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Macrobenthos Communities of Cambridge, McBeth and Itirbilung Fiords, Baffin Island, Northwest Territories, Canada[1]

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ABSTRACT. Thirty-eight marine invertebrates, including molluscs, echinoderms, polychaetes and several minor taxa, have been added to the previously described benthic macrofauna inhabiting Cambridge, McBeth and Itirbilung fiords in northeastern Baffin Island, Northwest Territories, Canada. The fiords lie fully within the marine arctic zone and organisms exhibiting panarctic distributions constitute the majority of species collected from them. Macrobenthic associations recorded in the fiords are comparable, both with respect to species composition and habitat, to benthic invertebrate associations occurring on the Baffin Island continental shelf and in east Greenland fiords, reflecting the broad environmental tolerances of the organisms constituting the benthic associations. Deposit-feeding organisms dominate the fiord macrobenthos, notably nuculanid bivalves, ophiuroid echinoderms and elasipod holothurians. The foraging and locomotory activities of these organisms may influence benthic community structure by reducing the abundance of sessile and/or tubiculous benthos.

Key words: marine benthos, eastern Baffin Island, fiords, continental shelf, zoogeography, ecology

RÉSUMÉ. Trente-huit invertébrés marins, y compris des mollusques, des échinodermes, des polychètes et divers taxons mineurs ont été ajoutés à la macrofaune benthique décrite précédemment habitant les fjords Cambridge, McBeth et Itirbilung dans le nord-est de la terre de Baffin située dans les Territoires du Nord-Ouest au Canada. Les fjords sont situés entièrement dans la zone arctique marine et des organismes affichant une distribution panboréale constituent la majorité des espèces recueillies dans ces fjords. Les associations macrobenthiques relevées dans les fjords sont comparables, sur le plan de la composition comme sur celui de l'habitat, aux associations d'invertébrés benthiques que l'on trouve sur le plateau continental de la terre de Baffin et dans les fjords du Groenland oriental, ce qui reflète la grande tolérance environnementale des organismes formant les associations benthiques. Les organismes qui se nourrissent sur le fond dominent le macrobenthos des fjords, en particulier les nucules, les ophiurides et les holothuries élasipodes. Les activités de pâturage et de locomotion de ces organismes peuvent influencer la structure de la communauté benthique en réduisant l'abondance du benthos sessile et/ou tubicole.

Mots clés: benthos marin, terre de Baffin orientale, fjords, plateau continental, zoogéographie, écologie

Traduit pour le journal par Nésida Loyer.

INTRODUCTION

The benthic macrofauna inhabiting the fiords of eastern Baffin Island has been the subject of several recent studies (Aitken *et al.*, 1988; Dale *et al.*, 1989; Syvitski *et al.*, 1989). This study focuses on the benthic macrofauna of Cambridge, McBeth and Itirbilung fiords recently described by Syvitski *et al.* (1989) (Fig. 1). These authors conducted a reconnaissance benthic sampling program within the fiords as part of the Sedimentology of Arctic Fiords Experiment (SAFE) organized by the Geological Survey of Canada (Syvitski and Schafer, 1985). Syvitski *et al.* (1989) recognized several benthic macrofaunal associations within these three fiords; these are, in order of depth, the *Portlandia* association (mean depth 55 m), the Onuphid association (mean depth 272 m) and the Maldanid association (mean depth 418 m).

The work of Curtis (1972) and Dale *et al.* (1989) indicates that diverse mollusc, polychaete and echinoderm populations, as well as a variety of minor phyla, inhabit Canadian arctic fiords. In light of this information, the authors reexamined the benthic material collected from Cambridge, McBeth and Itirbilung fiords by Syvitski *et al.* (1989) with the goal to 1) refine the systematic study of the benthic organisms in the collections and 2) to further our understanding of the zoogeography and ecology of benthic organisms inhabiting the fiords and continental shelf of Baffin Island. As a result of this research, 15 species of molluscs, 4 species of echinoderms, 17 species of polychaetes, a sponge, an ascidian, a sipunculid and a priapulid have been added to the benthic macrofauna described previously from Cambridge, McBeth and Itirbilung fiords.

PHYSICAL ENVIRONMENT

The physical environment of eastern Canadian arctic fiords differs significantly from the fiord environments of western North America and Europe. The restricted circulation and associated low levels of dissolved oxygen that characterize the latter (Syvitski *et al.*, 1986) have not been observed in Baffin Island fiords (Dale *et al.*, 1989). Circulation occurs throughout depth, largely via isohaline circulation and wind-induced mixing (Gade *et al.*, 1974; Perkin and Lewis, 1978; Neilsen and Ottesen-Hansen, 1980; Gilbert, 1983); thus these waters are oxygen rich (Table 1) and support a diverse benthic macrofauna.

The distribution of water masses within the fiords and over the continental shelf of eastern Baffin Island directly influences the distribution of arctic marine invertebrates (Grainger, 1954, 1955; Macpherson, 1971; Lubinsky, 1980). Several distinct water masses occur along the eastern Baffin Island coast. A seasonally variable shallow water mass develops in July and August from the mixing of Baffin Current water with freshwater from rivers and melting sea ice. The temperature of this water mass ranges from 0°C to 8°C and the salinity ranges from less than 20‰ to 30‰ (Ellis, 1960; Fissel *et al.*, 1981). This shallow water mass develops to depths of 5-60 m within the fiords (Gilbert, 1978; Trites, 1985) and 50-100 m depth across the continental shelf (Ellis, 1960; Fissel *et al.*, 1981). The nearshore habitat is defined to be those areas influenced by this seasonally variable shallow water mass.

The Baffin Island Current lies below the shallow surface water mass. It is formed by cold, low-salinity water (−1.8°C to 1.8°C; < 30.0-34.5‰; Dunbar, 1951; Meunch, 1971) that

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flows southward at depths of 100-300 m across the continental shelf of eastern Baffin Island. This water mass is of Atlantic origin and enters Baffin Bay via Davis Strait, where it is modified by cooling and mixing with surface runoff in northeastern Baffin Bay, or it is modified by cooling and freshening within the Arctic Ocean prior to entering Baffin Bay via Smith, Jones and Lancaster sounds (Meunch, 1971). Trites (1985) reported Baffin Island Current water at depths as great as 325 m in Baffin Island fiords. The inner shelf habitat is defined to be those areas influenced by the Baffin Island Current.

The Greenland Current flows below the Baffin Island Current. It is a relatively warm, saline water mass (0-2.0°C, 34.2-35‰; Bailey, 1957; Meunch, 1971) that flows southward at depths of 300-1300 m across the outer continental shelf and slope of eastern Baffin Island. This water originates in the Atlantic Ocean and is advected north via Davis Strait into Baffin Bay by the West Greenland Current. Here the Greenland Current water mixes with Baffin Island Current water and loses heat as it flows southward along the Baffin Island coast. Greenland Current waters enter Baffin Island fiords where sill depths permit,

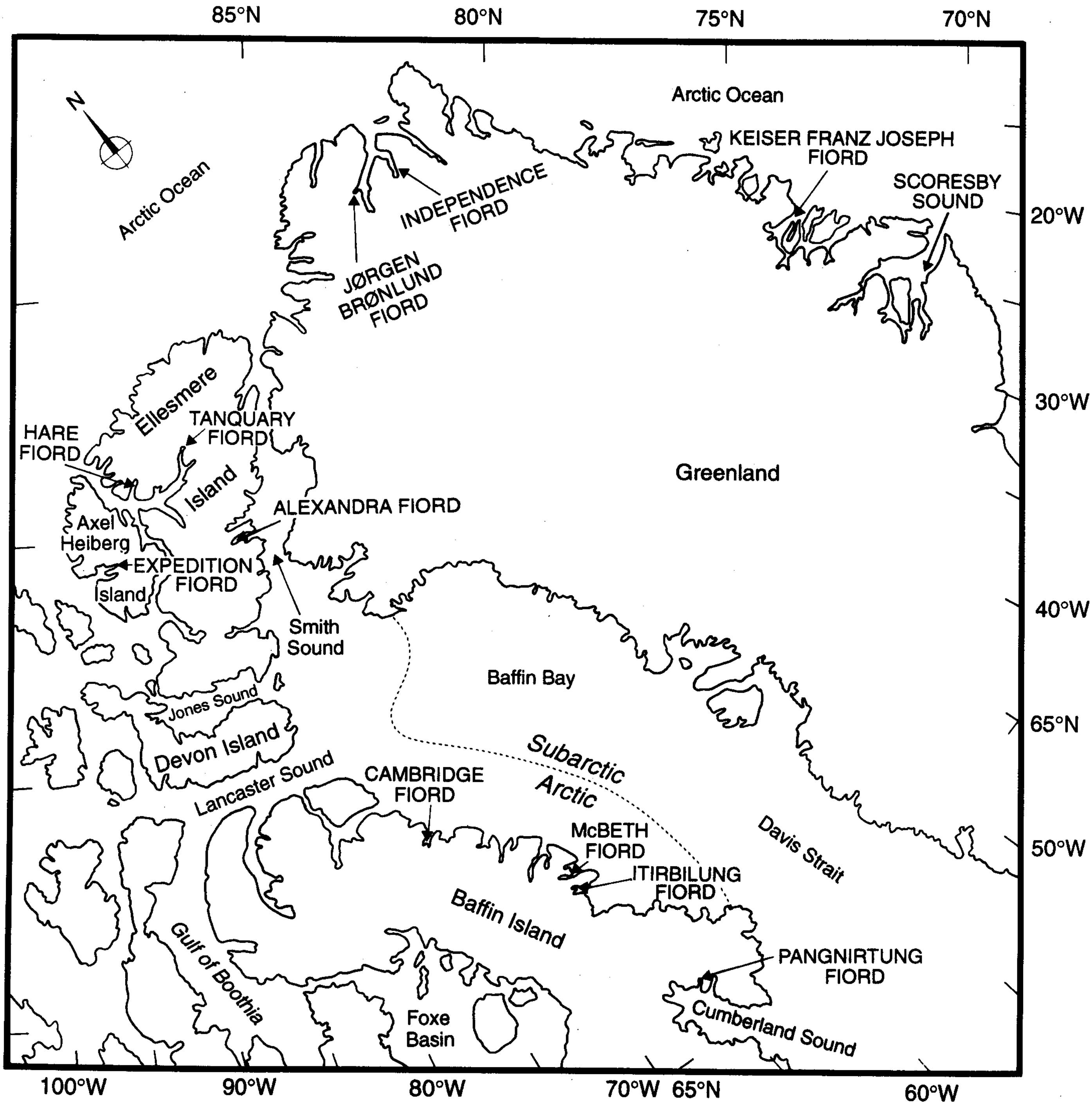

FIG. 1. Map of Baffin Island and Greenland illustrating the location of Cambridge Fiord (CA), McBeth Fiord (MC) and Itirbilung Fiord (IT) and other place names identified in the text. The dashed line in Baffin Bay represents the boundary between arctic waters and subarctic waters.

TABLE 1. Physical parameters of the fiords studied

Fiord	Fiord length (km)	Maximum depth (m)	Outer sill depth (m)	Large tidal range (m)	Date (D/M/Y)	Dissolved oxygen (mL·L⁻¹) Surface[a]	Bottom[b]
Cambridge	61	708	439	1.8	22-23/09/82	8.16	5.00
					20-24/09/83	8.78	5.61
McBeth	93	563	249	1.2	18-19/09/82	8.39	5.29
					29/09-02/10/83	8.74	4.98
Itirbilung	55	435	249	1.2	17/09/82	8.38	5.87
					25-29/09/83	8.82	6.33

[a]From 0 to 5 m depth.
[b]Within 20 m of the bottom.
Source: Trites *et al.*, 1983; Petrie and Trites, 1984; and Syvitski *et al.*, 1989.

forming a warmer bottom layer at the greatest depths in the fiords (Trites, 1985). The outer shelf habitat is defined to be those areas influenced by the Greenland Current.

Mixing of arctic and Atlantic water masses occurs across a broad front extending from Padloping Island (67°N) on eastern Baffin Island to Thule (77°N) on western Greenland (Fig. 1). The region occupied by waters of mixed arctic and Atlantic origin is known as the subarctic marine zone (Dunbar, 1951). The boundary between subarctic and boreal waters is established at the point of farthest penetration of arctic waters (Dunbar, 1951). The marine subarctic zone extends from the Scotian Shelf and the Gulf of St. Lawrence to Hudson Strait and along the coast of Baffin Island to Padloping Island.

METHODS AND MATERIALS

In 1983, 42 grab sample stations and 20 bottom camera stations were occupied in Cambridge, McBeth and Itirbilung fiords between 20 September and 1 October during C.S.S. *Hudson* cruise 83-028 (Table 2). Sample station locations are illustrated in Syvitski *et al.* (1989: Fig. 2, p. 235). The marine invertebrates were recovered from the sediments retained in a single 40 cm × 40 cm Van Veen or Shipek sampler at each grab sample station. The shallow prodelta at the head of McBeth Fiord was sampled with a 24 cm × 24 cm Ekman grab sampler operated by hand from a launch. The marine invertebrates were recovered from a single grab at each of 7 stations at this location. Approximately 5% of the total volume of sediment retained in the grab samplers was removed for other analyses and the remainder was seived through a 2 mm screen. Marine organisms retained on the screen were picked onboard ship and preserved in formalin (10% formaldehyde in seawater). All the organisms identified by the present authors are based on the examination of specimens recovered from the sieves. In their original study, Syvitski *et al.* (1989) converted the number of animals recovered in the grabs to individuals·m^{-2} (Table 2). These data were employed to calculate the relative abundance of marine invertebrate taxa reported in this study.

Underwater photographs were taken by a stereo Benthos camera system triggered by a compass bearing weight. The area photographed was 1.7 m × 1.2 m. In their original study, Syvitski *et al.* (1989) identified organisms to the level of higher taxa (e.g., ophiuroid echinoderms, buccinid gastropods) from enlarged photographs. Identification of organisms was facilitated through comparison with live specimens recovered in the bottom grab samples or with figures in the published literature. Syvitski *et al.* (1989) counted the organisms observed in the bottom photographs and divided their numbers by two to obtain individuals·m^{-2} (Table 2). These data were employed to calculate the relative abundance of marine invertebrate taxa reported in this study.

TABLE 2. Distribution of sampling effort for macrobenthos during C.S.S. *Hudson* cruise 83-028 in Cambridge (CA), McBeth (MC) and Itirbilung (IT) fiords, Baffin Island, Northwest Territories

Benthic association	Grab station CA	MC	IT	Total abundance[a] (no.·m⁻²)	Photo station CA	MC	IT	Total abundance[a] (no.·m⁻²)
Portlandia		7	4	6356			4	98
Onuphid	11		2	2398	6			578
Maldanid	8	4	6	3017	4	3	3	96
Total	19	11	12		10	3	7	

[a]These data were employed to calculate the relative abundance of marine invertebrate taxa in Tables 3, 5 and 7.

The marine invertebrates recovered from Cambridge, McBeth and Itirbilung fiords have been arranged within the *Portlandia* association, the Onuphid association and the Maldanid association, as designated in Syvitski *et al.* (1989). Organisms constituting the *Portlandia*, Onuphid and Maldanid associations were ranked according to their abundance based on the information presented in Syvitski *et al.* (1989:246-247). The method of feeding employed by the various organisms represented in this study was determined from information presented by Barnes (1980), Fauchald and Jumars (1979), Kohn (1983), and Morton (1983). Benthic invertebrates were designated as carnivores, scavengers, suspension feeders or deposit feeders using the classification scheme developed by Walker and Bambach (1974) based on this information.

FAUNAL COMPOSITION AND ZOOGEOGRAPHY OF THE FIORD BENTHIC MACROFAUNA

Portlandia *Association*

The *Portlandia* association occurs on soupground substrates, consisting of underconsolidated mud and sand, which develop in areas of rapid sedimentation at the heads of McBeth and Itirbilung fiords (Dale *et al.*, 1989) (Fig. 2). This benthic association is characterized by the presence and abundance of *Portlandia arctica*, maldanid polychaetes (e.g., *Maldane sarsi*) and ophiuroid echinoderms (Table 3). Suspension-feeding bivalves — *Hiatella arctica*, *Musculus discors* and *Mya truncata* — are apparently restricted to the shallow water depths (less than 50 m) sampled in McBeth Fiord. The bivalve fauna in McBeth Fiord is replaced by sabellid polychaetes, ophiuroid

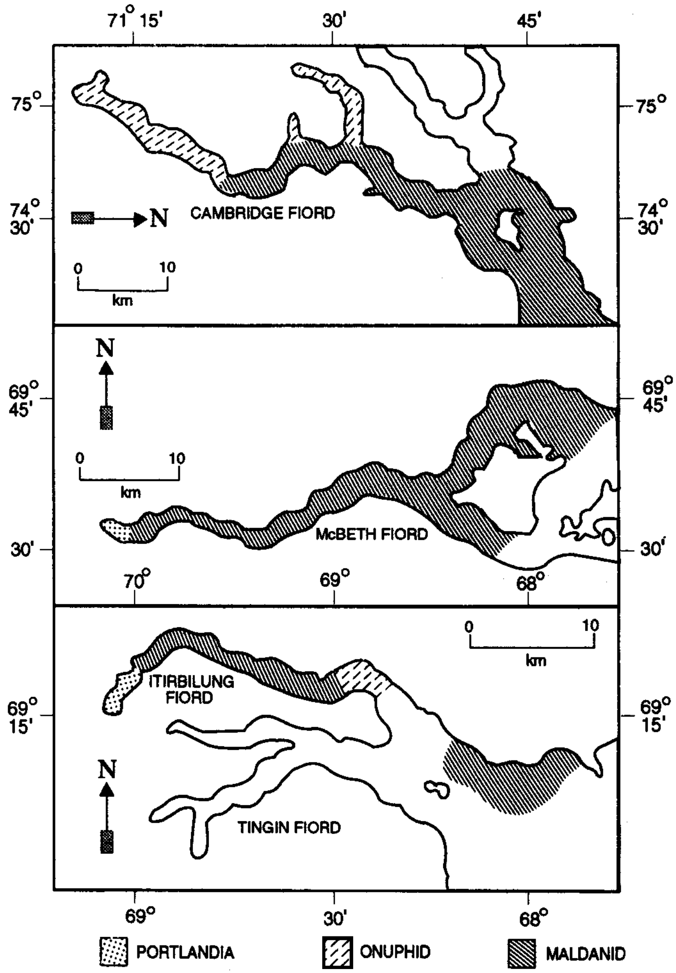

FIG. 2. Map illustrating the distribution of benthic invertebrate associations identified by Syvitski *et al.* (1989) within Cambridge, McBeth and Itirbilung fiords. Note that the *Portlandia* association occurs at the fiord head in McBeth and Itirbilung fiords but is replaced by the Onuphid association in Cambridge Fiord. The Maldanid association occurs farther seawards and at greater depths than the other two benthic associations.

echinoderms and buccinid gastropods in Itirbilung Fiord. The *Portlandia* association in McBeth Fiord includes species characteristic of *Portlandia* and *Macoma-Astarte* associations that inhabit mud and sand substrates associated with seasonally variable, shallow surface waters in the Canadian Arctic and Greenland: *Portlandia arctica*, *Macoma calcarea*, *Mya truncata*, *Hiatella arctica* and *Musculus discors* (Table 4). In eastern Greenland fiords *Portlandia arctica* occurs in great abundance in association with *Macoma calcarea*, *Astarte borealis* and *Hiatella arctica* at depths of 5-40 m; in Franz Joseph Fiord the presence of *Portlandia arctica* in the *Macoma-Astarte* association is restricted to the inner fiord (Thorson, 1933), as is the situation in McBeth Fiord. In Jørgen Brønlund Fiord, however, *Portlandia arctica* is present in the *Macoma-Astarte* association throughout the length of the fiord (Schiøtte, 1989).

Soupground substrates grade into softground substrates over distances of 1-5 km from the fiord head (Dale *et al.*, 1989). Softground substrates, composed of variable portions of mud, sand and gravel, occur in areas characterized by moderate to low sedimentation rates, which allow for gradual dewatering of the sediment and the development of firmer substrates. The Onuphid association is consistently associated with gravel on

TABLE 3. Benthic organisms occurring within the *Portlandia* association in McBeth and Itirbilung fiords

Benthic grab samples	Mean rank abundance[a]	Relative abundance[b] (%)	Life habit	Feeding mode
Bivalvia				
Portlandia arctica portlandia (Hitchcock)	1.8	43.3	Infaunal	Deposit feeder
Axinopsida orbiculata (G.O. Sars)	3.0	3.0	Infaunal	Deposit feeder
Macoma calcarea (Gmelin)	3.2	1.1	Infaunal	Deposit feeder
Nucula belloti Adams	3.4	0.3	Infaunal	Deposit feeder
Thyasira gouldi (Philippi)*			Infaunal	Deposit feeder
Mya truncata (Linné)	3.3	0.6	Infaunal	Suspension feeder
Thracia sp.*			Infaunal	Suspension feeder
Hiatella arctica (Linné)	3.0	6.3	Epifaunal	Suspension feeder
Musculus discors (Linné)§*	3.3	2.5	Epifaunal	Suspension feeder
Periploma abyssorum Bush*			Infaunal	Carnivore
Gastropoda				
Cylichna cf. *occulata* Mighèls and Adams*			Epifaunal	Carnivore
Polychaeta				
Maldanidae				
Maldane sarsi Malmgren*			Infaunal	Deposit feeder
Unidentified maldanid polychaetes	1.8	42.6	Infaunal	Deposit feeder
Ampharetidae				
Amphicteis sundevalli (Malmgren)*			Infaunal	Suspension feeder
Nephthyidae				
Nephthys ciliata (Müller)*			Motile	Carnivore
Oweniidae				
Owenia fusiformis delle Chiaje*			Infaunal	Deposit feeder
Sabellidae				
Unidentified sabellid polychaetes			Infaunal	Deposit feeder
Echinodermata				
Ophiuroid echinoderms	3.3	0.4	Epifaunal	Deposit feeder
Anthozoa				
Actinians (anemones)			Epifaunal	Carnivore

Bottom photographs	Mean rank abundance	Relative abundance (%)	Life habit	Feeding mode
Gastropoda				
Buccinum sp.	3.0	0.4	Epifaunal	Carnivore
Polychaeta				
Sabellid polychaetes	2.5	2.9	Infaunal	Suspension feeder
Echinodermata				
Ophiuroid echinoderms	1.0	95.8	Epifaunal	Deposit feeder
Anthozoa				
Actinians (anemones)	3.0	0.9	Epifaunal	Carnivore

*Those species recorded for the first time in these fiords.
§Identified as *Modiolaria* sp. in Syvitski *et al.*, 1989.
[a] Mean rank abundance = sum of the ranks/total number of samples.
[b] Relative abundance = (number of individuals for a taxon/total number of individuals) × 100%.

softground substrates, while the Maldanid association occurs on substrates largely free of gravel.

Onuphid Association

The Onuphid association occurs at the head of Cambridge Fiord and on the outer sill in Itirbilung Fiord (Fig. 2). This benthic association is characterized by the presence and abundance of onuphid polychaetes (e.g., *Nothria conchylega*), maldanid polychaetes, the bivalves *Yoldiella intermedia* and *Yoldiella lenticula*, ophiuroid echinoderms and agglutinated foraminifera (Table 5). The species composition of the Onuphid association resembles that of a variety of benthic invertebrate associations inhabiting mud, sand and gravel substrates associated with arctic waters (Table 4). *Macoma calcarea*, *Yoldiella* spp. and *Ophiura robusta* are characteristic species of *Macoma-Astarte* associations that occur at 50-300 m depth on the Baffin Island continental shelf. *Dacridium vitreum*, *Myriochele heeri*, maldanid polychaetes and agglutinated foraminifera are abundant in an oweniid polychaete association occurring at 50-250 m depth in Eclipse Sound. *Yoldiella* spp., *Axinopsida orbiculata*, *Dacridium vitreum* and *Ophiura robusta* occur abundantly in the *Bathyarca glacialis-Astarte crenata* association recorded from 45 to 200 m depth in Keiser Franz Joseph Fiord in East Greenland.

The presence of *Chlamys islandica* in the nearshore habitat of northern Baffin Island is of considerable zoogeographic interest. Its presence in the SAFE collections records a substantial range extension for this species in the eastern Canadian Arctic. A single live specimen of *Chlamys islandica* was recovered from 19 m depth at the head of Cambridge Fiord (station CAFE;

TABLE 4. Benthic invertebrate associations present within Baffin Island fiords on the Baffin Island continental shelf and within East Greenland fiords

1.	Baffin Island fiords	Baffin Island Shelf — nearshore associations			East Greenland fiords	
	Itirbilung Fiord, McBeth Fiord	Frobisher Bay	Scott Inlet	Eclipse Sound, Lancaster Sound, NW Baffin Island	Keiser Franz Joseph Fiord, Scoresby Sound	Keiser Franz Joseph Fiord, Scoresby Sound
	Portlandia association		*Portlandia* association	*Macoma-Astarte* association	*Portlandia* association	*Macoma* association
	Portlandia arctica	*Astarte borealis*	*Portlandia arctica*	*Astarte borealis*	*Portlandia arctica*	*Macoma calcarea*
	Musculus discors	*Hiatella arctica*	*Thyasira* spp.	*Astarte montagui*	*Myriotrochus rinki*	*Macoma moesta*
	Mya truncata	*Mya truncata*		*Macoma moesta*		*Astarte borealis*
	Hiatella arctica	*Macoma calcarea*		*Macoma calcarea*		*Astarte montagui*
	Macoma calcarea	*Musculus discors*		*Mya truncata*		*Astarte elliptica*
	Maldanid polychaetes	*Ophiacantha bidentata*		*Musculus niger*		*Mya truncata*
		Ophiopus arcticus		*Nuculana minuta*		*Hiatella arctica*
		Nichomache lumbricalis		*Ophiura robusta*		*Musculus discors*
		Nephtys spp.		*Myriotrochus rinki*		*Ophiocten sericeum* *Priapulus caudatus*
Depth (m):	5-40	30-75	5-20	15-50	10-60	5-45
Substrate:	Sandy mud	Sandy mud	Muddy sand	Silty sand	Mud	Muddy sand
Source:	Syvitski *et al.*, 1989; Aitken and Fournier (this study)	Wacasey *et al.*, 1979, 1980	Thomson *et al.*, 1986	Thomson *et al.*, 1986	Spärck, 1933; Thorson, 1934	Thorson, 1933, 1934; Bertelsen, 1937
2.	Baffin Island fiords	Baffin Island Shelf — inner shelf associations			East Greenland fiords	
	Cambridge Fiord, Itirbilung Fiord	Hudson Strait, Davis Strait	Eclipse Sound, Lancaster Sound, NW Baffin Bay	Eclipse Sound, Scott Inlet	Keiser Franz Joseph Fiord	
	Onuphid association		*Macoma-Astarte* association	Oweniid association	*Bathyarca-Astarte crenata* association	
	Macoma calcarea	*Astarte striata*	*Macoma calcarea*	*Dacridium vitreum*	*Bathyarca glacialis*	
	Nucula belloti	*Macoma calcarea*	*Astarte montagui*	*Ophiocten sericeum*	*Astarte crenata*	
	Yoldiella spp.	*Thyasira gouldi*	*Hiatella arctica*	*Ophiura sarsi*	*Yoldiella* spp.	
	Axinopsida orbiculata	*Nuculana pernula*	*Margarites* sp.	*Myriochele* spp.	*Axinopsida orbiculata*	
	Dacridium vitreum	*Yoldiella lucida*	*Lepeta caeca*	*Nephtys ciliata*	*Thyasira gouldi*	
	Ophiacantha bidentata	*Lepeta caeca*	*Ophiura robusta*	*Maldane sarsi*	*Dacridium vitreum*	
	Ophiura robusta	*Ophiura robusta*	*Ophiocten sericeum*	Agglutinated foraminifera	*Delectopecten greenlandicus*	
	Gorgonocephalus arcticus	*Ophiopholis aculeata*	*Strongylocentrotus droebachiensis*		*Lepeta caeca*	
	Nothria conchylega	*Strongylocentrotus droebachiensis*			*Strongylocentrotus droebachiensis*	
	Maldanid polychaetes					
	Agglutinated foraminifera	*Scoloplos armiger*			*Ophiura robusta*	
Depth (m):	100-560	100-300	50-250	50-250	45-200	
Substrate:	Sandy mud, gravel	Sandy mud, gravelly sand	Muddy sand	Muddy sand	Mud	
Source:	Syvitski *et al.*, 1989; Aitken and Fournier (this study)	Stewart *et al.*, 1985	Thomson, 1982	Thomson, 1982	Spärck, 1933; Thorson, 1933	

(continued on next page)

71°11.5′N, 75°02.5′W). This record extends the range of this species 700 km northward from Cumberland Sound, the approximate present northern limit of *Chlamys islandica* in eastern Canadian waters, where large populations inhabit depths greater than 30 m (Dale *et al.*, 1989).

Marine molluscs with subarctic affinities have been collected from postglacial marine sediments throughout the eastern Canadian Arctic, indicating a greater extension of subarctic waters into Davis Strait and Baffin Bay in the early and middle Holocene than at present (Andrews, 1972; Andrews *et al.*, 1981). Miller (1980) noted the time-transgressive nature of the incursion of subarctic waters along the eastern Baffin Island coast. Subarctic molluscs, notably *Astarte striata*, *Chlamys islandica* and *Mytilus edulis*, expanded their range during the period *ca.* 10 000-8000 a BP. Diverse macrofaunal assemblages, containing such subarctic water mass indicator species as *Chlamys islandica* and *Mytilus edulis*, are observed in Holocene marine deposits as old as 9725 ± 120 a BP (QC-450; Miller, 1979) in Frobisher Bay (63°N), 8750 ± 100 a BP (GSC-2508; Miller, 1979) on northern Hall Peninsula (65°N), 8230 ± 160 a BP (Gak-3090; Andrews and Miller, 1972) in Narpaing Fiord (67°N), 8190 ± 120 a BP (Y-1705; Andrews and Drapier, 1967) in Inugsuin Fiord (69°N) and 7780 ± 115 a BP (SI-2620; Andrews, 1976) at Cape Hunter, Buchan Gulf (71°N) along the eastern Baffin Island coast.

Ameliorated marine climates persisted throughout the interval *ca.* 5500-3000 a BP, culminating with the appearance of *Macoma balthica* in postglacial marine deposits on eastern Baffin Island (Andrews, 1972). Subsequent deterioration of the marine climate of Baffin Bay coincided with the expansion of glaciers on Baffin Island over the last 3000 years (Andrews, 1972; Miller, 1973; Dyke, 1979) and the retreat of subarctic molluscs southwards along the Baffin Island coast. It is most probable that the live specimen of *Chlamys islandica*, sampled at the head of Cambridge Fiord, is derived from a relict population isolated during the southward retreat of subarctic molluscs described above.

New bathymetric records for the eastern Canadian Arctic are recorded for the bivalves *Dacridium vitreum* and *Yoldiella lenticula* among the organisms constituting the Onuphid association (Table 6).

Maldanid Association

The Maldanid association occurs on muddy sand substrates throughout the central and outer portions of all three fiords (Fig. 2). This benthic association is characterized by the presence and abundance of maldanid (e.g., *Asychis biceps*) and sabellid (e.g., *Myxicola infundibulum*) polychaetes, ophiuroid echinoderms, elasipod holothurians, the bivalves *Axinopsida orbiculata* and *Bathyarca glacialis*, sea anemones and agglutinated foraminifera (Table 7). The species composition of the Maldanid association resembles that of a variety of benthic invertebrate associations inhabiting mud and sand substrates associated with Atlantic waters (Table 4). *Bathyarca glacialis*, *Astarte crenata*, *Gorgonocephalus arcticus* and *Ophiopleura borealis* are characteristic species of the *Bathyarca-Astarte crenata* association recorded from 40 to 550 m depth in Scoresby Sound, East Greenland. Two benthic associations, characterized by the abundance of *Bathyarca* spp., recorded from the continental shelf of Baffin Island are analogous to the Maldanid association: a *Bathyarca raridentata* association developed on mud substrates at 250-500 m depth in Lancaster Sound, and a *Bathyarca pectunculoides-Astarte crenata* association developed on mud substrates at 300-700 m depth in Davis Strait.

TABLE 4. Continued

3.	Baffin Island fiords	Baffin Island Shelf — outer shelf associations			East Greenland fiords	
	Cambridge Fiord, McBeth Fiord, Itirbilung Fiord	Davis Strait	Lancaster Sound, NW Baffin Bay	Lancaster Sound, NW Baffin Bay	Scoresby Sound	Keiser Franz Joseph Fiord, Scoresby Sound
	Maldanid association		*Bathyarca* association	*Praxillura-Golfingia* association	*Bathyarca-Astarte crenata* association	Foraminifera association
	Astarte crenata	*Astarte crenata*	*Bathyarca raridentata*	*Ophiacantha bidentata*	*Bathyarca glacialis*	Agglutinated foraminifera
	Bathyarca glacialis	*Bathyarca pectunculoides*	*Praxillella gracilis*	*Praxillura* sp.	*Astarte crenata*	*Yoldiella frigida*
	Axinopsida orbiculata	*Nucula delphinodonta*		*Nothria conchylega*	*Nucula tenuis*	*Yoldiella lenticula*
	Yoldiella intermedia	*Nothria conchylega*		*Asychis biceps*	*Nothria conchylega*	*Ctenodiscus crispatus*
	Yoldiella lenticula			*Goldfingia margaritacea*	*Gorgonocephalus arcticus*	*Asychis biceps*
	Ophiacantha bidentata				*Ophiopleura borealis*	*Axinopsida orbiculata*
	Ophiopleura borealis				Agglutinated foraminifera	*Thyasira gouldi*
	Gorgonocephalus arcticus					
	Elasipod holothurians					
	Asychis biceps					
	Agglutinated foraminifera					
Depth (m):	255-750	300-700	250-500	250-500	40-550	50-780
Substrate:	Sandy mud	Mud	Mud	Coarse silt, fine sand	Mud	Mud
Source:	Syvitski *et al.*, 1989; Aitken and Fournier (this study)	Stewart *et al.*, 1985	Thomson, 1982	Thomson, 1982	Thorson, 1934	Spärck, 1933; Thorson, 1934

TABLE 5. Benthic organisms occurring within the Onuphid association in Cambridge and Itirbilung fiords

Benthic grab samples	Mean rank abundance[a]	Relative abundance[b] (%)	Life habit	Feeding mode
Bivalvia				
Astarte crenata (Gray)*			Infaunal	Suspension feeder
Astarte striata (Leach)	3.8	0.3	Infaunal	Suspension feeder
Periploma abyssorum Bush*			Infaunal	Suspension feeder
Bathyarca glacialis (Gray)	3.8	0.3	Epifaunal	Suspension feeder
Chlamys islandica (Müller)			Epifaunal	Suspension feeder
Dacridium vitreum (Möller)§*	3.7	0.6	Epifaunal	Suspension feeder
Musculus discors (Linné)*			Epifaunal	Suspension feeder
Axinopsida orbiculata (G.O. Sars)	3.5	2.7	Infaunal	Deposit feeder
Macoma calcarea (Gmelin)	3.6	1.5	Infaunal	Deposit feeder
Macoma loveni (Steenstrup) Jensen*			Infaunal	Deposit feeder
Nucula belloti Adams	3.5	1.8	Infaunal	Deposit feeder
Nuculana pernula costigera Leche*			Infaunal	Deposit feeder
Portlandia arctica portlandia (Hitchcock)	3.8	0.3	Infaunal	Deposit feeder
Thyasira gouldi (Philippi)*			Infaunal	Deposit feeder
Yoldiella spp.‡	3.2	7.6	Infaunal	Deposit feeder
Cuspidaria glacialis (G.O. Sars)	3.8	0.3	Infaunal	Carnivore
Gastropoda				
Lepeta caeca (Müller)*			Epifaunal	Browser
Polychaeta				
Onuphidae				
Nothria conchylega (Sars)*			Epifaunal	Scavenger
Unidentified onuphid polychaetes	1.6	32.0	Epifaunal	Scavenger
Maldanidae				
Nichomache lumbricalis (Fabricius)*			Infaunal	Deposit feeder
Petaloproctus longissima Arwidsson*			Infaunal	Deposit feeder
Praxillura longissima Arwidsson*			Infaunal	Deposit feeder
Unidentified maldanid polychaetes	2.1	35.3	Infaunal	Deposit feeder
Sabellidae				
Euchone analis (Kröyer)*			Infaunal	Suspension feeder
Unidentified sabellid polychaetes	3.5	3.3	Infaunal	Suspension feeder
Capitellidae				
Notomastus latericeus Sars*			Infaunal	Deposit feeder
Lumbrineridae				
Lumbrineris fragilis (Müller)*			Motile	Carnivore
Oweniidae				
Myriochele heeri Malmgren*			Infaunal	Deposit feeder
Owenia fusiformis delle Chiaje*			Infaunal	Deposit feeder
Spionidae				
Laonice cirrata Sars*			Infaunal	Deposit feeder
Echinodermata				
Ophiuroidea				
Ophiacantha bidentata (Retzius)*			Epifaunal	Deposit feeder
Ophiura robusta (Ayres)*			Epifaunal	Deposit feeder
Ophiura sarsi (Lütken)*			Epifaunal	Deposit feeder
Unidentified ophiuroid echinoderms	3.7	2.5	Epifaunal	Deposit feeder
Sipunculida				
Phascolion strombi (Montagu)*			Infaunal	Deposit feeder
Agglutinated foraminifera	3.3	11.4	Epifaunal	Deposit feeder
Bottom photographs				
Gastropoda				
Buccinum sp.	4.5	0.03	Epifaunal	Scavenger
Polychaeta				
Onuphid polychaetes	1.5	97.8	Epifaunal	Scavenger
Sabellid polychaetes	5.2	0.02	Infaunal	Suspension feeder
Echinodermata				
Gorgonocephalus arcticus (Leach)	3.7	0.11	Epifaunal	Suspension feeder
Ophiuroid echinoderms	2.7	1.8	Epifaunal	Deposit feeder
Bryozoa				
Unidentified bryozoans	4.7	0.03	Epifaunal	Suspension feeder
Porifera				
Unidentified sponges	4.8	0.02	Epifaunal	Suspension feeder
Anthozoa				
Actinians (anemones)	3.0	0.19	Epifaunal	Carnivore
Pennatulaceans (sea pens)	4.7	0.01	Epifaunal	Carnivore
Alcyonaceans (soft coral)	4.8	0.02	Epifaunal	Carnivore
Arthropoda				
Pycnogonids	5.0	0.03	Epifaunal	Carnivore

*Those species recorded for the first time in these fiords.
§Identified as *Modiolaria* sp. in Syvitski *et al.*, 1989.
‡Both *Yoldiella intermedia* (M. Sars) and *Yoldiella lenticula* (Möller) were identified in the grab samples; both are recorded for the first time in these fiords.
[a] Mean rank abundance = sum of the ranks/total number of samples.
[b] Relative abundance = (number of individuals for a taxon/total number of individuals) × 100%.

TABLE 6. New bathymetric records for marine invertebrates in the eastern Canadian Arctic

Species	Station[a]	North latitude	West longitude	Depth (m)	Previous records	
					Depth (m)	Source
Dacridium vitreum (Möller)	CA 2.2	71° 19.4′	74° 46.2′	292	31	Ellis, 1960
	CASill3.5	71° 42.1′	74° 23.6′	255	77-245	Arctic Biological Station, 1980
					31-73	Wacasey *el al.*, 1979, 1980
Nuculana pernula (Müller)	IT 2.1	69° 25.3′	68° 51.2′	310	4-40	Greig, 1909
					20-50	Ellis, 1960
					35, 245	Arctic Biological Station, 1980
					30-73	Wacasey *et al.*, 1979, 1980
					145, 292	Stewart *et al.*, 1985
Ophiopleura borealis (Danielssen and Koren)	MC 2.0	69° 33.5′	69° 40.2′	320	450-160	
					0	Mortensen, 1932
Tetilla sp.	CASill3.1	71° 41.5′	74° 15.0′	397	<150	Dale *et al.*, 1989
Yoldiella lenticula (Möller)	CA 1.5	71° 14.0′	74° 57.0′	262	192	Wagner, 1964
	CA 1.7	71° 15.0′	74° 54.0′	310	10-130	Lubinsky, 1980
	CA 4.1	71° 25.5′	74° 45.7′	520		
	MC 4.1	69° 36.6′	69° 44.5′	549		
	IT 6.0	68° 52.7′	66° 24.5′	502		

[a]The location of the various stations within the three fiords is illustrated in Syvitski *et al.*, 1989.
CA = Cambridge Fiord; MC = McBeth Fiord; IT = Itirbilung Fiord.

Ophiacantha bidentata and *Asychis biceps* are represented abundantly in a polychaete-sipunculid association developed on fine sand substrates at 250-500 m depth in Lancaster Sound. *Axinopsida orbiculata*, *Yoldiella* spp., *Asychis biceps* and agglutinated foraminifera are characteristic species of the Foraminifera association recorded from 50 to 780 m depth in East Greenland fiords.

New bathymetric records in the eastern Canadian Arctic are recorded for the bivalves *Nuculana pernula* and *Yoldiella lenticula*, the ophiuroid echinoderm *Ophiopleura borealis* and the sponge *Tetilla* sp. among the organisms constituting the Maldanid association (Table 6).

The three fiords lie fully within the marine arctic zone as defined by Dunbar (1951); hence it is not surprising that 45 of the 52 species recorded in this study inhabit arctic waters. Of these 45 organisms, 11 are restricted to arctic waters: *Portlandia arctica portlandia*, *Cuspidaria glacialis*, *Dacridium vitreum*, *Macoma loveni*, *Thyasira gouldi*, *Yoldiella intermedia*, *Yoldiella lenticula*, *Astarte crenata*, *Bathyarca glacialis*, *Ophiopleura borealis* and *Periploma abyssorum*. The remaining 34 species possess a broad tolerance to higher temperatures and salinities and inhabit the marine subarctic zone as well. Many common arctic marine invertebrates are included in this group of panarctic organisms: *Axinopsida orbiculata*, *Buccinum* spp., *Macoma calcarea*, *Musculus discors*, *Mya truncata*, *Nucula belloti*, *Nuculana pernula*, *Ophiacantha bidentata*, *Ophiura sarsi* and *Thyasira gouldi*. Subarctic and cosmopolitan species are poorly represented in the macrofaunas of the fiords. *Chlamys islandica*, *Astarte striata*, *Astarte montagui* and *Myxicola infundibulum* are among the subarctic organisms inhabiting the fiords; cosmopolitan organisms inhabiting the fiords are represented by *Hiatella arctica*, *Maldane sarsi* and *Owenia fusiformis*.

ECOLOGY OF THE FIORD BENTHIC MACROFAUNA

The interaction of fiord macrofaunal organisms with bottom substrates and with one another can be examined through trophic analysis (Walker and Bambach, 1974). One method of describing the trophic structure of benthic associations employs the feeding habits of organisms (Scott, 1978). A comparison of the trophic structure, based on organism feeding habits, of various benthic associations inhabiting eastern Baffin Island and Greenland fiords is presented in Table 8. Deposit-feeding taxa are well represented in the fiord benthic associations and are the most abundant taxa composing the benthic macrofauna of Cambridge, McBeth and Itirbilung fiords. The foraging activities of mobile deposit-feeding taxa, notably nuculanid bivalves (*Portlandia*, *Yoldiella*, *Nuculana* and *Nucula*), ophiuroid echinoderms and holothurians, and scavenging, tubiculous onuphid polychaetes contribute to the vigorous reworking of fiord bottom sediments (Gilbert, 1982) and may influence the structure of benthic communities. Changes in sediment fabric produced by the feeding and locomotory activities of mobile benthic organisms contribute to enhanced resuspension and deposition of sediment and mortality of sessile and/or tubiculous organisms (Brenchley, 1981; Wilson, 1981; Thayer, 1983). Dale *et al.* (1989) noted that low abundances of sessile tubiculous polychaetes and cerianthid anemones were associated with high densities of ophiuroid echinoderms on soupground substrates in Baffin Island fiords.

Sessile, suspension-feeding organisms associated with hard substrates are restricted largely to fiord walls and sills, environments characterized by low rates of sedimentation and/or strong currents (Dale *et al.*, 1989; Syvitski, 1989). The presence of ice-rafted debris (e.g., gravel, boulders) on the fiord bottom (Gilbert, 1984) provides these organisms with suitable substrates for attachment in otherwise unsuitable softground substrates. These hard substrates are readily colonized by a variety of taxa associated with hard substrates: *Gorgonocephalus arcticus*, ascidians, bryozoans and sponges, creating the "faunal islands" described by Dale *et al.* (1989).

The data presented in Table 8 indicate that the total number of marine invertebrate taxa and the proportion of carnivorous/scavenging taxa constituting the east Greenland fiord benthos are greater than in the three Baffin Island fiords examined in this study. The differences in diversity and trophic structure may be attributed to the greater variety of gastropod, polychaete, crustacean and asteroid echinoderm taxa recorded from Greenland fiords. Many of these invertebrates are motile,

TABLE 7. Benthic organisms occurring within the Maldanid association in Cambridge, McBeth and Itirbilung fiords

Benthic grab samples	Mean rank abundance[a]	Relative abundance[b] (%)	Life habit	Feeding mode
Bivalvia				
Axinopsida orbiculata (G.O. Sars)	3.6	11.8	Infaunal	Deposit feeder
Nucula belloti (Adams)	4.1	1.0	Infaunal	Deposit feeder
Macoma calcarea (Gmelin)	4.3	1.0	Infaunal	Deposit feeder
Nuculana pernula costigera Leche			Infaunal	Deposit feeder
Thyasira gouldi (Philippi)*			Infaunal	Deposit feeder
Yoldiella intermedia (M. Sars)*			Infaunal	Deposit feeder
Yoldiella lenticula (Möller)*			Infaunal	Deposit feeder
Astarte spp. §	4.1	0.9	Infaunal	Suspension feeder
Periploma abyssorum Bush*			Infaunal	Suspension feeder
Bathyarca glacialis (Gray)	3.8	2.4	Epifaunal	Suspension feeder
Dacridium vitreum (Möller)*			Epifaunal	Suspension feeder
Musculus discors (Linné)*			Epifaunal	Suspension feeder
Cuspidaria glacialis (G.O. Sars)	4.2	0.7	Infaunal	Carnivore
Gastropoda				
Lepeta caeca (Müller)*‡			Epifaunal	Browser
Natica clausa (Broderip and Sowerby)*			Epifaunal	Carnivore
Polychaeta				
Maldanidae				
Asychis biceps Sars*			Infaunal	Deposit feeder
Praxillella gracilis Sars*			Infaunal	Deposit feeder
Unidentified maldanid polychaetes	2.1	24.2	Infaunal	Deposit feeder
Onuphidae				
Nothria conchylega (Sars)*			Epifaunal	Scavenger
Unidentified onuphid polychaetes	4.3	0.2	Epifaunal	Scavenger
Sabellidae				
Myxicola infundibulum (Renier)*			Infaunal	Suspension feeder
Unidentified sabellid polychaetes	3.4	10.2	Infaunal	Suspension feeder
Capitellidae				
Notomastus latericeus Sars*			Infaunal	Deposit feeder
Scalibregmidae				
Polyphysia crassa (Oersted)*			Motile	Carnivore
Unidentified ampharetid polychaetes			Infaunal	Suspension feeder
Echinodermata				
Holothuroidea				
Elasipod holothurians	4.1	0.7	Epifaunal	Deposit feeder
Ophiuroidea				
Ophiacantha bidentata (Retzius)*			Epifaunal	Deposit feeder
Ophiopleura borealis (Danielssen and Koren)*			Epifaunal	Deposit feeder
Ophiura robusta (Ayres)*			Epifaunal	Deposit feeder
Unidentified ophiuroid echinoderms	4.2	0.5	Epifaunal	Deposit feeder
Ascidiacea				
Ciona intestinalis (Linné)			Epifaunal	Suspension feeder
Porifera				
Tetilla sp.*			Epifaunal	Suspension feeder
Priapulida				
Priapulus caudatus Lamarck*			Motile	Carnivore
Agglutinated foraminifera	3.2	41.5	Epifaunal	Deposit feeder
Bottom photographs				
Gastropoda				
Buccinum spp.	4.6	0.7	Epifaunal	Scavenger
Polychaeta				
Onuphid polychaetes	4.3	6.2	Epifaunal	Scavenger
Sabellid polychaetes	3.8	3.3	Infaunal	Suspension feeder
Echinodermata				
Holothuroidea				
Elasipod holothurians	4.1	5.3	Epifaunal	Deposit feeder
Ophiuroidea				
Ophiuroid echinoderms	1.7	77.3	Epifaunal	Deposit feeder
Gorgonocephalus arcticus Leach	4.8	3.7	Epifaunal	Suspension feeder
Ascidicea				
Unidentified ascidians	5.2	0.1	Epifaunal	Suspension feeder
Porifera				
Unidentified sponges	5.3	0.1	Epifaunal	Suspension feeder
Anthozoa				
Actinians (anemones)	3.5	2.4	Epifaunal	Carnivore
Pennatulaceans (sea pens)	5.2	0.2	Epifaunal	Carnivore
Arthropoda				
Pycnogonids	4.4	0.6	Epifaunal	Carnivore

*Species recorded for the first time in these fiords.

§Three species of *Astarte* have been identified in the collections: *Astarte borealis* (Schumacher), *Astarte montagui* (Dillwyn) and *Astarte crenata* (Gray), which is recorded for the first time in Cambridge Fiord.

‡A single empty shell was collected.

[a] Mean rank abundance = sum of the ranks/total number of samples.

[b] Relative abundance = (number of individuals for a taxon/total number of individuals) × 100%.

TABLE 8. Trophic composition of various bethnic invertebrate associations inhabiting eastern Baffin Island and eastern Greenland fiords (the number of taxa in each category is presented in the table)[1]

	Trophic category			
Benthic association	Deposit feeders	Suspension feeders	Browsers	Carnivores/ scavengers
Portlandia§	10	6	0	5
*Portlandia**	5	3	0	3
*Macoma calcarea**	33	23	4	37
Onuphid§	17	11	1	9
*Bathyarca glacialis-Astarte crenata**	20	15	1	28
Maldanid§	18	13	0	10
*Bathyarca glacialis-Astarte crenata**	20	15	1	28
Foraminifera*	25	9	0	20

[1] The trophic terminology follows Walker and Bambach (1974). Data for invertebrate taxa occurring within each benthic association are taken from the following sources: Baffin Island fiords — § Syvitski *et al.*, 1989; Aitken and Fournier (this study); Greenland fiords — * Spärck, 1933; Thorson, 1933, 1934; Bertelsen, 1937.

carnivorous/scavenging organisms that occur less abundantly in the fiord benthos and hence may be underrepresented in the Baffin Island benthos due to the small samples recovered at each station in the three fiords (see Methods and Materials).

SUMMARY

Syvitski *et al.* (1989) identified three macrofaunal associations in Cambridge, McBeth and Itirbilung fiords; proceeding seawards from the heads of the fiords these are the *Portlandia* association (mean depth 55 m), the Onuphid association (mean depth 272 m) and the Maldanid association (mean depth 418 m). The present study has demonstrated that the species composition of each of these macrofaunal associations is broadly similar to that of macrofaunal associations occurring over the same bathymetric range on similar substrates along the continental shelf of eastern Baffin Island and in the fiords of eastern Greenland. The similarity of benthic macrofaunal associations along the eastern coasts of Baffin Island and Greenland reflects the broad distribution of arctic and panarctic species in polar and subarctic waters.

CONCLUSIONS

Thirty-eight species of marine invertebrates have been added to the benthic macrofauna described previously as inhabiting Cambridge, McBeth and Itirbilung fiords (Table 9), bringing the present total to 52 species: 22 bivalves, 4 gastropods, 5 echinoderms, 17 polychaetes and 4 minor taxa. A number of taxa, including ascidians, bryozoans, elasipod holothurians, pennatulaceans, pycnogonids and sponges, were observed in bottom photographs but were not recovered in benthic grab samples. Curtis (1972) recorded 68 species of polychaetes inhabiting depths as great as 100 m in Hare Fiord and Tanquary Fiord, Ellesmere Island. Dale *et al.* (1989) recorded 145 species of benthic marine invertebrates in Pangnirtung Fiord, Baffin Island: 25 bivalves, 30 gastropods, 32 polychaetes, 25 echinoderms and 33 other taxa. It is apparent that the present study of Baffin Island fiord macrobenthos underestimates the diversity of benthic organisms inhabiting these estuarine environments.

TABLE 9. Summary of the marine invertebrate species recorded for the first time in Cambridge, McBeth and Itirbilung fiords, Baffin Island, Northwest Territories

	Benthic association		
	Portlandia	Onuphid	Maldanid
Bivalvia			
Astarte crenata (Gray)		X	X
Dacridium vitreum (Möller)		X	X
Macoma loveni (Steenstrup) Jensen		X	
Musculus discors (Linné)	X	X	X
Nuculana pernula costigera Leche		X	
Periploma abyssorum Bush	X	X	X
Thracia sp.	X		
Thyasira gouldi (Phillipi)	X	X	X
Yoldiella intermedia (M. Sars)		X	X
Yoldiella lenticula (Möller)		X	X
Gastropoda			
Cylichna cf. *occulata* Mighels and Adams	X		
Lepeta caeca (Müller)		X	
Natica clausa (Broderip and Sowerby)			X
Polychaeta			
Amphicteis sundevalli Malmgren	X		
Asychis biceps Sars			X
Euchone analis (Kröyer)		X	
Laonice cirrata Sars		X	
Lumbrineris fragilis (Müller)		X	
Maldane sarsi Malmgren	X		
Myriochele heeri Malmgren		X	
Myxicola infundibulum (Renier)			X
Nephthys ciliata (Müller)	X		
Nichomache lumbricalis (Fabricius)		X	
Nothria conchylega (Sars)		X	X
Notomastus latericeus Sars		X	X
Owenia fusiformis delle Chiaje	X	X	
Petaloproctus longissima Arwidsson		X	
Polyphysia crassa (Oersted)			X
Praxillella gracilis Sars			X
Praxillura longissima Arwidsson		X	
Echinodermata			
Ophiuroidea			
Ophiacantha bidentata (Retzius)		X	X
Ophiopleura borealis (Danielssen and Koren)			X
Ophiura robusta (Ayres)		X	X
Ophiura sarsi (Lütken)		X	
Ascidiacea			
Ciona intestinalis (Linné)			X
Porifera			
Tetilla sp.			X
Priapulida			
Priapulus caudatus Lamarck			X
Sipunculida			
Phascolion strombi (Montagu)		X	

Future expeditions to this region must devote sufficient time for a dedicated five-replicate grab benthic sampling program, as recommended by Holme and McIntyre (1984), to adequately quantify the fiord benthos.

The feeding and locomotory activities of mobile and/or deposit-feeding organisms play an important role in structuring the marine benthos inhabiting unconsolidated substrates by altering the physical properties of marine sediments (Thayer, 1983). The inverse relation between the abundance of motile ophiuroid echinoderms and sessile tubiculous polychaetes and cerianthid anemones on soupground substrates described by Dale *et al.* (1989) in Baffin Island fiords suggests that bioturbation may influence benthic community structure. Physical disturbance of Baffin Island fiord sediments by motile and/or deposit-feeding organisms has been observed in box cores (Gilbert, 1982) and on bottom photographs (Syvitski *et al.*, 1989). The role of common marine invertebrates such as nuculanid bivalves, ophiuroid echinoderms and onuphid polychaetes in structuring the marine benthos of arctic fiords remains to be investigated.

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