very fine grained; abundant asymmetrical ripple marks	2.0	467.0
9	**Dolostone:** as in Unit 8, except approximately 10% of unit **dolostone:** thinly laminated; abundant green-grey shaly partings; common intraformational conglomerate; desiccation cracks; small ripple marks; rare fossil fish fragments	25.0	465.0
8	**Dolostone:** pale green-grey; finely crystalline; very finely laminated; platy to slabby weathering, rare small ripple marks, desiccation cracks; trace fossils; rare seams of green-grey **shale;** rare vugs lined with dolomite crystals; rare coarser grained intervals, up to 5 cm thick, of ostracods and indeterminate shell debris	22.0	440.0
	ALLEN BAY FORMATION (incomplete)		
7	**Dolostone:** as in Unit 6, except pale grey, pale grey weathering	43.0	418.0
6	**Dolostone:** cream, yellowish weathering; finely crystalline; finely laminated; slabby to blocky weathering; scattered chert nodules; abundant tiny vugs; rare thin layers of undulatory, probably stromatolitic, laminae; rare thin **shales;** passes rapidly upward into Unit 7	61.5	375.5
5	Covered interval; talus indicates lithology similar to Unit 4	76.0	313.5
4	**Dolostone:** as in Unit 1, except medium bedded; cliff-forming, inaccessible	147.5	237.5
	Fault Zone		
3	**Dolostone:** cream, yellowish buff weathering; medium to coarse crystalline; massive bedded; vugs up to 5 cm in diameter, lined with dolomite crystals; rare trace fossils	56.0	90.0
2	**Dolostone:** cream, buff weathering; finely crystalline; medium bedded; layers of chert nodules; streaks of dark grey (?)argillaceous matter; rare mottling; rare gastropods	10.0	34.0
1	**Dolostone:** cream, yellowish buff weathering; medium to coarse crystalline; massive bedded; vugs up to 5 cm in diameter, lined with dolomite crystals; rare trace fossils	24.0	24.0

SECTION 62. Creswell Bay (Field section 76-MLA-16). This section was measured in an unnamed stream canyon, 6 km northwest of the mouth of the Creswell River.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	PEEL SOUND FORMATION (undivided) (incomplete)		
7	**Sandstone:** pink; fine to medium grained; faintly laminated; slabby weathering; rare trough crossbeds; lenses of abundant dolostone intraclasts and comminuted fossil fish debris	22.5	90.0
	SOMERSET ISLAND FORMATION (undivided) (incomplete)		
6	**Sandstone:** cream, grey weathering; fine grained; slabby weathering	1.0	67.5
5	**Dolostone:** silty, slightly sandy; medium to dark grey, pale grey to pink weathering; finely laminated; gradational upper contact	2.5	66.5
4	**Sandstone:** dolomitic; fine grained; slabby weathering	4.9	64.0
3	**Dolostone:** sandy; faint pink weathering near top; finely crystalline; abundant dolostone intraclasts	39.0	59.1
2	**Dolostone:** sandy; finely crystalline; abundant dolostone intraclasts	0.1	20.1
1	**Siltstone** with interbedded **dolostone:** silty; pale grey, green grey weathering; finely laminated; thin bedded; slabby weathering; rare desiccation cracks; rare smooth-shelled brachiopods and ostracods	20.0	20.0

SECTION 80. Fury Point North (Field section 76-MLA-6). The section is situated in an unnamed stream canyon, 7.5 km north of Fury Point. Measurements commenced near a stream junction, and continued to the top of the gorge on the north side.

	SOMERSET ISLAND FORMATION Lower member (incomplete)		
9	**Limestone:** (?)dolomitic; medium grey weathering; abundant compound corals, stromatoporoids, nautiloids, crinoids and gastropods	4.1	68.5
8	**Dolostone:** silty; as in Unit 2; a few grey, irregular nodular laminae, and even, parallel laminae; scattered ostracod, gastropod and brachiopod debris; gradational upper contact	28.6	64.4
7	**Limestone:** argillaceous; nodular; in part bioclastic; platy weathering; gastropods and stromatoporoids; sharp lower contact, gradational upper contact	0.9	35.8
6	**Dolomicrite:** finely laminated; argillaceous streaks; trace fossils, ostracods and brachiopods; rare lenses containing scattered brachiopod debris; sharp upper contact	6.4	34.9
5	**Limestone:** argillaceous; nodular; in part bioclastic; platy weathering; gastropods and stromatoporoids; sharp lower contact, gradational upper contact	0.5	28.5
4	**Dolostone:** silty; as in Unit 2; rare concentric ring brachiopods on bedding planes, and *Atrypella*(?) sp.; sharp upper contact; GSC locality C-60508	17.0	28.0

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
3	**Limestone:** argillaceous; nodular; in part bioclastic; platy weathering; gastropods and stromatoporoids; sharp lower contact, gradational upper contact	1.6	11.0
2	**Dolostone:** silty; well laminated; platy weathering; asymmetric ripple marks; bounce marks; feeding trails; rare ostracods	4.4	9.4
1	Covered interval: lithology probably similar to Unit 2; (?)gypsum at base	5.0	5.0

SECTION 82. Fury Point (Field section 76-MLA-85).

SOMERSET ISLAND FORMATION
Lower member
(incomplete)

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
7	**Limestone:** bioclastic; abundant brachiopods, gastropods and ostracods; basal 20 cm of unit is intraclast lag with scoured base	20.5	75.5
6	**Dolostone:** laminated and ripple marks; platy weathering; syneresis cracks; rare micaceous, silty parting planes; ostracods; sharp upper contact	13.5	55.0
5	**Limestone:** bioclastic; gradational upper contact	0.5	41.5
4	**Dolostone:** laminated and ripple marks; platy weathering; syneresis cracks; rare micaceous, silty parting planes; ostracods; sharp upper contact	16.0	41.0
3	**Limestone:** argillaceous; rubbly; thin bioclastic lenses; gradational upper contact	1.5	25.0
2	**Dolostone:** laminated and ripple marks; platy weathering; syneresis cracks; rare micaceous, silty parting planes; ostracods	13.5	23.5

DOURO FORMATION
(incomplete)

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
1	**Limestone:** argillaceous; rubbly; thin, bioturbated intraclast breccias; very rare ripple laminated dolomicrite lenses, 3 cm thick; abundant brachiopods	10.0	10.0

SECTION 86. Cape Garry North (Field section 76-MLA-23). The section was measured along an unnamed stream canyon, 20 km northwest of Cape Garry. A major northwest-southeast trending normal fault has caused a marked structural thinning of the Somerset Island Formation. The Peel Sound and Douro formations are undisturbed.

PEEL SOUND FORMATION
Upper part
(incomplete)

Observations from bluffs 4-5 km to the north indicate that an additional thickness of approximately 76 m of the Peel Sound Formation is preserved stratigraphically above the units included in this section.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
20	**Conglomerate:** polymictic; trough crossbedded, with abundant mudflake intraclasts; abundant subangular pebbles (up to 5 cm in diameter) of Douro lithology containing crinoids and brachiopod fragments; rare, rounded gneiss and quartzite pebbles up to 8 cm in diameter	23.0	291.0
19	**Conglomerate:** polymictic; abundant lenses of sandstone; trough crossbedded; rounded pebbles up to 7 cm in diameter, composed predominantly of dolostone and gneiss; sharp, flat lower contact, gradational upper contact	13.0	268.0
18	**Sandstone:** pebbly; pink; very coarse grained; abundant trough crossbeds	3.5	255.0
17	**Conglomerate:** polymictic; rounded pebbles up to 7 cm in diameter, composed predominantly of dolostone and gneiss; sharp, flat lower contact, gradational upper contact	0.5	251.5

Lower part

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
16	**Sandstone:** silty; two lenses, each approximately 0.5 m thick, of sandstone with alpha crossbeds about 10 cm thick	11.0	251.0
15	**Sandstone:** pinkish; medium to coarse grained; thick to massive bedded; abundant trough crossbeds; poorly cemented; very rare intraclasts of green mudstone; resistant; gradational upper contact	4.3	240.0
14	**Sandstone:** pink; medium grained; finely laminated; rare ripple marks; abundant thin, purple, silty laminae	0.4	235.7
13	**Sandstone:** white; with pinkish bands; medium to coarse grained; thick to massive bedded; abundant trough crossbeds, rare overturned crossbeds; poorly cemented; very rare intraclasts of green mudstone; gradational upper contact	9.3	253.3
12	**Sandstone:** white; medium to coarse grained; thick to massive bedded; abundant trough crossbeds; poorly cemented; resistant; very rare intraclasts of green mudstone; gradational upper contact	12.0	226.0
11	Inaccessible section. Apparently **sandstone:** red, slabby weathering, with interbeds of silty, red sandstone	18.0	214.0
10	Covered interval: poor exposures of **sandstone**, as in Unit 8	59.0	196.0
9	**Sandstone:** silty; purple; very fine grained	1.5	137.0
8	**Sandstone:** as in Unit 7, except cream, green weathering; thinly laminated	6.5	135.5
7	**Sandstone:** slightly dolomitic; red and mottled greenish buff and pale brown; very fine grained; slabby weathering; thin seams of purple siltstone and green mudstone; rare fossil fish fragments	5.0	129.0

SOMERSET ISLAND FORMATION (undivided)
(faulted)

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
6	**Dolostone:** medium grey, buff-grey weathering; thinly laminated; ripple marks and desiccation cracks; rare ostracods	2.0	124.0
5	**Limestone:** slightly sandy; medium grey to pink, pale buff-grey to pink weathering; slabby weathering, scattered platy weathering layers with syneresis cracks and desiccation cracks	17.0	122.0

DOURO FORMATION

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
4	**Limestone:** bioclastic; coarse grained; vaguely bedded; clasts composed of crinoid ossicles and compound coral fragments	43.0	105.0
3	**Limestone:** bioclastic; coarse grained; vaguely bedded; clasts composed of crinoid ossicles and compound coral fragments	2.0	62.0

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
2	**Limestone:** bioclastic; thick bedded; oolitic at base; a few brachiopods and corals, rare trilobites	35.0	60.0
1	**Limestone:** argillaceous; medium grey; medium bedded; rubbly; layers of mottled limestone; abundant thin bioclastic lenses containing crinoid ossicles, shelly debris and rare brachiopods	25.0	25.0

The section is underlain, across a sharp contact, by the Cape Storm Formation, which consists of greenish grey, thin bedded, slabby weathering dolostone.

SECTION 89. Cape Garry (Field section 76-MLA-35). The section is situated in an unnamed stream canyon 15 km northwest of Cape Garry. Measurements were made on the south canyon wall.

PEEL SOUND FORMATION
Upper part
(incomplete)

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
34	**Conglomerate:** polymictic; clast supported; lenses of sandstone	1.6	46.8
33	**Sandstone:** pebbly; trough crossbedded	0.9	45.2
32	**Conglomerate:** granule; medium bedded; pebbles composed of dolostone and limestone, up to 1 cm in diameter	0.5	44.3

Lower part
(incomplete)

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
31	**Sandstone:** fine grained; interbedded with silty, greenish sandstone	0.2	43.8
30	**Sandstone:** medium grained; alpha and theta crossbeds about 10 cm thick; siltstone intraclasts and dolostone pebbles up to 2 cm in diameter; sharp lower contact, gradational upper contact; very abundant intraclasts in lower 0.5 m	7.8	43.6
29	**Sandstone:** silty; purplish; soft	1.5	35.8
28	**Sandstone:** medium grained; alpha and theta crossbeds about 10 cm thick; siltsone intraclasts and dolostone pebbles up to 2 cm in diameter; sharp lower contact, gradational contact	0.3	34.3
27	**Sandstone:** silty; purplish; soft	1.5	34.0
26	**Sandstone:** medium grained; alpha and theta crossbeds about 10 cm thick; siltstone intraclasts and dolostone pebbles up to 2 cm in diameter; sharp lower contact, gradational upper contact	0.5	32.5
25	**Sandstone:** red; fine grained; planar laminated	1.0	32.0
24	Covered interval	5.0	31.0
23	**Sandstone:** red; fine to medium grained; planar laminated	1.7	26.0
22	**Siltstone:** purplish; recessive	0.8	24.3
21	**Sandstone:** fine grained. Interbedded with **sandstone:** silty; pink to dark brown; thinly laminated	1.1	23.5
20	**Sandstone:** red; medium to coarse grained; trough crossbedded; mudstone intraclasts; sharp lower contact, gradational upper contact	0.5	22.4
19	**Sandstone:** fine grained. Interbedded with **sandstone:** silty; pink to dark brown; thinly laminated	1.4	21.9
18	**Sandstone:** pink; coarse grained; trough crossbedded; scoured lower contact, gradational upper contact	1.0	20.5
17	**Sandstone:** silty; green; fine grained	0.1	19.5
16	**Sandstone:** white; medium to coarse grained; trough crossbedded; scattered intraclasts of green-grey mudstone	0.9	19.4
15	**Sandstone:** silty; red and grey mottled; very fine grained; thin lenses of fine grained sandstone; sharp contacts	0.5	18.5
14	**Sandstone:** silty; red; very fine grained; finely laminated; fossil fish debris	0.5	18.0
13	**Sandstone:** fine grained; thinly laminated, and **sandstone:** silty; dark brown to pink; ripple marks	2.0	17.5
12	**Sandstone:** pink; medium to coarse grained; trough crossbedded; abundant siltstone intraclasts; erosional lower contract, gradational upper contact	0.2	15.5
11	**Sandstone:** silty; very fine grained; very finely laminated; ripple marks	0.2	15.3
10	**Sandstone:** pink; medium to coarse grained; trough crossbedded; abundant siltstone intraclasts; erosional lower contact, gradational upper contact	0.3	15.1
9	**Sandstone:** fine grained; thinly laminated, and **sandstone:** silty; dark brown to pink; ripple marks	0.6	14.8
8	**Sandstone:** thin bedded; ripple marks; green, shaly partings	1.0	14.2
7	**Sandstone:** white; medium to coarse grained; trough crossbedded; scattered intraclasts of green-grey mudstone	6.7	13.2
6	**Sandstone:** white; fine to medium grained; laminated; greenish **siltstone** at top of unit; sharp upper contact	1.5	6.5
5	**Sandstone:** dolomitic, silty; medium grey; thin bedded	0.9	5.0
4	**Sandstone:** silty; fine to very fine grained; gradational contacts	0.3	4.1
3	**Sandstone:** white; medium grained; trough crossbedded; erosional lower contact	0.1	3.8
2	**Sandstone:** fine to medium grained; thinly laminated; parts well cemented; thin interbeds of green **shale**	1.5	3.7
1	**Sandstone:** white; medium to coarse grained; trough crossbedded; scattered intraclasts of green-grey mudstone	2.2	2.2

SECTION 93. Cape Garry (Field section 76-MLA-95).

SOMERSET ISLAND FORMATION
Lower member

The section is overlain by a poorly exposed outcrop of the basal unit of the Upper member, which is composed of silty, red dolostone with abundant intraclasts.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
9	**Dolostone:** cream, buff weathering; finely crystalline; slabbly weathering; rare symmetrical ripple marks; thin sandy laminae; a few lenses with brachiopods	24.7	105.0
8	**Limestone:** bioclastic; stromatoporoids	0.3	80.3

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
7	**Dolostone:** cream, buff weathering; finely crystalline; slabbly weathering; rare symmetrical ripple marks; thin sandy laminae; a few lenses with brachiopods	9.0	80.0
6	**Limestone:** bioclastic	2.0	71.0
5	**Dolostone:** cream, buff weathering; finely crystalline; slabbly weatheirng; rare symmetrical ripple marks; thin sandy laminae; a few lenses with brachiopods	8.0	69.0
4	**Limestone:** bioclastic; sharp lower contact, gradational upper contact	0.3	61.0
3	**Dolostone:** slabby weathering; gradationally overlies thin, basal, bioclastic unit	0.7	60.7
2	**Dolostone:** cream, buff weathering; finely crystalline; slabby weathering; rare symmetrical ripple marks; thin sandy laminae; a few lenses with brachiopods	58.0	60.0
	DOURO FORMATION (incomplete)		
1	**Limestone:** slightly nodular; grey; ripple marks; bioturbated	2.0	2.0

SECTION 96. Lost River (Field section 76-MLA-97). The section commences downstream from Section 76-MLA-96, which was described by Miall and Kerr (1980).

DOURO FORMATION

An additional 24 m of the Douro Formation were measured above the uppermost unit of this section, bringing the total thickness of the formation to 174.0 m. The Douro grades upward into the typical platy dolostones of the Lower member of the Somerset Island Formation.

6	**Limestone:** argillaceous; rubbly; abundant brachiopods, stromatoporoids, and crinoid debris; sharp lower contact	77.0	150.0
5	Covered interval	58.0	73.0
4	**Limestone:** argillaceous; rubbly; abundant brachiopods, stromatoporoids, and crinoid debris; sharp lower contact	8.3	15.0
3	**Dolostone:** platy weathering; ripple laminated, desiccation cracks; sharp upper contact	3.7	6.7
2	**Limestone:** argillaceous; rubbly; abundant brachiopods, stromatoporoids, and crinoid debris; sharp lower contact	1.3	3.0
	CAPE STORM FORMATION (incomplete)		
1	**Dolostone:** platy weathering; desiccation cracks; rare brachiopods and fish fossils	1.7	1.7

SECTION 64. Creswell Bay East (Field section 76-MLA-13). The section was measured in an unnamed stream canyon 25 km northwest of Fury Point.

Unit	Lithology	Unit Thickness metres	Cumulative Thickness Above Base metres
	SOMERSET ISLAND FORMATION Upper member (incomplete)		
24	**Siltstone** and silty **dolostone:** as in Unit 18	3.7	40.0
23	**Dolostone:** bituminous; finely crystalline; well laminated; ripple marks; porous; gradational upper contact	2.0	36.3
22	**Siltstone** and silty **dolostone:** as in Unit 18	3.3	34.3
21	**Limestone coquina:** (poorly exposed)	0.4	31.0
20	**Siltstone:** greenish; finely laminated; abundant ripple marks; rare desiccation cracks	3.1	30.6
19	**Siltstone:** red	1.0	27.5
18	**Siltstone** and silty **dolostone:** as in Unit 16, except with abundant laminae of bioclastic material, including ostracods and gastropods; rare flat beds with groove casts	9.8	26.5
17	**Siltstone:** red	1.2	16.7
16	**Siltstone** interbedded with silty **dolostone:** greenish; ripple laminated; with desiccation cracks and intraclasts; feeding trails; gradational upper contact	1.9	15.5
15	**Siltstone:** red	1.6	13.6
14	**Limestone:** argillaceous; green-grey; scattered indeterminate fossil debris	0.8	12.0
13	**Siltstone:** red and green; finely laminated; abundant desiccation cracks, evaporite nodules and solution cavities; gradational upper contact	0.4	11.2
12	**Limestone coquina:** well laminated, showing grain size variation across laminae; abundant flat intraclasts; sharply scoured lower contact, gradational upper contact	1.8	10.8
11	**Siltstone:** quartzose; white; well laminated; sharp flat base, scoured top	0.4	9.0
10	**Siltstone:** "muddy"; reddish; possible evaporite solution cavities	0.6	8.6
9	**Limestone coquina:** well laminated, showing grain size variation across laminae; abundant flat intraclasts; sharply scoured lower contact, gradational upper contact	2.0	8.0
8	**Dolomicrite:** ripple laminated; rare desiccation cracks	0.5	6.0
7	**Sandstone:** greenish; fine grained; abundant (?)solution cavities; sharp contacts	0.1	5.5
6	**Mudstone:** silty; purplish and greenish mottled	2.4	5.4
5	**Siltstone:** red and green; finely laminated; abundant desiccation cracks, evaporite nodules and solution cavities; gradational upper contact	1.5	3.0
4	**Sandstone:** greenish; fine grained; abundant (?)solution cavities; sharp contacts	0.1	1.5
3	**Siltstone:** red; faintly laminated; sharp upper contact	0.7	1.4
2	**Siltstone:** green; finely laminated; gradational upper contact	0.4	0.7
1	**Siltstone:** red; faintly laminated; gradational upper contact	0.3	0.3

APPENDIX 3

BIOSTRATIGRAPHIC DATA

Part I: Conodonts

1. Turner Cliffs Formation, Lower member

1.1 GSC Locality: C-60638

Location: Section 41 (Field sections 76-MLA-63, 64)

Stratigraphic Position: 150.5 m above base of member (and formation)

Source: C.R. Barnes, unpublished report, 1977

Proconodontus muelleri muelleri Miller

Remarks. *Proconodontus muelleri muelleri* ranges from the top of the Parrish Glacier Formation to the lower part of Member 2 of the Copes Bay Formation in the Arctic Islands (Nowlan, 1976) and suggests a Late Cambrian (Trempealeauan) age. Elsewhere, this taxon ranges from Late Cambrian to the lowest part of the Ordovician.

1.2 GSC Locality: C-45605

Location: Aston Bay, UTM 15X VM 439100E 8182750N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: unspecified; appears to be in upper part of Lower member

Source: C.R. Barnes, unpublished report, 1977

Cordylodus prion Lindström
Drepanoistodus n. sp. Nowlan
Oneotodus nakamuri Nogami

Remarks. Nowlan (1976) found that *Cordylodus prion* occurs in the lower part of Member 3 of the Copes Bay Formation in the Canadian Arctic Islands. *Oneotodus nakamuri* extends down into Member 2 of the Copes Bay Formation and overlaps the lower range of *C. prion* (Nowlan, 1976). An early Tremadocian age is indicated.

1.3 GSC Locality: C-60709

Location: Section 98 (Field section 76-MLA-100)

Stratigraphic Position: 231.5 m above base of section; base of section approximately 2 m above basal nonconformity

Source: C.R. Barnes, unpublished report, 1977

Acontiodus iowensis Furnish s.f.
Cordylodus prion Lindström
Drepanoistodus n. sp.
Oneotodus cf. *O. gracilis* (Furnish)
Paltodus bassleri Furnish

Remarks. This fauna is present in the lower part of Member 3 of the Copes Bay Formation, Arctic Islands (Nowlan, 1976). The fauna equates with Fauna B and the lower part of Fauna C of Ethington and Clark (1971). It indicates a late Tremadocian age.

2. Turner Cliffs Formation, Upper member

GSC Locality: C-30875/6060-6120 ft (1847.1-1865.4 m)

Location: Section 34 (Panarctic Deminex Garnier O-21 well)

Stratigraphic Position: 21.3 to 39.6 m above base of member

Source: R.S. Tipnis and C.R. Barnes in Mayr et al. (1980)

New genus of Repetski and Ethington (1977)
"*Acontiodus*" cf. "*A.*" *staufferi* Furnish

Remarks. The new genus, as it is presently understood, is known to be restricted to Fauna C of Ethington and Clark (1971). Fauna C, of late Tremadocian age, has also been found in the uppermost Copes Bay Formation on Grinnell Peninsula on Devon Island.

3. Ship Point Formation

GSC Locality: C-60596

Location: Section 94 (Field section 76-MLA-40; locality Z of Dixon, 1973a)

Stratigraphic Position: basal bed of formation, 359.8-365.4 m above base of section (Unit 27 of Section 6 of Miall and Kerr, 1980)

Source: C.R. Barnes, unpublished report, 1977

Drepanoistodus? gracilis (Branson & Mehl)
Drepanodus parallelus (Branson & Mehl)
Eoneoprioniodus? akpatokensis (Barnes)
Scolopodus quadraplicatus (Branson & Mehl)
N. gen. n. sp.

Remarks. *Eoneoprioniodus? akpatokensis* and N. gen. n. sp. have a relatively restricted stratigraphic range in the Arctic Islands (Nowlan, 1976), being found only from the top of Member 1 to the lower part of Member 3 of the Eleanor River Formation. This equates with the upper part of Fauna D of Ethington and Clark (1971) and Fauna 1 of Sweet et al. (1971). *E.? akpatokensis* probably ranges into Fauna 2 at Akpotok Island, Ungava Bay (Workum et al., 1976). (A late Canadian age is indicated.)

4. Bay Fiord Formation

4.1 GSC Locality: C-60645

Location: Section 46 (Field sections 76-MLA-72, 73)

Stratigraphic Position: Unit 6 of Section 14 of Miall and Kerr (1980), which represents the entire Bay Fiord Formation at this locality

Source: C.R. Barnes, unpublished report, 1977

Multioistodus cf. *M. subdentatus* Cullison

Remarks. In the Arctic Islands (Nowlan, 1976), *Multioistodus subdentatus* is indicative of faunas 2-4 of Sweet et al. (1971), i.e. upper Whiterockian (early Middle Ordovician).

4.2 GSC Locality: C-53087

Location: 16 km north of Creswell Bay, UTM 15X VL 470500E 8091875N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: unspecified; collected from just below contact between the Bay Fiord Formation and the Octi map unit

Source: C.R. Barnes, unpublished report, 1977

Drepanoistodus? sp.
Multioistodus subdentatus Cullison
Ptiloconus cf. *P. gracilis* (Branson & Mehl)
Tricladiodus n. sp.

Remarks. *Multioistodus subdentatus* and *Tricladiodus* n. sp. were found in the lower half of the Bay Fiord Formation of the Arctic Islands by Nowlan (1976). These conodonts are typical of faunas 2-4 of Sweet et al. (1971) and indicate a late Whiterockian age (early Middle Ordovician).

4.3 GSC localities: C-45606, C-45607, C-45608

Location: Aston Bay, UTM 15X VM 439700E 8183250N (spot samples collected by J.Wm. Kerr)

Stratigraphic Position: collected from unspecified strati-graphic intervals in the uppermost part of the Bay Fiord Formation

Source: C.R. Barnes, unpublished report, 1977

C-45606: *Belodina* n. sp. A Barnes (1974)
Belodina n. sp.
Drepanoistodus cf. *D. suberectus* Branson & Mehl
Erismodus n. sp.
Phragmodus cf. *P. flexuosus* Moskalenko
Panderodus gracilis (Branson & Mehl)

Remarks. *Phragmodus flexuosus* is well known from the middle part of the Bay Fiord Formation (Nowlan, 1976) and from the upper Ship Point Formation of the Foxe Basin (Barnes, 1973; and in Trettin, 1975, p. 19). This species ranges through faunas 5 and 6 of Sweet et al. (1971) and indicates a Chazyan (early Middle Ordovician) age.

C-45607: *Belodella* n. sp.

Remarks. This distincive species has a similar stratigraphic range to, and is a common associate of *Phragmodus flexuosus* (see C-45606 above). It occurs in the upper half of the Bay Fiord Formation of the Arctic Islands (Barnes, 1973; Nowlan, 1976) and is known from the upper Ship Point Formation of the Foxe Basin and Melville Peninsula (Barnes, 1973, 1977). A Chazyan (early Middle Ordovician) age is indicated.

C-45608: *Appalachignathus* sp.
Belodina compressa (Branson & Mehl)
Drepanoistodus cf. *D. suberectus* (Branson & Mehl)
Panderodus gracilis (Branson & Mehl)
Periodon grandis (Ethington)
Stereoconus sp. s.f.

Remarks. The range of *Appalachignathus* is relatively limited, ranging through faunas 6 and 7 of Sweet et al. (1971). It is known from the upper Bay Fiord and lower Thumb Mountain formations of the Arctic Islands (Nowlan, 1976) and the Bad Cache Rapids Formation of Melville Peninsula (Barnes, 1977). A late Chazyan to Blackriverian age is indicated (middle Middle Ordovician).

4.4 GSC Locality: C-29864, 4582-4592 ft (1396.6-1400.3 m)

Location: Section 34 (Panarctic Deminex Garnier O-21 well)

Stratigraphic Position: not precisely known – lithological log included by Mayr (1978) shows sample interval spanning the contact between the Bay Fiord and Thumb Mountain formations. This log was not adjusted to the mechanical log from which formational boundaries were picked. Mayr (pers. comm., 1982) considers the collection most likely to have been derived from the uppermost Bay Fiord Formation.

Source: R.S. Tipnis and C.R. Barnes in Mayr et al. (1980)

Panderodus cf. *P. panderi* Stauffer
Panderodus gracilis (Branson & Mehl)
Drepanoistodus homocurvatus (Lindström)
Polyplacognathus ramosus Stauffer
Appalachignathus delicatulus Bergström et al.
Belodina compressa (Branson & Mehl)
Belodina sp.
Belodella n. sp. (of Barnes, 1973)
Hyaline elements

Remarks. Both the belodelliform and oistodiform elements of *Belodella* n. sp. are close to, but probably not identical with, those of *Belodella jemtlandica* Löfgren (Löfgren, 1978). The age of the fauna is late Chazy to mid-Barnveld (early Caradocian), representing faunas 6-7 of Sweet et al., 1971.

5. Thumb Mountain Formation

5.1 GSC Locality: C-45627

Location: 18 km southeast of Aston Bay, UTM 15X VM 458800E 8160200N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: unspecified, but map position indicates that the sample was derived from the lower part of the formation

Source: C.R. Barnes, unpublished report, 1977

Acodus mutatus Branson & Mehl s.f.
Belodina compressa (Branson & Mehl)
Drepanoistodus suberectus (Branson & Mehl)
Panderodus gracilis (Branson & Mehl)
P. spp.
Plectodina? sp.
Plegagnathus dartoni (Stone & Furnish) s.f.
N. gen. A n. sp. 1 Barnes (1977) s.f.

Remarks. The presence of N. gen. A n. sp. 1 Barnes (= *Belodina* sp. A of Sweet et al., 1971) and *Plegagnathus dartoni* is indicative of Fauna 11 and early Fauna 12 of Sweet et al. (1971). Both taxa are known from the uppermost Thumb Mountain and Irene Bay formations of the Arctic Islands (Barnes, 1973; Nowlan, 1976) and the Churchill River Formation of northern Hudson Bay (Barnes, 1973). A Maysvillian age is indicated.

5.2 GSC Locality: C-45626

Location: 18 km southeast of Aston Bay, UTM 15X VM 459000E 8160250N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: unspecified; stratigraphically higher than GSC locality C-45627

Source: C.R. Barnes, unpublished report, 1977

Belodina compressa (Branson & Mehl)
Drepanoistodus suberectus (Branson & Mehl)
Panderodus gracilis (Branson & Mehl)
Plectodina sp.

Remarks. Age is Middle to Upper Ordovician.

5.3 GSC Locality: C-45628

Location: 15 km southeast of Aston Bay, UTM 15X VM 456900E 8161700N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: unspecified

Source: C.R. Barnes, unpublished report, 1977

Belodina compressa (Branson & Mehl)
B. profunda (Branson & Mehl)
B. n. sp.
Drepanoistodus suberectus (Branson & Mehl)
Panderodus gracilis (Branson & Mehl)
P. panderi (Stauffer)
Plectodina sp.

Remarks. The presence of *Belodina profunda* indicates an Upper Ordovician age.

5.4 GSC Locality: C-53100

Location: UTM 15X VL 471500E 8080500N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: unspecified

Source: C.R. Barnes, unpublished report, 1977

Acodus mutatus Branson & Mehl s.f.
Aphelognathus politus (Hinde)
Belodina compressa (Branson & Mehl)
B. dispansa (Glenister)
Drepanoistodus suberectus (Branson & Mehl)
Oistodus venustus Stauffer s.f.
Panderodus gracilis (Branson & Mehl)
P. panderi (Stauffer)
Staufferella lindstroemi (Ethington & Schumacher)

Remarks. A late Middle Ordovician to Upper Ordovician age is indicated by the presence of *Aphelognathus politus* and *Staufferella lindstroemi*.

5.5 GSC Locality: C-63434

Location: 9 km north of Creswell Bay, UTM 15X VL 462900E 8084100N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: unspecified

Source: C.R. Barnes, unpublished report, 1977

Drepanoistodus suberectus (Branson & Mehl)
Panderodus gracilis (Branson & Mehl)

Remarks. A Middle to Upper Ordovician age is indicated.

5.6 GSC Locality: C-64206

Location: 18 km north of Abernethy Bay, UTM 15W WJ 500200E 7879100N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: unspecified

Source: C.R. Barnes, unpublished report, 1977

Belodina compressa (Branson & Mehl)
Drepanoistodus suberectus (Branson & Mehl)
Panderodus gracilis (Branson & Mehl)
Plectodina sp.

Remarks. A middle Middle Ordovician to Upper Ordovician age is indicated.

6. **Cape Crauford Formation**

GSC localities:

(a) C-30875/2180-2200 ft (664.5-670.6 m)
(b) C-30875/970-1030 ft (295.7-313.9 m)

Location: Section 34 (Panarctic Deminex Garnier O-21 well)

Stratigraphic Position: (a) 144.4-150.5 m above base of formation (b) 501.1-519.3 m above base of formation

Source: T.T. Uyeno in Mayr et al. (1980)

(a) Peculiar greilingiform element that is closely similar to the Sb element of *Ozarkodina plana* (Walliser)

(b) Slightly asymmetrical trichonodelliform element similar to the Sa element of *Oulodus jeannae* Schönlaub

Remarks. Both taxa were previously reported from the Western Karawanken Alps in Austria, where they occur in the *celloni* Zone of Llandoverian age (Sweet and Schönlaub, 1975, p. 49-53).

7. **Cape Storm Formation** (main stratigraphic sections)

7.1 *Section*: Aston River tributary, Section 33 (Field section 75-RAE-11)

Source: T.T. Uyeno, personal communication, 1983

GSC Loc.	Position above base of formation (m)	Conodont fauna
C-48364	006.0-006.2	Apparatus A of Uyeno (1980)
C-48376	035.2-035.9	Apparatus A of Uyeno (1980)
C-48405	079.9-080.4	*Ozarkodina confluens* (Branson & Mehl) alpha morphotype
C-48413	096.5-098.3	*O. confluens* (Branson & Mehl) alpha morphotype
C-48424	115.5-117.3	*O. confluens* (Branson & Mehl) alpha morphotype
C-48437	148.9-155.4	*O. confluens* (Branson & Mehl) gamma morphotype
C-48442	159.8-160.7	*Ozarkodina douroensis* Uyeno
C-48443	160.7-161.9	*O. douroensis* Uyeno
C-48444	164.5-168.2	*O. confluens* (Branson & Mehl) gamma morphotype
C-48445	168.2-168.7	*O. confluens* (Branson & Mehl) gamma morphotype
		O. douroensis Uyeno
		O. excavata excavata (Branson & Mehl)
C-48446	168.7-169.8	*O. confluens* (Branson & Mehl) alpha and gamma morphotypes
C-48447	169.8-171.9	*O. confluens* (Branson & Mehl) alpha and gamma morphotypes
		O. douroensis Uyeno
C-48448	173.1-174.2	*O. douroensis* Uyeno

Remarks. All morphotypes of *O. confluens* refer to those designated by Klapper and Murphy (1975). Apparatus A has been found previously in the lower part of the Cape Storm Formation at Goodsir Creek on Cornwallis Island. *O. confluens* alpha morphotype has its lowest occurrence in the Wenlockian, and *O. confluens* gamma morphotype probably ranges downward into the *siluricus* Zone of Ludlovian age. *O. douroensis*, as it is presently understood, appears to be restricted in range to the *siluricus* Zone. Notably, this taxon appears only in the upper part of the Cape Storm Formation both at Goodsir Creek and in this section. The only reported occurrence of *O. douroensis* at a lower stratigraphic level is on Griffith Island, where it occurs in association with *O. confluens* gamma morphotype in the uppermost Allen Bay Formation (Thorsteinsson and Uyeno, in Thorsteinsson, 1980, p. 22).

The above data suggest that the upper part of the Cape Storm Formation, as developed in this section, is Ludlovian in age (*siluricus* Zone). The paucity of diagnostic taxa from the lower part of the formation precludes a precise age determination. Notably, however, Apparatus A of Uyeno (1980) occurs in the lower Cape Storm Formation both in this section and in the Goodsir Creek section, which might suggest that the lower part of the formation is correlative between the two areas. The base of the Cape Storm Formation in known to be early Ludlovian in age elsewhere on Cornwallis Island, as at Snowblind Creek (Thorsteinsson and Uyeno, *op. cit.*, p. 21), and the base of that formation appears to fall within the *siluricus* Zone on Griffith Island based on the conodont associations noted above. Hence, the Cape Storm Formation in Section 33 may also be confined in age to the Ludlovian.

7.2 *Section*: South Pressure Point, Section 20 (Field section 75-RAE-6)

Source: T.T. Uyeno, personal communication, 1983

GSC Loc.	Position below top of formation (m)	Conodont fauna
C-48100	90.5-91.5	*Ozarkodina confluens* (Branson & Mehl) gamma morphotype
C-48101	81.5-90.5	*Ozarkodina douroensis* Uyeno
C-48103	24.5-25.5	*O. douroensis*
		O. confluens (Branson & Mehl) gamma morphotype
C-48105	0.0- 9.0	*O. excavata*? (Branson & Mehl)

Remarks. All morphotypes of *O. confluens* refer to those designated by Klapper and Murphy (1975). As in the case of Section 33, the presence of *O. douroensis* in this section suggests a Ludlovian (*siluricus* Zone) age for the upper Cape Storm Formation.

7.3 *Section*: Creswell Bay area, Section 60 (Section B of Savelle, 1978)

Source: T.T. Uyeno, unpublished reports, 1974, 1976

GSC Loc.	Position below top of formation (m)	Conodont fauna
C-37661	16.8	*Ozarkodina douroensis* Uyeno
C-37660	15.2	*O. douroensis* Uyeno
C-37659	9.1	*O. douroensis* Uyeno
C-37658	3.1	*O. douroensis* Uyeno
		O. confluens (Branson & Mehl) P element
		Panderodus spp.

Remarks. Age is Ludlovian (*siluricus* Zone), based on the occurrence of *O. douroensis* Uyeno.

8. **Cape Storm Formation** (other localities)

8.1 GSC Locality: C-30089

Location: Port Leopold area, Section A of Jones and Dixon (1975); Section 29 of this report

Stratigraphic Position: approximately 5 m above base of Cape Storm Formation

Source: T.T. Uyeno, personal communication, 1982

Ozarkodina confluens (Branson & Mehl) gamma morphotype, and gamma transitional to epsilon morphotype of Klapper and Murphy (1975)

Apparatus A of Uyeno (1980)

Remarks. The age of the fauna is mid-Ludlovian through earliest Pridolian. Apparatus A has been found previously in the lower Cape Storm Formation at Goodsir Creek on Cornwallis Island (Uyeno, 1980, p. 48).

8.2 GSC Locality: C-30087

Location: Port Leopold area, UTM 15X WM 581250E, 8196100N; Section P of Jones and Dixon (1975, 1977)

Stratigraphic Position: unspecified

Source: T.T. Uyeno, personal communication, 1982

"*Ozarkodina*" *ortuformis* Walliser
Ozarkodina confluens (Branson & Mehl)

Remarks. The specimens of *O. confluens* are similar to that illustrated by Uyeno (1980, Plate 1, fig. 29), which were assigned to "morphotype undesignated". The latter are from the Cape Storm Formation, of mid-Ludlovian age.

8.3 GSC Locality: C-45647

Location: 15 km southeast of Cape Admiral M'Clintock; UTM 15X WN 570900E, 8207250N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: approximately 9 m below upper contact of Cape Storm Formation

Source: T.T. Uyeno, unpublished report, 1976

Ozarkodina confluens (Branson & Mehl) gamma morphotype and form approaching epsilon morphotype of Klapper & Murphy (1975)

Remarks. Age is mid-Ludlovian through earliest Pridolian.

8.4 GSC Locality: not catalogued

Location: North Elwin River, UTM 15X WM 546250E, 8183600N (unpublished section measured by B. Jones)

Stratigraphic Position: 37.4 m above base of section; appears to have been derived from the uppermost part of the formation

Source: T.T. Uyeno, unpublished report, 1977

Ozarkodina douroensis Uyeno
O. confluens (Branson & Mehl) alpha morphotype of Klapper & Murphy (1975)
fish fragments

Remarks. Age is Ludlovian (*siluricus* Zone)

8.5 GSC Locality: C-33931

Location: Garnier Bay, Section B of Jones and Dixon (1977); Section 28 of this report

Stratigraphic Position: uncertain; sample derived from a level approximately 14 m above base of section

Source: T.T. Uyeno, unpublished report, 1975

Ozarkodina douroensis Uyeno
O. confluens (Branson & Mehl)? (juvenile specimen)
Panderodus spp.

Remarks. Age is Ludlovian (*siluricus* Zone)

8.6 GSC Locality: C-30355

Location: Creswell Bay area, Section A of Savelle (1978); Section 57 of this report

Stratigraphic Position: 9.1 m below upper contact of Cape Storm Formation

Source: T.T. Uyeno, unpublished reports, 1974, 1976

Ozarkodina douroensis Uyeno

Remarks. Age is Ludlovian (*siluricus* Zone).

9. **Douro Formation** (main stratigraphic sections)

Section: South Pressure Point, Section 20 (Field section 75-RAE-6)

Source: T.T. Uyeno, personal communication, 1983

GSC Loc.	Position above base of formation (m)	Conodont fauna
C-48106	000.0-046.2	*Ozarkodina douroensis* Uyeno
C-48108	046.2-046.6	*O. excavata excavata* (Branson & Mehl)
C-48109	046.6-090.1	*O. excavata excavata* (Branson & Mehl)
		Ancoradella ploeckensis Walliser
C-48113	104.1-139.9	*O. excavata excavata* (Branson & Mehl)
C-48115	175.4-232.9	*O. excavata excavata* (Branson & Mehl)
		O. douroensis Uyeno
C-48119	232.9-235.1	*O.* cf. *O.* n. sp. A of Klapper & Murphy (1975)
		O. douroensis Uyeno
C-48120	235.1-237.0	*O. excavata excavata* Branson & Mehl
		O. douroensis Uyeno
C-48121	237.0-237.9	*O. excavata excavata* Branson & Mehl
		O. douroensis Uyeno

Remarks. The occurrence of *Ancoradella ploeckensis* in sample C-48109 is probably an extension of this species into the *siluricus* Zone of Ludlovian age, based on the age of the Douro Formation at other localities. *O. douroensis*, as it is presently understood, appears to be restricted in range to the *siluricus* Zone. The distribution of conodonts in this section suggests an age assignment of the Douro Formation to the *siluricus* Zone, in accordance with the age range established for the formation by Thorsteinsson and Uyeno (in Thorsteinsson, 1980) at a number of other localities.

10. **Douro Formation** (other localities)

10.1 *Ozarkodina douroensis* Uyeno has been recovered from a number of localities within the Douro Formation. As was noted earlier, this species appears to be restricted in range to the *siluricus* Zone of Ludlovian age. The localities are listed in the following table (all identifications by T.T. Uyeno).

GSC Loc.	Location and UTM coordinates or section number	Stratigraphic position
C-48729	22.5 km southwest of Elwin Bay; UTM 15X WM 545000E, 8150500N	Lowermost Douro Formation
C-45727, 8	Garnier Bay; UTM 15X VM 508800E, 8193300N	Upper part of Douro Formation
C-45735	7.5 km west of Cunningham Inlet; UTM 15X VN 465250E, 8226750N	Upper part of Douro Formation
C-48721	Central Somerset Island; UTM 15X VM 503800E, 8155750N	Upper part of Douro Formation
C-48546	23 km SSE of Cunningham Inlet; Section 25	0.7-7.7 m below upper Douro Formation contact
C-37657	7 km north of Creswell Bay; Section 60 (Section B of Savelle, 1978)	1.5 m above base of Douro Formation
C-51878	As for C-37657	Approximately 152 m above base of Douro Formation

10.2 GSC Locality: C-45648

Location: 15 km southeast of Cape Admiral M'Clintock; UTM 15X WN 570900E, 8207250N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: approximately 3 m above lower Douro Formation contact

Source: T.T. Uyeno, unpublished report, 1976

Ozarkodina confluens (Branson & Mehl) gamma morphotype and a form approaching epsilon morphotype (of Klapper & Murphy, 1975)
Ozarkodina douroensis Uyeno

Remarks. Age is Ludlovian (*siluricus* Zone)

10.3 GSC Locality: C-45650

Location: Garnier Bay; UTM 15X WN 524900E, 8204500N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: "upper reefoid facies" of Narbonne (1981) in upper Douro Formation

Source: T.T. Uyeno, personal communication, 1982

Polygnathoides siluricus Branson & Mehl

Remarks. Age is Ludlovian, *siluricus* Zone.

10.4 GSC Locality: C-51890

Location: Cape Admiral M'Clintock, Section M of Jones and Dixon (1976, 1977); Section 14 of this report

Stratigraphic Position: uncertain; sample derived from a level approximately 2 m above base of section

Source: T.T. Uyeno, unpublished report, 1976; personal communication, 1982

Ozarkodina douroensis Uyeno
O. confluens (Branson & Mehl) gamma morphotype of Klapper & Murphy (1975)

Remarks. Age is Ludlovian (siluricus Zone).

10.5 GSC Locality: C-26655

Location: northeastern Boothia Peninsula, Locality 3 of Thorsteinsson (1980); Section 97 of this report

Stratigraphic Position: upper 1.82 m of Douro Formation

Pedavis sp. aff. *P. thorsteinssoni* Uyeno
Torpedaspis elongata Broad & Dineley
undet. chitinoid brachiopod
indet. ostracod

Remarks. The occurrence of *Pedavis* sp. aff. *P. thorsteinssoni* suggests a late Ludlovian age (*latialata* Zone) on the basis of the association of that species with *P. latialata* on the Barlow Inlet Formation on Cornwallis Island.

12.3 GSC Locality: C-48555

Location: north-central Somerset Island, Section 25

Stratigraphic Position: 21.0-27.3 m above the base of the Somerset Island Formation (Unit 54)

Source: T.T. Uyeno, personal communication, 1982

Pedavis sp.
Ozarkodina n. sp. H of Uyeno (1981)

Remarks. A late Ludlovian (*latialata* Zone) age is suggested by the presence of O. n. sp. H (see earlier comments regarding this new species).

12.4 GSC localities: C-30358, C-33935

Location: Cunningham Inlet area, Section E of Jones and Dixon (1977); Section 2 of this report

Stratigraphic Position: both samples collected from the Somerset Island Formation as presently mapped, from a level situated approximately 85-90 m above faulted base of section

Source: T.T. Uyeno, personal communication, 1982

Ozarkodina n. sp. A of Klapper & Murphy (1975)

Remarks. O. n. sp. A is known to occur in the Barlow Inlet Formation and in the lowermost part of the Devon Island Formation, where it is associated with *Pedavis latialata.* This suggests an age assignment to the *latialata* Zone of late Ludlovian age.

12.5 GSC Locality: C-45731

Location: 15 km west of Garnier Bay, UTM 15X VN 506100E, 8204200N (spot sample collected by J.Wm. Kerr)

Stratigraphic Position: problematic; assigned tentatively to the Somerset Island Formation, but occurs in an atypical facies. Sample probably derived from a level close to the contact between the Douro and Somerset Island formations

Source: T.T. Uyeno, personal communication, 1982

Ozarkodina excavata excavata (Branson & Mehl)
O. n. sp. A of Klapper & Murphy (1975)
Polygnathoides? sp. A of Uyeno (1980)

Remarks. O. n. sp. A has its known occurrences in the Barlow Inlet Formation and the lowermost part of the Devon Island Formation, where it occurs with *Pedavis latialata* (Walliser). On the other hand, *Polygnathoides*? sp. A is thus far only known from the Douro Formation. The conodont evidence, therefore, does not solve the problem of assignment of this locality to either of the Somerset Island or Douro formations. An assignment to the Somerset Island Formation may be perhaps more tenable, that is, to the *latialata* Zone, primarily because O. n. sp. A is more widespread.

Part 2: Macrofossils

The following is a list of a series of fossil collections obtained from the Thumb Mountain, Douro and Somerset Island formations during Operation Boothia. All identifications were made by B.S. Norford (unpubl. rept., 1976) of the Geological Survey of Canada.

Extensive fossil collections from the lower Paleozoic formations of Somerset Island have been reported on by various geologists from the University of Ottawa. The formations studied and the respective references are listed below:

1. "Lang River Formation": (Turner Cliffs, Ship Point, Bay Fiord, Thumb Mountain and Irene Bay formations of this report): Dixon (1973a, 1975)
2. Cape Storm Formation: Turner and Dixon (1971), Jones (1974a), Jones and Dixon (1975), Loeffler and Jones (1976, 1977), Dixon and Jones (1978), Savelle (1978)
3. Douro Formation: Jones (1974a, b, 1979), Savelle (1978), Dixon (1979), Narbonne (1981)
4. Somerset Island and Peel Sound formations: Dineley (1968), Broad and Dineley (1973)

Formation	Section No. or UTM Coordinates of Spot Locality Fauna and Age	GSC Loc.
Thumb Mountain Formation	UTM 15X VL 464600E, 8082200N echinoderm debris *Maclurites* sp. *Bighornia* sp. *Catenipora* sp. *Palaeofavosites* sp. streptelasmid coral stromatoporoid Age: Late Ordovician, Ashgillian	C-53090
Thumb Mountain Formation	UTM 15W WJ 500200E, 7879100N *Maclurites* sp. nautiloid cephalopod *Receptaculites* sp. Age: Middle or Late Ordovician	C-64206

Source: Thorsteinsson and Uyeno (in Thorsteinsson, 1980, p. 25)

Ozarkodina douroensis Uyeno
O. *excavata excavata* (Branson & Mehl)
Oulodus sp.
Panderodus sp.
Apparatus B of Uyeno (1981)
undet. corals, stromatoporoid and nautiloid

Remarks. Age is Ludlovian (*siluricus* Zone).

11. **Somerset Island Formation** (main stratigraphic sections)

Section: South Pressure Point, Section 20 (Field section 75-RAE-6)

Source: T.T. Uyeno, personal communication, 1983

GSC Loc.	Position above base of formation (m)	Conodont fauna
C-48128	009.3-011.6	*Ozarkodina* cf. O. n. sp. H of Uyeno (1980)
C-48144	055.3-058.6	*Ozarkodina* cf. O. *douroensis* Uyeno *Pelekysgnathus arcticus* Uyeno O. *confluens* (Branson & Mehl) alpha morphotype
C-48146	058.6-059.0	O. *confluens* (Branson & Mehl) probably gamma morphotype
C-48147	059.0-059.7	O. *confluens* (Branson & Mehl) probably gamma morphotype *Pelekysgnathus* cf. *P. arcticus* Uyeno
C-48149	060.0-061.5	O. *confluens* (Branson & Mehl) epsilon(?) and alpha morphotypes
C-48151	061.9-062.6	O. *confluens* (Branson & Mehl) alpha, beta, gamma and gamma transitional to epsilon morphotypes
C-48152	062.6-064.0	O. *confluens* (Branson & Mehl) epsilon(?) and gamma morphotypes *Pelekysgnathus* cf. *P. arcticus* Uyeno
C-48155	068.6-069.8	O. *confluens* (Branson & Mehl) beta morphotype
C-48157	072.9-074.1	O. *confluens* (Branson & Mehl) morphotype indet.
C-48160	090.5-092.3	O. *confluens* (Branson & Mehl) gamma morphotype and morphotype indet.
C-48163	096.5-099.0	O. *confluens* (Branson & Mehl) gamma(?) morphotype
C-48165	101.7-102.0	O. *confluens* (Branson & Mehl) gamma morphotype
C-48186	130.8-132.9	O. *confluens* (Branson & Mehl) gamma morphotype *Pelekysgnathus arcticus* Uyeno

Remarks. All morphotypes of O. *confluens* listed refer to those designated by Klapper and Murphy (1975). In general, most of the taxa found in this section cannot be dated more precisely than Ludlovian or Pridolian. The occurrence of *P. arcticus* in this section may, however, be of significance. This species has been found previously in the Barlow Inlet Formation on Cornwallis Island, the Devon Island Formation on Devon Island, the Lower member of the Peel Sound Formation on Prince of Wales Island, and the uppermost Douro Formation on Somerset Island (see Thorsteinsson and Uyeno in Thorsteinsson, 1980). The last occurrence suggests that *P. arcticus* may range downward into the uppermost *siluricus* Zone, based on the age range of the Douro Formation, as established elsewhere on Somerset Island and on other islands. This lower age range of *P. arcticus* is supported by recent work conducted on collections from the Barlow Inlet Formation at Goodsir Creek on Cornwallis Island. Based on its known occurrences elsewhere, *P. arcticus* does not appear to occur in strata younger than about middle Pridolian in age. Thus, an approximately late Ludlovian (upper *siluricus* Zone) to middle Pridolian age range may be indicated for this species.

In summary, the age assignment suggested by the distribution of conodonts in this section is consistent with, but does not prove, a late Ludlovian (*latialata* Zone) age for the Somerset Island Formation.

12. **Somerset Island Formation** (other localities)

12.1 *Ozarkodina* n. sp. H has been recovered from a large number of samples from the Somerset Island Formation. These are listed below. O. n. sp. H is known from the Barlow Inlet Formation on Cornwallis Island, where it has been recovered from a level situated stratigraphically above the first appearance of *Pedavis latialata*, name-bearer of the *latialata* Zone (T.T. Uyeno, unpubl. rept., 1977). O. n. sp. H is also known from the Lower member of the Peel Sound Formation in eastern Prince of Wales Island, which appears to be late Ludlovian (*latialata* Zone) in age (Thorsteinsson and Uyeno, in Thorsteinsson, 1980, p. 27). These known associations suggest that O. n. sp. H ranges through the *latialata* Zone, although further studies will be required to confirm this.

GSC Loc.	Location and UTM coordinates or section no.	Stratigraphic position
C-48649, 51	17 km SSW of Cunningham Inlet; UTM 15X VN 467000E, 8206200N	Uncertain
C-45644	16 km SSE of Cunningham Inlet; UTM 15X VN 482300E, 8205600N	Uncertain
C-45734	North Central Somerset Island; UTM 15X VM 491600E, 8185250N	Map position suggests sample derived from lower part of Somerset Island Formation
C-45741	23 Km SSE of Cunningham Inlet; UTM 15X VM 485600E, 8199600N	Map position suggests sample derived from lowermost Somerset Island Formation
C-45743	26 km SW of Cunningham Inlet; UTM 15X VM 460000E, 8199750N	Uncertain
C-30342	Creswell Bay area; Section 57 (Section A of Savelle, 1978)	33.5 m above base of Somerset Island Formation

12.2 GSC Locality: C-26653

Location: northeastern Boothia Peninsula, Locality 3 of Thorsteinsson (1980); Section 97 of this report

Stratigraphic Position: 0.9-2.1 m above base of Somerset Island Formation

Source: Thorsteinsson and Uyeno (in Thorsteinsson, 1980, p. 25)

Formation	Section No. or UTM Coordinates of Spot Locality Fauna and Age	GSC Loc.
Thumb Mountain Formation	Section 78, 203 m above base bryozoan *Maclurites* sp. streptelasmid coral Age: late Middle Ordovician to Late Ordovician	C-60654
Thumb Mountain Formation	Section 78, 208 m above base echinoderm debris gastropod undetermined brachiopods large asaphid trilobite (fragment) *Encrinuroides* sp. *Nanillanenus*(?) sp. Age: Ordovician, probably Middle Ordovician	C-60651
Thumb Mountain Formation	Section 95, Unit 5 of Christie (1973, p. 26); probably corresponds to lower half of Unit 12 of Lost River section measured by Miall and Kerr (1980, p. 29) undetermined cephalopod westonoceratid cephalopod *Maclurites* sp. *Grewingkia* aff. *G. haysii* (Meek) *Receptaculites* sp. Age: Ordovician, roughly late Caradoc, about Eden-Maysville.	C-24148
Douro Formation, lowermost part	UTM 15X WM 536750E, 8151800N *Atrypella phoca* (Salter) *Ferganella*? sp. *Howellenla* sp. *Strophonella*? sp. Age: Late Silurian, late Ludlovian or early Pridolian	C-53096
Douro Formation, lowermost part	UTM 15X WL 543250E, 8097100N sponge spicules bryozoan gastropods undetermined brachiopods *Protathyris* sp. *Encrinurus* (*Frammia*) sp. *Hemiarges* sp. Age: Late Silurian, probably early Ludlovian	C-60501
Douro Formation, uppermost part	UTM 15X VN 488600E, 8213500N bryozoan rugose coral *Atrypella phoca* (Salter) Age: Late Silurian, late Ludlovian or early Pridolian	C-45631
Douro Formation	UTM 15X VN 488300E, 8213250N *Atrypella phoca* (Salter) Age: Late Silurian, late Ludlovian or early Pridolian	C-45632
Douro Formation	UTM 15X WN 524500E, 8204350N echinoderm columnals solitary coral *Atrypella* sp. Age: Late Silurian, Ludlovian or Pridolian	C-45649
Douro Formation	UTM 15X WN 530600E, 8204200N *Atrypella prunum* (Dalman) Age: Late Silurian, Ludlovian or early Pridolian	C-45723
Douro Formation	UTM 15X VM 508800E, 8193300N indeterminate brachiopod *Atrypella scheii* (Holtedahl) form B of Smith (1976) Age: Late Silurian, Ludlovian or Pridolian	C-45727
Douro Formation, uppermost part	UTM 15X VN 465250E, 8226750N echinoderm debris ostracod stromatoporoid undetermined solitary coral *Favosites* 3 spp. undetermined brachiopod *Atrypella* aff. *A. carinata* Johnson *Conchidium* sp. Age: Late Silurian, probably Ludlovian, possibly Pridolian	C-45736
Douro Formation	UTM 15X VM 494800E, 8192600N echinoderm debris ostracod *Favosites*(?) sp. *Strophonella* (*Strophonella*) sp. *Atrypella* cf. *A. prunum* (Dalman) *Encrinurus* (*Frammia*) *arcticus* (Haughton) Age: Late Silurian, probably Ludlovian	C-45746
Douro Formation	UTM 15X WN 516800E, 8207600N echinoderm debris *Atrypella* sp. *Encrinurus* sp. Age: Late Silurian	C-47983
Douro Formation	UTM 15X VN 478900E, 8218250N bryozoan *Zelophyllum* sp. undetermined brachiopod *Atrypella scheii* (Holtedahl) cf. form B of Smith (1976) *Ferganella* cf. *F. turkestanica* Nikiforova(?) *Howellella* sp. Age: Late Silurian, Ludlovian or Pridolian	C-51075
Douro Formation, 0-6 m above base	Section 52, Unit 16 echinoderm debris gastropod undetermined brachiopods *Howellella*(?) sp. *Protathyris* sp. indeterminate trilobites Age: probably Late Silurian, Ludlovian	C-60526
Somerset Island Formation	UTM 15X WN 510750E, 8201900N indeterminate gastropods and straight cephalopod undetermined rugose corals *Atrypella phoca* (Salter) *Conchidium*(?) sp. or *Kirkidium*(?) sp. Age: Late Silurian, late Ludlovian or early Pridolian	C-45717
Somerset Island Formation	UTM 15X VN 507600E, 8202600N echinoderm debris bryozoan indeterminate gastropod undetermined solitary coral *Atrypella scheii* (Holtedahl) form B of Smith (1976) Age: Late Silurian, Ludlovian or Pridolian	C-45732
Somerset Island Formation	UTM 15X VN 497000E, 8201900N echinoderm plates and debris sponge spicules gastropods indeterminate solitary coral *Bainbridgia* sp. *Favosites* sp. *Atrypa* sp. *Atrypella* sp. *Hesperorthis* sp. *Kozlowskiellina* sp. *Lanceomyonia*(?) sp. undetermined rhynchonellid brachiopod *Encrinurus* sp. Age: Late Silurian, Ludlovian or Pridolian	C-45635
Somerset Island Formation	UTM 15X VN 477500E, 8223000N ostracod *Atrypella* sp. Age: Late Silurian, Ludlovian or Pridolian	C-51080
Somerset Island Formation	UTM 15X VN 480250E, 8220000N gastropod undetermined rugose coral *Atrypella* aff. *A. phoca* (Salter) Age: Late Silurian, Ludlovian or Pridolian	C-51084

Part 3: Pollen and Spores

1. Eureka Sound Formation

GSC localities: C-7163, C-7164, C-7165, C-7166, C-7167, C-7168 and C-7169

Location: 15 km southeast of Cunningham Inlet, approximately UTM 15X VN 488250E, 8211750N

Stratigraphic Position: uncertain – random sampling

Source: D.J. McIntyre, unpublished report, 1983 (based on re-examination of reprocessed samples collected originally by Hopkins, 1971)

Alnus sp.
Paraalnipollenites alterniporus (Simpson) Srivastava
Ericaceae (*Ericipites* spp.)
Triporopollenites spp.
Trudopollis sp. (Type B of Manum)
T. barentsii Manum
Liquidambar sp.
Insulapollenites sp. cf. *I. rugulatus* Leffingwell
Momipites sp. cf. *M. tenuipolus* Anderson
M. sp. cf. *M. anellus* Nichols and Ott
Caryapollenites veripites (Wilson and Webster) Nichols and Ott
Saxonipollis sp. A of Ioannides and McIntyre

Remarks. The palynological assemblages from the seven samples indicate a middle to late Paleocene age.