ARCTIC
VOL. 35, NO. 1 (MARCH 1982), P. 41-55

Vertical Distribution of Zooplankton in Eastern Lancaster Sound and Western Baffin Bay, July - October 1978

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ABSTRACT. Zooplankton samples (n = 150) collected from 23 July to 10 October 1978 at 19 oceanographic stations were analyzed for species composition, abundance, biomass and vertical distribution. Sampling was by closing nets hauled vertically at five depth intervals between 0 and 1900 m.

At least 116 species were present in the macro-zooplankton of the study area. Species not previously reported from the area included the copepods *Spinocalanus horridus, Chiridiella reducta, Derjuginia tolli, Neoscolecithrix farrani?, Pachyptilus pacificus, Haloptilus longicirrus?, Mormonilla polaris,* and *Monstrilla longicirrus*?. In addition, small numbers of the previously undescribed adult male stages of the copepods *Aetideopsis multiserrata* and *A. rostrata* were found. Three copepod species that appear to be new to science were also collected. The high numbers of species, new records for the area, and previously undescribed species or stages collected reflect the relatively intensive sampling, particularly in deep water.

In general, the zooplankton was numerically dominated by copepods, particularly the calanoids *Calanus glacialis, C. hyperboreus, Pseudocalanus minutus, Metridia longa* and *Microcalanus* spp. and the cyclopoid *Oithona similis*. Most of these species (exceptions: *Metridia longa* and *Microcalanus* spp.) were most abundant in the upper 50 m; total zooplankton numbers were also greatest there. However, one or more stages of each of these copepod species, except *P. minutus*, were present in depths as great as 1900 m.

Factor analysis identified 10 zooplankton assemblages. Of these, two were virtually restricted to the upper 50 m, two were mainly in the upper 50 m but were also found throughout the water column, five were primarily deep-water groups (one almost entirely restricted to deep water), and one was primarily an intermediate depth group.

Key words: zooplankton, vertical distribution, Baffin Bay, Lancaster Sound, species composition, abundance, biomass

RÉSUMÉ. Cent cinquante échantillons de zooplancton ont été préleves du 23 juillet au 10 octobre 1978. L'échantillonnage se fit à 19 stations à l'aide de filets fermant tirés verticalement à partir de cinq niveaux de profondeur entre zéro et 1900 m. L'analyse de ces échantillons avait pour but de déterminer la composition du zooplancton, son abondance, sa biomasse et sa distribution verticale.

Au moins 116 espèces de macrozooplancton ont été trouvées dans la région étudiée. Parmi ces espèces, les copépodes *Spinocalanus horridus, Chiridiella reducta, Derjuginia tolli, Neoscolecithrix farrani?, Pachyptilus pacificus, Haloptilus longicirrus?, Mormonilla polaris* et *Monstrilla longicirrus?* ainsi que quelques groupes d'âge d'adultes mâles de *Aetideopsis multiserrata* et *A. rostrata* n'avaient pas été signalés auparavant. Des copépodes de trois espèces possiblement nouvelles ont aussi été capturés. Le grand nombre d'espèces, ainsi que les nouvelles espèces et groupes d'âge recueillis résultent sans doute de l'intensité de l'échantillonnage, surtout en eau profonde.

En général, dans la région étudiée, le zooplancton se compose numériquement surtout de calanoides *Calanus glacialis, C. hyperboreus, Pseudocalanus minutus, Metridia longa* et *Microcalanus* spp., et de cyclopes *Oithona similis*. À l'exception de *Metridia longa* et *Microcalanus* spp. la plupart des espèces se rencontrent le plus entre zéro et 50 m de profondeur. Le total des individus du zooplancton est aussi plus élevé entre zéro et 50 m de profondeur. A part *P. minutus* au moins un groupe d'âge de chacune des espèces de copépodes est présent à des profondeurs allant jusqu'à 1900 m.

Dix assemblages de zooplanctons ont été identifiés à l'aide d'analyse des facteurs. Parmi ces assemblages, deux se retrouvent uniquement entre zéro et 50 m de profondeur; deux autres, bien que présents à toutes profondeurs, se retrouvent surtout entre zéro et 50 m; cinq sont présents surtout en eau profonde; et un dernier est présent à des profondeurs intermédiaires.

Mots clés: zooplancton, distribution verticale, Baie de Baffin, Détroit de Lancaster, composition, abondance, biomasse

Traduit par Jean-Marie Sempels, Petro-Canada, Calgary.

INTRODUCTION

Previous zooplankton work in the western Baffin Bay-eastern Lancaster Sound region has been limited, for the most part, to distributional records and taxonomic descriptions of the major species. The Danish Godthaab Expedition of 1928 occupied several oceanographic stations in western Baffin Bay and selected members of the zooplankton community have been described in a series of papers summarized by Kramp (1963). These descriptive works include Stephensen (1933) on amphipods, Jespersen (1934) on copepods, Wesenburg-Lund (1936) on planktonic polychaetes, and Kramp (1939, 1942a,b,c,d, 1961) on chaetognaths, siphonophores, ctenophores, larvaceans, medusae and pteropods. Other studies that included collections within the western Baffin Bay-Lancaster Sound area include Kerswill (1940) on pteropod distribution, Dunbar (1941a) on *Sagitta elegans* breeding cycles (as far north as Clyde River), and Dunbar (1941b, 1942) on amphipods, euphausiids, mysids, medusae, siphonophores, ctenophores, pteropods and chaetognaths, distributional records and taxonomic descriptions (including records for Clyde River and Pond Inlet). Grainger (1961) discusses the distributions and descriptions of *Calanus glacialis* and *C. finmarchicus*, and Grainger

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(1963) discusses *C. glacialis, C. finmarchicus* and *C. hyperboreus* as indicator species in the Canadian Arctic; both of these studies included results from several collections in Lancaster Sound. Tidmarsh (1973) conducted a detailed summer study of the species composition and life histories of the copepods of the Baffin Bay North Water.

The most intensive, and only quantitative, zooplankton research within the region prior to the present study was the Lancaster Sound baseline survey for Norlands Petroleums (Sekerak *et al.*, 1976). However, their collections were limited to the upper 150 m of water.

This paper describes the species composition and vertical distribution of zooplankton in the western Baffin Bay and eastern Lancaster Sound region during the summer and early autumn of 1978. For additional information on geographic distribution and seasonal changes in community structure, see Sekerak *et al.* (1979).

MATERIALS AND METHODS

Study Area

During 23 July to 10 October 1978, 53 stations were occupied in the western Baffin Bay-eastern Lancaster Sound region to assess temperature, salinity, nutrients, phytoplankton and zooplankton. Zooplankton samples from 19 stations were analyzed for species composition, abundance, biomass and distribution (Fig. 1, Table 1).

Field Methods

Collections were made during daylight hours by vertical hauls (winch speed ~2 m·s^{-1}) with 0.5 m plankton nets (239 μm mesh) equipped with flowmeters and closing bridles. Sampling depths were determined by wire out and wire angle, and the depth intervals sampled were generally 50 to 0 m, 150 to 50 m, 250 to 150 m, 1200 to 250 m, and 1900 to 1200 m as governed by station depth. Samples were fixed in 10% buffered formalin.

Laboratory Methods

Samples were strained through 76 μm mesh and rinsed gently with water; all large animals were removed, identified and counted. If, after removal of the large animals, few animals remained (no more than about 200 of any one species or stage), the entire sample was processed. Of 150 samples processed, 132 were analyzed in their entirety. The others were subsampled (⅕ by volume) by Hensen-Stempel pipette. Analysis of five samples by both methods showed that total numbers of zooplankters were overestimated by 2 to 14% in samples that were subsampled. Larvaceans, because their fragile structure and behavior disallow meaningful estimates in net-collected samples, were classified as 'rare', 'few', 'common', or 'abundant'.

Biomass was determined for each species (or species group) by washing the formalin-preserved specimens in water, blotting on filter paper to remove excess surface water, and weighing (± 1 mg).

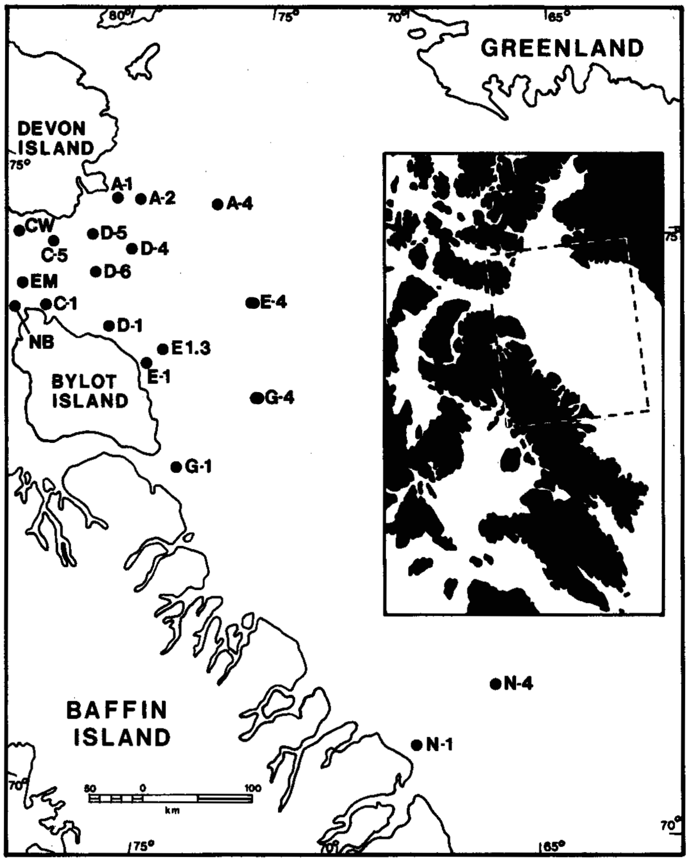

FIG. 1. Locations of 1978 EAMES oceanographic stations from which zooplankton collections were analyzed.

TABLE 1. Oceanographic station list for zooplankton collections that were analyzed for the present study

Station	Position	Water depth (m)	Dates
A-1	74° 54′ 48″N 79°08′W	347	03/08/78, 24/08/78, 17/09/78
A-2	74° 55′ 00″N 78°40′W	479	03/08/78, 25/08/78
A-4	74° 55′ 48″N 76°52′W	353	02/08/78, 24/08/78, 30/09/78
C-1	73° 48′ 12″N 80°11′W	825	31/07/78, 06/09/78, 20/09/78
C-5	74° 29′ 48″N 80°26′W	650	04/08/78, 06-07/09/78, 19/09/78
D-1	73° 42′ 18″N 77°56′W	1030	24/07/78, 05/09/78, 27/09/78
D-4	74° 30′ 00″N 77°19′W	573	27/07/78, 05/09/78, 29/09/78
D-5	74° 37′ 00″N 79°12′W	538	22-23/08/78
D-6	74° 07′ 48″N 78°32′W	836	01/08/78
E-1	73° 30′ 36″N 77°03′W	1010	25/07/78, 04/09/78
E-1.3	73° 36′ 18″N 77°02′W	969	23/07/78
E-4	74° 10′ 36″N 74°43′W	721	26/07/78, 04-05/09/78
G-1	72° 50′ 42″N 75°48′W	516	26/07/78, 10/09/78, 02/10/78
G-4	73° 29′ 00″N 73°30′W	833	26/07/78, 11/09/78, 02/10/78
N-1	70° 41′ 00″N 68°25′W	48	16/08/78, 06/10/78
N-4	71° 23′ 00″N 67°01′W	>2000	15/08/78, 06/10/78
CW	74° 27′ 00″N 82°03′W	768	21/08/78, 07/09/78, 19/09/78
EM	74° 06′ 00″N 81°30′W	750	28/07/78, 07/09/78
NB	73° 43′ 00″N 81°02′W	547	19/08/78, 08/09/78, 22/09/78

Identification

Calanoid and harpacticoid copepods were identified to species and stage, whenever possible, with the aid of Wilson (1932), Lang (1948), Brodskii (1950), Vidal (1971), Damkaer (1975) and Coull (1977). Cyclopoid copepods were identified to species only (Wilson, 1932), as their small size and occurrence in large numbers made identifications to stage too time-consuming. Identification of unusual copepods was verified or performed by C.-T. Shih (National Museums of Canada, Ottawa, Ontario). Larval benthic invertebrates were identified to the lowest possible taxon and type of larva. Small planktonic isopods, which never appeared in large numbers, were not identified to species.

The taxonomy of some arctic copepods and amphipods is still uncertain. In some cases a complex of closely-related forms appears to be present and authorities do not agree on their taxonomic status. In other cases, rare species are poorly described, males of some species have never been described, and new species are not uncommonly discovered.

Pseudocalanus. Controversy exists over the taxonomy of this genus. Sars (1900) and Brodskii (1950) described three species based on size, shape and relative lengths of body parts. With (1915) considered the three forms to be subspecies of *minutus*, and Farran and Vervoort (1951) followed this opinion. Geletin (1977), working with Pacific copepods, divided the genus into two species, again based on size and morphological characteristics. Due to the general disagreement among authorities, all *Pseudocalanus* taken in this study are listed as *P. minutus* (Krøyer, 1848).

Aetideidae. Once they reach the copepodite IV stage, most aetideids can be distinguished easily by the shape of the cephalothoracic spine. However, similarities in size and shape of copepodites I to III, and absence of the spine from these early stages, prevented their specific identification.

Euchaeta spp. Older individuals (copepodite III to adult) of this genus are easily distinguished by color, size and taxonomic characters such as rostrum shape. Copepodites I and II were not separable into species. The nauplii of this genus are much larger than other calanoid nauplii and were easily distinguished, but not separated into species.

Microcalanus. All specimens of this genus in near-surface samples (<150 m) were identified as *Microcalanus pygmaeus*. However, in deeper hauls, the appearance of the males and the size of females and copepodites showed that >1 'species' was present. Because of their small size, large numbers and generally poor condition, it was not feasible to differentiate these specimens. They were identified as *Microcalanus* spp. and probably included *M. pygmaeus, Microcalanus* sp. a and *Microcalanus* sp. b as described by Vidal (1971).

Calanus glacialis and C. finmarchicus. Adults of these species were differentiated by body size and morphology of the fifth pair of legs. Sizes of copepodites and adults were similar to those reported by Grainger (1963).

Andaniexis abyssi?-subabyssi?. Stephensen (1933) and Barnard (1962) have reported only *A. subabyssi*, an (?) amphipod not previously recorded from western Baffin Bay in the Arctic (D. Laubitz, National Museums of Canada, pers. comm). Until more detailed taxonomic research is performed, we cannot confidently identify the present individuals to species.

Data Analysis

Factor analysis was used to identify species or stages of zooplankton whose abundances were strongly correlated (i.e. that repeatedly tended to occur together), and factor scores were calculated to identify the samples in which particular 'assemblages' were prominent. In the factor analysis, each zooplankton sample constituted a case and the abundance of 98 species or stages of zooplankters were variables. Copepodite stages were combined for all copepods except for the most abundant species (*Calanus glacialis, C. hyperboreus, C. finmarchicus, Pseudocalanus minutus, Microcalanus* spp., *Metridia longa*). Species that occurred in very low mean numbers (<1 ind$\cdot$1000 m^{-3}), groups that possibly contained a mixture of species (e.g. damaged hydrozoans and ctenophores) and species for which accurate counts were not available (e.g. *Dimophyes arctica*) were not included in the analysis. To reduce skewness, abundance (no$\cdot m^{-3}$) data were transformed (log [x + 1]) before analysis. The factor analysis consisted of (1) calculation of a correlation matrix based on the transformed abundance data, (2) extraction of the principal components of the matrix, and (3) generation of factors by Varimax rotation. The number of factors was limited to the number of principal components with eigenvalues >1.0. All steps were performed with the BMDP4M computer program (Dixon and Brown, 1977). All zooplankton samples, except the one from below 1200 m at Station N-4, were considered (n = 149).

RESULTS AND DISCUSSION

Major Groups

Copepods were by far the dominant group in all depth ranges sampled; they comprised 88-98% of total numbers (Fig. 2) and 58-86% (excluding the one sample from 1900 to 1200 m) of total biomass (Fig. 3). Calanoid copepods were especially important, contributing 63-84% of total numbers and 62-84% of total biomass. The overwhelming dominance of arctic zooplankton by copepods, particularly calanoids, has been previously reported by Hopkins (1969). He found that copepods accounted for over 80% of total zooplankton biomass, and that the genus *Calanus* alone contributed 45-54%.

Most zooplankton groups were most abundant in the upper 50 m with numbers gradually decreasing with depth (Fig. 2). Only ostracods and shrimp increased in both numbers and biomass with depth.

Species Composition and Vertical Distribution

Species collected during the present study and their mean densities for each depth range sampled are shown in Tables 2 to 9. Some of the most important and/or interesting species are discussed in the following sections.

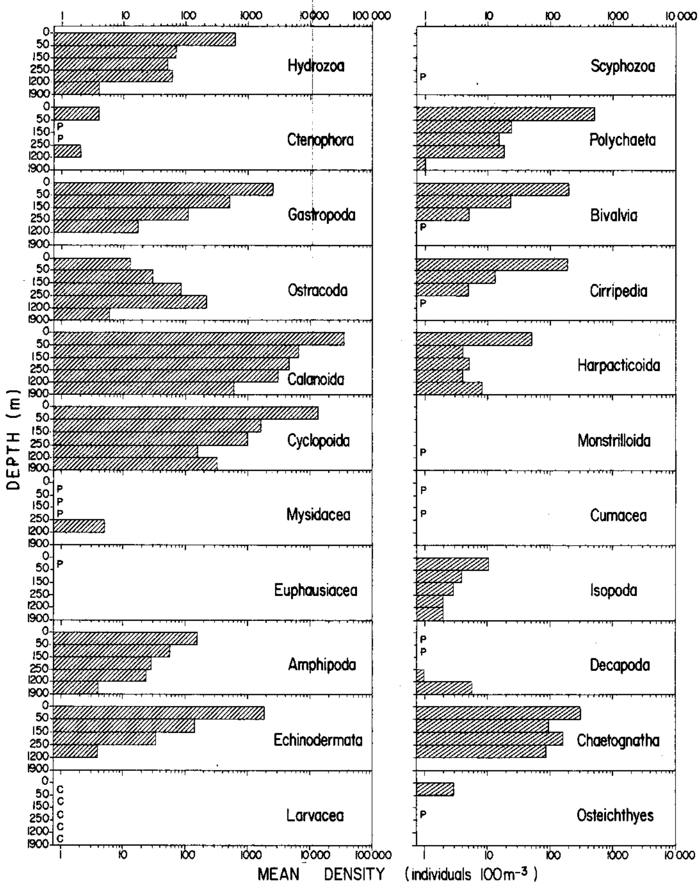

FIG. 2. Mean density (individuals·100 m^{-3}) by depth of major zooplankton groups in western Baffin Bay, 23 July to 10 October 1978. P = Present; C = Common. For each group, sample sizes were 39, 38, 38, 34 and 1 at depths 0-50, 50-150, . . . , 1200-1900 m, respectively.

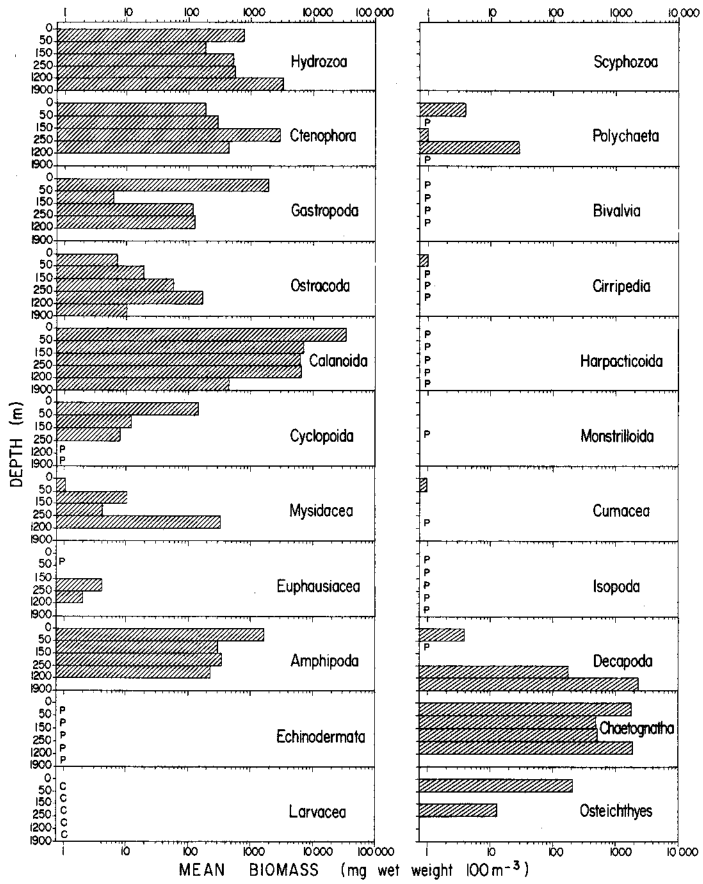

FIG. 3. Mean biomass (mg wet weight·100 m^{-3}) by depth of major zooplankton groups in western Baffin Bay, 23 July to 10 October 1978. Plotted as in Fig. 2.

Copepods

At least 57 species of copepods were collected from the study area. Calanoids were the most diverse group (39 species found), followed by cyclopoids (eight species), harpacticoids (eight species) and monstrilloids (one species). This number of species is unusually large for a high arctic region. However, most other studies in the Canadian Arctic have been restricted to shallow-water sampling, usually not deeper than 50 or 150 m. Deep waters of northern Baffin Bay and adjacent areas have seldom been investigated and, as shown below, a more diverse copepod community exists below depths of about 250 m.

Most copepod species were uncommon (<5 ind·100 m^{-3}) and six species contributed over 85% of the total numbers of copepods found (Tables 2 and 3). Four of these six species occurred in largest densities in surface (<50 m) waters: *Calanus glacialis, Pseudocalanus minutus* and *Oithona similis* became progressively less common in deeper waters; and *Calanus hyperboreus*, while being most common from 50 to 0 m, was evenly distributed at lower densities from 1200 to 50 m. The two dominant copepods that were most abundant in deeper water were *Metridia longa* and *Microcalanus* spp. *Metridia longa* has been reported to prefer deeper waters in the area (Sekerak *et al.*, 1976), and, during this study, appeared to be most abundant between 250 and 50 m. As noted previously, *Microcalanus* spp. is a mixture of *M. pygmaeus* and possibly two other species. Due to its small size, early copepodite stages were not assessed quantitatively and are not included in density estimates; thus its abundance is underestimated here. The density of *Microcalanus*, unlike that of the other abundant copepods, increased with depth.

Disregarding the taxonomic confusion relating to *Microcalanus* and *Pseudocalanus*, the above six species are well-known as being among the most important copepods in arctic regions. They occur in the Arctic Ocean, they are circumpolar, and some (e.g. *Calanus hyperboreus* and *C. glacialis*) extend well into temperate regions of the North Atlantic where they occur only in deep water (Brodskii, 1950; Ekman, 1953; Grainger, 1963, 1965). Sekerak *et al.* (1976) found the same species dominating the copepod community in the upper 150 m of Lancaster Sound.

Calanus hyperboreus. The mean density of *C. hyperboreus* at depths of 50 to 0 m was 5000 ind·100 m^{-3}, considering all life stages at all stations. It was about ten times less abun-

TABLE 2. Mean abundance (individuals·100 m^{-3}) of calanoid copepods in five depth intervals in western Baffin Bay

Species and Stage	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Calanus finmarchicus					
-I	116	2	P[b]	-	-
-II	33	2	1	-	-
-III	10	1	P	-	-
-IV	2	1	P	P	-
-V	36	25	32	14	-
-female	35	22	27	10	-
-male	P	-	-	-	-
Calanus glacialis					
-I	2128	150	46	2	-
-II	959	184	22	1	-
-III	516	79	13	1	-
-IV	635	94	32	11	-
-V	1524	515	256	223	-
-female	303	98	61	55	-
-male	1	1	2	1	-
Calanus hyperboreus					
-I	44	P	P	-	-
-II	205	7	4	P	-
-III	1079	121	61	12	-
-IV	1600	192	135	150	8
-V	1487	88	113	171	5
-female	560	50	77	120	14
-male	P	P	P	P	-
Pseudocalanus minutus					
-I	1575	29	28	8	1
-II	5030	167	99	13	2
-III	4965	341	102	7	1
-IV	2735	459	63	5	1
-V	1154	431	186	80	-
-female	869	326	259	135	-
-male	6	2	1	P	-
Aetideopsis multiserrata					
-IV	-	-	P	P	-
-V	-	-	P	P	-
-female	-	-	-	P	-
-male	-	-	-	P	-
Aetideopsis rostrata					
-II	-	-	-	-	4
-III	-	-	-	-	13
-IV	-	P	2	1	2
-V	P	-	-	P	5
-female	-	-	-	1	6
-male	-	-	-	P	1
Chiridius obtusifrons					
-IV	-	-	2	1	-
-V	P	P	3	2	-
-female	1	2	5	6	-
-male	-	P	1	P	-
Derjuginia tolli					
-IV	-	P	-	-	-
-V	P	-	P	-	-
-female	-	P	-	-	-
Gaidius brevispinus					
-IV	-	-	-	P	-
-V	-	-	-	P	-
-female	-	-	-	P	-
-male	-	-	-	P	-

Species and Stage	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Microcalanus spp.					
-II	-	-	-	P	-
-III	4	P	1	1	-
-IV	25	29	50	27	12
-V	29	162	277	190	45
-female	30	54	148	274	109
-male	6	7	25	33	-
Spinocalanus antarcticus					
-II	-	-	-	P	8
-III	-	-	-	P	1
-IV	-	-	-	1	-
-V	P	-	-	3	1
-female	P	P	-	3	22
-male	-	-	-	P	2
Spinocalanus elongatus					
-IV	-	-	-	P	-
-V	-	-	-	P	-
-female	P	-	-	1	-
Spinocalanus horridus					
-II	-	-	-	-	6
-III	-	-	-	-	5
-IV	-	-	-	-	4
-V	-	-	-	-	5
-female	-	-	-	-	16
Spinocalanus longicornis					
-III	1	P	P	2	-
-IV	2	2	-	14	1
-V	2	2	2	29	-
-female	7	10	6	69	-
-male	P	P	-	3	-
Chiridiella reducta[c]					
-II	-	-	-	-	3
-III	-	-	-	-	1
-IV	-	-	-	-	1
-V	-	-	-	-	1
Aetideidae					
-I	1	8	2	20	2
-II	1	5	4	18	-
-III	1	5	12	16	-
-IV	-	-	P	P	-
-V	-	-	-	P	-
Euchaeta barbata					
-III	P	-	-	P	-
-IV	-	-	-	P	-
-V	-	-	-	P	-
-female	-	-	-	P	-
Euchaeta glacialis					
-III	8	11	16	7	-
-IV	5	6	5	1	-
-V	11	5	2	2	-
-female	6	5	3	5	-
-male	-	-	P	1	-
Euchaeta norvegica					
-III	P	-	1	1	-
-IV	P	-	-	P	-
-V	1	P	P	P	-
-female	P	P	P	1	-

TABLE 2. (cont'd) Mean abundance (individuals·100 m^{-3}) of calanoid copepods in five depth intervals in western Baffin Bay

Species and Stage	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Gaidius tenuispinus					
-IV	1	2	1	12	-
-V	1	1	5	32	-
-female	2	2	21	22	-
-male	P	P	P	4	-
Xanthocalanus borealis					
-II	-	-	-	P	-
-III	-	-	P	P	-
-IV	P	P	1	1	-
-V	-	P	1	1	-
-female	-	P	-	P	-
Xanthocalanus sp.					
-male	-	-	P	P	-
Neoscolecithrix farrani[c]					
-female	-	-	-	P	-
Phaennidae[c]-unid. spp.					
-IV	-	-	P	-	-
-V	P	-	-	P	-
-female	-	-	-	P	-
-male	-	-	-	P	-
Scaphocalanus brevicornis					
-II	-	-	-	-	16
-III	-	-	-	P	77
-IV	-	-	-	1	26
-V	-	-	-	3	12
-female	P	P	-	4	13
-male	-	-	-	1	2
Scaphocalanus magnus					
-V	-	-	-	P	-
-female	-	-	-	P	-
-male	-	-	-	P	-
Scaphocalanus sp.					
-V	-	-	-	P	-
-female	-	-	-	P	-
Haloptilus acutifrons					
-III	-	-	-	P	-
-IV	-	-	-	P	-
-V	-	-	-	P	-
-female	P	-	-	P	-
Haloptilus longicirrus[c]					
-V	-	-	-	P	-
Augaptilus glacialis					
-III	-	-	-	P	-
-V	-	-	-	-	1
-male	-	-	-	P	-
Pachyptilus pacificus					
-female	-	-	-	P	-
Euchaeta spp.					
-I	3	3	12	12	-
-II	6	8	23	19	-
-III	P	-	P	-	-
-nauplius	2	5	6	11	1
Scolecithricella minor					
-III	-	-	-	P	-
-IV	P	P	1	4	-
-V	1	1	3	10	-
-female	1	5	4	10	-
-male	1	P	1	3	-
Undinella oblonga					
-III	-	-	-	P	-
-IV	-	-	-	P	-
-V	-	P	P	P	-
-female	-	-	-	P	-
-male	-	-	-	P	-
Metridia longa					
-I	1	4	10	17	-
-II	5	12	19	40	-
-III	6	15	43	57	-
-IV	31	76	156	163	-
-V	416	1223	1025	347	1
-female	575	1071	764	316	2
-male	11	38	107	232	-
Heterorhabdus norvegicus					
-II	-	-	-	P	-
-III	P	P	P	2	-
-IV	P	2	5	7	-
-V	P	1	3	3	-
-female	1	2	3	5	1
-male	1	1	5	7	-
Heterostylites major					
-II	1	1	-	1	1
-III	1	1	-	2	1
-IV	3	2	-	3	42
-V	3	2	-	9	32
-female	4	2	P	9	16
-male	1	P	-	8	13
Mormonilla polaris					
-IV	-	-	-	-	3
-V	1	-	-	P	6
-female	3	P	-	1	31
Acartia longiremis					
-II	7	-	-	-	-
-III	6	-	P	P	-
-IV	5	-	P	-	-
-V	P	-	P	-	-
-female	1	-	P	-	-
-male	P	-	P	-	-
Total[d]	28849	6180	4406	3131	605

[a]Or bottom, whichever was least.

[b]Less than 1 individual · 100 m^{-3}.

[c]Tentative identification.

[d]Excluding those accounted by P.

dant from 1200 to 50 m, and few specimens were found in the single sample from below 1200 m (Table 2). All stages, except adult males, were most common in the upper 50 m of water but slight differences in depth preferences existed. Older stages were progressively less confined to surface waters, and copepodites IV and V and adult females were not uncommon from 1200 to 250 m. Adult males appeared to be most abundant in deep water but, due to the small numbers found (a total of only ten specimens), their depth distribution remains poorly documented. The scarcity of adult males was expected because they occur primarily in winter and spring (Dawson, 1978).

Calanus finmarchicus and C. glacialis. Calanus glacialis was also abundant and was slightly more evenly distributed in the water column than *C. hyperboreus*; all stages were present at all depths above 1200 m (Table 2). However, all stages except adult males were most abundant in the upper 50 m.

Calanus finmarchicus was present in relatively small numbers at all stations sampled. It was generally more common in surface waters but substantial numbers of copepodite V and adult females were found throughout the water column above 1200 m (Table 2). The one adult male recovered was in a sample from 50 to 0 m. Young copepodite stages were generally restricted to the upper 50 m of water. Mean density of all stages was 230 ind·100 m^{-3} in the upper 50 m of water and less than 60 ind·100 m^{-3} in the remainder of the water column above 1200 m. *C. finmarchicus* was not found in the single sample taken below 1200 m.

There is much interest in the distribution and taxonomy of *Calanus* in general, but especially *C. finmarchicus* in arctic and subarctic regions (Jaschnov, 1955, 1961; Grainger, 1961, 1963; Maclellan, 1967; Tidmarsh, 1973; Fleminger and Hulsemann, 1977). *Calanus finmarchicus* and *C. glacialis* are closely related and difficult to differentiate. However, *C. glacialis* is an arctic species extending into temperate waters only in deep water flowing from the Arctic Ocean. *C. finmarchicus* is a North Atlantic species but is carried into the Arctic Ocean by Atlantic inflow east of Greenland and into Baffin Bay by the West Greenland Current. It has been thought that *C. finmarchicus* does not successfully breed in a pure arctic environment but survives there for long periods of time. From various collections taken between July and October of 1954-1961, Grainger (1963) found *C. finmarchicus* in many portions of northern Baffin Bay. However, no copepodites younger than Stage IV occurred in his collections. The presence of *C. finmarchicus* has, therefore, been used as an indicator of penetration of Atlantic water into more northern regions (e.g. eastern Arctic Ocean and north Baffin Bay, west Hudson Strait and northeast Hudson Bay).

There is now reason to believe that some successful breeding of *C. finmarchicus* occurs in northern Baffin Bay and eastern Lancaster Sound. We found early copepodite stages (Table 2), and Sekerak *et al.* (1976) found small numbers of *C. finmarchicus* (stages not specified) at all locations sampled in Lancaster Sound. Tidmarsh (1973) found *C. finmarchicus* in small numbers throughout northern Baffin Bay and in a small number of collections from Kane Basin; within this area it was most abundant in northeastern Baffin Bay. Unlike Grainger, he found a few early copepodites in northern Baffin Bay in August and more in September. (Kane Basin was not sampled at the appropriate time of year to collect young.) Tidmarsh did not report specific areas where young were present. The extent of breeding in these areas may be related to the variable northward extent of the West Greenland Current.

Pseudocalanus minutus. Other than in offshore regions of the Arctic Ocean itself, *P. minutus* is probably the most abundant copepod in arctic waters. It was the most common copepod found in Lancaster Sound by Sekerak *et al.* (1976) and the most common species in the present study area. Its mean density in the upper 50 m of water was 16 300 ind·100 m^{-3}. Mean densities decreased substantially with depth but it was found in small numbers in the deepest waters sampled (Table 2). Early copepodites were generally more restricted to surface waters than later stages, and adult females and copepodite V were relatively common above 1200 m. Unlike adult males of *C. hyperboreus* and *C. glacialis, P. minutus* adult males were most common in the upper 50 m of water.

Microcalanus spp. In the present study the mean abundance of *Microcalanus* was 500 ind·100 m^{-3} at depths between 250 and 1200 m but only about 250 and 100 ind·100 m^{-3} at 150-50 and 50-0 m, respectively (Table 2). Here, as elsewhere in waters of the Canadian Arctic Archipelago (pers. obs.), *Microcalanus pygmaeus* is normally less abundant than *Pseudocalanus minutus*. In contrast, *M. pygmaeus* was the most abundant copepod collected in the Arctic Ocean from ice island T-3 (Grainger, 1965).

As previously discussed, there appeared to be two forms of *Microcalanus* in the study area. The most abundant appeared to be *M. pygmaeus*, which occurred more commonly in deep water, below 750 m (Table 2). Sekerak *et al.* (1976) also noted two forms of *Microcalanus* in Lancaster Sound; they rarely collected *M. pygmaeus*, probably because they did not sample deep water, where *M. pygmaeus* is most common. Vidal (1971) recognized three different forms of *Microcalanus* (*M. pygmaeus, Microcalanus* spp. a and b) in the Arctic Ocean. Due to the taxonomic uncertainty regarding this group of 'species', and the small size of early copepodites (which were not sampled adequately with the 239 μm mesh nets), the life cycle cannot be interpreted from our material.

Metridia longa. This calanoid was common throughout the study area and most abundant between 250 and 50 m where it occurred in mean densities of 2100 to 2400 ind·100 m^{-3} (Table 2). The depth distributions of different stages of *M. longa* were distinctly different from those of *Calanus hyperboreus, C. glacialis* and *Pseudocalanus minutus*. Although young copepodites were present at all depths, they were most abundant between 1200 and 250 m. Progressively older stages (except adult males) became more and more common at 50 to 250 m.

Metridia longa breeds in deep water (Digby, 1954; Grainger, 1959); hence the presence of early copepodites and substantial numbers of adult males at great depths was expected. However, their densities were low, and highest densities of adult females were found between 250 and 50 m depths. This perhaps indicates that only limited reproduction was occurring. *M. longa* is known to have an extended breeding period, and the season of peak breeding activity appears to vary widely — e.g. June in the Arctic Ocean (Bogorov, 1946); August near East Greenland (Digby, 1954).

Other less abundant calanoid copepods. Many species of copepods were collected, but most occurred sporadically and in low mean densities. Many became more common in deep water. Densities of eight moderately common (i.e. from about 20 to 100 ind·100 m^{-3}) calanoid copepods (*Euchaeta glacialis, Scolecithricella minor, Heterorhabdus norvegicus, Chiridius obtusifrons, Gaidius tenuispinus, Spinocalanus longicornis, S. antarcticus, Heterostylites major*) are shown, in relation to depth, in Table 2. Except for *Euchaeta glacialis*, whose density was quite uniform to about 1200 m, a trend toward increasing densities in deep waters is apparent. Jespersen (1934) also found *E. glacialis* in about equal numbers throughout the water column in Baffin Bay. Six of these eight species, the exceptions being *Spinocalanus antarcticus* and *S. longicornis*, were also found in Baffin Bay by Tidmarsh (1973). However, in view of the research by Damkaer (1975), the *S. magnus* and *S. abyssalis* of Tidmarsh (1973) are, in all probability, *S. antarcticus* and *S. longicornis*.

Spinocalanus horridus (Wolfenden 1911) was collected only at Station N-4 at depths between 1900 and 700 m (Table 2). A total of 43 specimens ranging from copepodite Stage II to adult females was obtained. Apparently this species has not been reported previously in the present study area. Damkaer (1975) postulated that it has a worldwide distribution in water below 500 m and it has been collected throughout the Arctic Ocean (Minoda, 1967; Dunbar and Harding, 1968; Vidal, 1971).

Six copepodites (Stage II to V) collected from deep water at Station N-4 were tentatively identified as *Chiridiella reducta* Brodskii 1950. This species has not been reported as occurring in the study area but has been collected in deep water in the central Arctic Ocean (Brodskii, 1950) and a single female was found by Shih and Laubitz (1978) in the Beaufort Sea.

Derjuginia tolli (Linko 1913) was found in small numbers (1 adult female, 2 V, 2 IV) at three inshore stations above depths of 250 m (Table 2). Brodskii (1950) described the species as neritic and occurring in slightly-freshened surface waters. Grainger (1965) reported that *D. tolli* was primarily confined to marginal seas of the Arctic Ocean, and Shih and Laubitz (1978) found *D. tolli* in shallow waters of the Beaufort Sea and once in Barrow Strait. The species is apparently quite uncommon in the Canadian eastern Arctic and has not been found previously in Lancaster Sound or Baffin Bay.

Twenty specimens (one male, eight females, six V and five IV) of *Aetideopsis multiserrata* (Wolfenden 1904) were recovered from 11 samples at nine different stations. Although this copepod is not uncommon in the Arctic Ocean (Brodskii, 1950; Dunbar and Harding, 1968) and in northern Baffin Bay (Tidmarsh, 1973), the adult male of this species has not yet been described. One male, tentatively identified as *A. multiserrata*, was collected from between 1000 and 250 m at Station D-1 (5 September). Apart from specimens in one sample (Station E-1, 4 September, 250 to 150 m), all *A. multiserrata* captured were distributed below 250 m (Table 2).

Six adult male *Aetideopsis rostrata* (G.O. Sars 1903) were taken below 250 m at Stations E-1.3 (23 July), D-1 (14 June), C-5 (4 August), N-4 (15 August) and C-1 (20 September). The male of this otherwise common deep-water arctic species has not been described previously (*cf.* Shih and Stallard, 1982). Small numbers (maximum 13) of adult females and copepodites V and IV were collected from most stations throughout the study area, generally below 250 m (Table 2). Thirteen copepodite III and four II were recorded from 1900 to 1245 m at Station N-4 (15 August).

Sixteen *Euchaeta barbata* (Brady 1883) were collected below 250 m at Stations C-1, C-5, D-1, E-1, E-4 and N-4. All (except one copepodite III) were taken where total water depth exceeded 700 m. This large carnivorous copepod grows to a larger size and occurs in deeper water in the Arctic than in more temperate waters (Brodskii, 1950). Jespersen (1934) also collected *E. [Pareuchaeta] barbata* in Baffin Bay.

Eleven adult females, one adult male and four copepodite V of *Scaphocalanus magnus* (Scott 1893) were collected below 250 m at some of the northernmost stations (A-2, C-1, C-5, E-1, E-1.3, E-4, and EM). Jespersen (1934) and Tidmarsh (1973) reported *S. magnus* in waters deeper than 300 m in Baffin Bay. Tidmarsh concluded that this species probably does not breed in Baffin Bay.

Two adult female *Neoscolecithrix* sp., probably *N. farrani* Smirnov 1935 (C.-T. Shih, pers. comm.), were taken at Station NB (19 August) in a 400 to 250 m haul. This rare genus has not been reported previously from the northwestern Atlantic or the Canadian Arctic, but *N. farrani* has been found in the White Sea and off the Norwegian coast (Fosshagen, 1972; also see Shih and Stallard, 1982).

One adult female *Pachyptilus pacificus* (Johnson 1936) was found at Station G-4 (26 July) below 250 m; this species has been reported from deep water in the Central Arctic (Vidal, 1971), the Pacific Ocean and Bering Sea (Brodskii, 1950), and the Beaufort Sea (Shih and Laubitz, 1978). This appears to be a new record for the eastern Canadian Arctic.

Two adult males, one copepodite V and one copepodite III of *Augaptilus glacialis* (G.O. Sars 1900) were taken below 700 m at Station N-4 (15 August), and a skeleton of an adult female of this species was collected between 50 and 0 m at N-4. This species occurs below 200 m in the central Arctic Ocean (Brodskii, 1950) and below 800 m in Baffin Bay (Jespersen, 1934), the Greenland Sea (Damas and Koefoed, 1907) and the Norwegian Sea (Østvedt, 1955).

One copepodite V found at Station EM (7 September) below 250 m was tentatively identified as *Haloptilus longicirrus* (Brodskii, 1950). This species was first recorded from deep water (4000-1000 m) of the Pacific. It has not been found previously in the Arctic.

Mormonilla polaris (G.O. Sars 1900), a calanoid copepod not previously recorded from western Baffin Bay (C.-T. Shih, pers. comm.), was found widely distributed in small numbers (from 0 to 38 per sample), generally below 250 m. Single specimens were found in a few surface (50 to 0 m) samples, but they may have been contaminants from previous deep tows.

Nineteen previously undescribed calanoids (probably of the family Phaennidae) were collected at Stations C-1, C-5, D-1, D-4 and D-6. All but two occurred below 250 m. Identification and description of these specimens is in progress.

Cyclopoid copepods. *Oithona similis* occurred in large numbers in the study area (only the calanoid *Pseudocalanus minutus* was more abundant) and was present throughout the water column, although numbers were low in deep waters (Table 3). *O. similis* is, by far, the most abundant cyclopoid copepod in northern regions and is normally a major component of near-surface copepod communities (Johnson, 1963; Grainger, 1965).

Small numbers of the cyclopoid *Lubbockia glacialis* (G.O. Sars 1900), previously reported from northern Baffin Bay only by Tidmarsh (1973), were commonly encountered in deep (below 250 m) water throughout the study area. At some 'inshore' stations (C-1, G-1, and NB), a few specimens were taken at 150 to 0 m. This species is relatively common in the Arctic Basin (Harding, 1966) and has been recorded from the Greenland Sea (Damas and Koefoed, 1907).

Two previously undescribed cyclopoid species of the family Oncaeidae were found below 150 m throughout the sampling area. A total of 333 *Oncaea* sp. was collected; of these, 289 were taken below 700 m at Station N-4 on 15 August. A total of 33 specimens of another new species (possibly of the genus *Epicalymma*) was collected; of these, 23 were taken below 700 m at N-4. Descriptions of these species are in preparation.

Monstrilloid copepods. A single female monstrilloid was captured between 1000 and 254 m at D-1 on 27 September. Few species of monstrilloids have been described from arctic or subarctic waters and the species that do occur in northern waters are found in small numbers. The present specimen conforms most closely but not exactly to *Monstrilla longicornis* (Thompson 1890), as described by Isaac (1975).

TABLE 3. Mean abundance (individuals·100 m^{-3}) of harpacticoid and cyclopoid copepods in five depth intervals in western Baffin Bay

Species	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Harpacticoida					
Ectinosoma finmarchicum	15	P[b]	P	-	-
Ectinosoma neglectum	1	P	-	-	-
Harpacticus superflexus	4	3	4	3	-
Tisbe furcata[c]	30	1	1	P	-
Tisbe gracilis[c]	-	-	-	-	2
Tisbe inflata[c]	-	-	-	-	5
Ameiropsis sp.[c]	-	-	-	P	-
Sarsameira elongata[c]	-	P	-	-	-
Total[d]	50	4	5	3	7
Cyclopoida					
Oithona spinirostris	P	-	P	P	-
Oithona similis	13399	1510	983	144	47
Cyclopina schneideri	11	1	P	P	-
Cyclopina sp.	-	-	-	P	-
Oncaea borealis	72	7	13	10	-
Oncaea sp.	P	-	-	2	255
Lubbockia glacialis	2	1	-	3	4
Oncaeidae-unid. sp.	2	-	P	P	18
Total[d]	13486	1519	996	159	324

[a]Or bottom, whichever was least.
[b]Less than 1 individual · 100 m^{-3}.
[c]Tentative identification.
[d]Excluding those accounted by P.

Amphipods

About 15 species of amphipods were collected; *Parathemisto libellula* and *P. abyssorum* were the most common. *P. abyssorum* was more common than *P. libellula* at all depths except 50 to 0 m (Table 4). Despite its name, *P. abyssorum* commonly inhabits relatively shallow water in arctic regions and occurs exclusively in deep water in temperate waters (Ekman, 1953). *Apherusa glacialis* and *Onisimus glacialis* are reportedly pelagic but also occur on the undersurface of fast ice and on the sides of pan ice in summer; *O. glacialis* may also be associated with shallow-water benthos (Sekerak *et al.*, 1976; Buchanan *et al.*, 1977; Cross, 1982).

Two specimens of *Cyphocaris bouvieri*, 6 and 17 mm long, were captured at Stations EM (28 July) and C-1 (20 September) between 250 and about 750 m. This is an Atlantic-Pacific deep-water species whose minimum recorded depth in these areas is 887 m (Barnard, 1962). Off West Greenland it has been found previously at depths of 1500 to 1800 m as far north as 60°50′ (Stephensen, 1933).

One specimen of the genus *Lanceola* was recovered at Station E-4 on 4 September between 245 m and 700 m. Five species of this hyperiid genus are known from the waters of West Greenland but only *L. clausi* has been found at the latitude of the present study area (Stephensen, 1933).

Four *Eusirus holmi* were found in deep water (>280 m) at Stations C-1 (31 July), C-5 (7 September) and N-4 (15 August). This is a pelagic deep-water arctic species that has been recorded from the Polar Basin, Norwegian Sea and West Greenland (Stephensen, 1933).

Cyclocaris guilelmi was collected at Station N-4 (15 August) in depths from 1900 to 240 m (12 specimens ranging from 4 to 13 mm in length). In addition, three specimens from 1 to 12 mm long were found below 250 m at E-4 (26 July) and C-1 (6 September). *C. guilelmi* is a deep-water arctic species with a minimum recorded depth of 130 m (Barnard, 1962). Off West Greenland it has been taken from 200 to 1800 m between 66° and 75°N (Stephensen, 1933).

TABLE 4. Mean abundance (individuals·100 m^{-3}) of amphipods in five depth intervals in western Baffin Bay

Species	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Apherusa glacialis	P[b]	P	1	2	1
Eusirus holmi	-	-	-	P	1
Gammaridae-juvenile	1	P	-	P	-
Cyclocaris guilelmi	-	-	-	P	2
Cyphocaris bouvieri	-	-	-	P	-
Onisimus glacialis	3	1	1	P	-
Onisimus nanseni	P	-	-	-	-
Lysianassidae-damaged	P	-	-	-	-
Anadaniexis spp.	P	P	-	6	-
Hyperia galba	P	P	P	P	-
Hyperia medusarum	P	-	-	P	-
Hyperoche medusarum	P	-	-	-	-
Parathemisto abyssorum	58	42	13	11	-
Parathemisto libellula	95	13	13	2	-
Parathemisto spp. juvenile	P	-	-	-	-
Scina borealis	-	P	P	1	-
Lanceola sp.	-	-	-	P	-
Hyperiidae-juvenile	1	P	-	P	-
Total[c]	158	56	28	22	4

[a]Or bottom, whichever was least.
[b]Less than 1 individual · 100 m^{-3}.
[c]Excluding those accounted by P.

Mysids and Decapods

Only one species of decapod shrimp (*Hymenodora glacialis*) was identified in the study area. It was found in small numbers from 1900 to 250 m (Table 5). However, due to its large size, it comprised quite an important portion of the total biomass of the deep-water zooplankton community (Fig. 3). *H. glacialis* is an arctic species and is the only decapod reported from zooplankton collections in the Arctic Basin (Leung *et al.*, 1971). Stephensen (1935) also found it to be common in deep areas of Baffin Bay.

Of the two species of mysids found in the zooplankton, *Boreomysis arctica* was more common. It occurred in small numbers below 50 m and was most abundant in deep water below 250 m (Table 5). *B. nobilis* was found only between 1200 and 250 m and always in small numbers. Both of these species have been reported from West Greenland and Baffin Bay (Stephensen, 1935). *B. nobilis* was the only species of boreomysid reported from the Arctic Ocean by Geiger (1969).

TABLE 5. Mean abundance (individuals·100 m^{-3}) of decapods and mysids in five depth intervals in western Baffin Bay

Species	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Decapoda					
Hymenodora glacialis	-	-	-	1	6
Hymenodora spp.	-	-	-	P	-
larvae	P[b]	P	-	-	-
Total[c]	P	P	-	1	6
Mysidacea					
Boreomysis arctica	-	P	P	4	-
Boreomysis nobilis	-	-	-	1	-
Total[c]	-	P	P	5	-

[a]Or bottom, whichever was least.
[b]Less than 1 individual · 100 m^{-3}.
[c]Excluding those accounted by P.

Hydrozoans

At least six hydrozoan species were recovered but *Aglantha digitale* was, by far, the most abundant. The majority of the species (exceptions: *Dimophyes arctica* and *Botrynema ellinorae*) were most common in the upper 50 m (Table 6). *Dimophyes arctica* is a common deep-water arctic species (Shih *et al.*, 1971). Four specimens of *Botrynema ellinorae* (Hartlaub 1909) were obtained in our one sample from depths of 1900 to 1245 m at Station N-4. Kramp (1942d) collected relatively large numbers of *B. ellinorae* in central Baffin Bay from depths of 1800 to 1000 m. This species is probably common in deep water throughout the study area. It has also been recorded in deep water of the Beaufort Sea (Shih and Laubitz, 1978) and of the central Arctic Ocean (Shirley and Leung, 1970).

Chaetognaths

The three species of chaetognaths collected during the study are all common to Canadian arctic waters and have been reported previously from the study area (Kramp, 1939; Sekerak *et al.*, 1976). *Sagitta elegans* was nearly restricted to the upper 50 m, *Eukrohnia hamata* was fairly common throughout the water column, and *S. maxima* was common only in deep water (Table 7).

TABLE 6. Mean abundance (individuals·100 m^{-3}) of hydrozoans in five depth intervals in western Baffin Bay. All numbers given below are underestimated due to numerous fragmented specimens.

Species	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Halitholus cirratus	P	P	-	-	-
Halitholus spp.	P	-	-	-	-
Aglantha digitale	124	37	29	13	-
Aeginopsis laurentii	5	1	2	P	-
Botrynema ellinorae	-	-	-	-	4
Dimophyes arctica	P	P	P	P	-
Unid. larvae	344	1	P	P	-
Unid. juveniles	42	-	P	-	-
Total[c]	515	39	31	13	4

[a]Or bottom, whichever was least.
[b]Less than 1 individual · 100 m^{-3}.
[c]Excluding those accounted by P.

TABLE 7. Mean abundance (individuals·100 m^{-3}) of chaetognaths and young-of-the-year fish in five depth intervals in western Baffin Bay

Species	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Chaetognatha					
Eukrohnia hamata	167	66	96	54	-
Sagitta elegans	100	2	P	P	-
Sagitta maxima	-	P	1	3	-
Sagitta spp.	-	-	P	P	-
Total[c]	267	68	97	57	-
Osteichthyes					
Boreogadus saida	3	-	P	-	-
Liparis koefoedi	P	-	P	-	-
Total[c]	3	-	P	-	-

[a]Or bottom, whichever was least.
[b]Less than 1 individual · 100 m^{-3}.
[c]Excluding those accounted by P.

Young-of-the-Year Fish

Two species, arctic cod (*Boreogadus saida*) and the gelatinous seasnail (*Liparis koefoedi*), were collected in the vertical plankton hauls. Arctic cod were the more common of the two and were most abundant in the upper 50 m (Table 7). The abundance and the distribution of young-of-the-year arctic cod in the study area are described by Sekerak (1982).

Other Groups

Larvae and young benthic invertebrates were often abundant in the surface waters (<50 m) of the study area, particularly near shore (Table 8).

TABLE 8. Mean abundance (individuals·100 m^{-3}) of benthic invertebrate larvae and young in five depth intervals in western Baffin Bay

Group	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Bivalvia					
larvae	194	23	5	P	-
juveniles	P[b]	-	-	-	-
Polychaeta					
trochophores	5	1	P	P	-
mitraria	235	5	2	2	-
juveniles	272	13	7	1	-
Cirripedia					
nauplii	182	12	4	P	-
cyprids	5	1	P	-	-
Asteroidea					
juveniles	P	3	1	P	-
Ophiuroidea					
plutei	1930	111	34	2	-
juveniles	-	-	-	P	-
Total[c]	2823	169	53	5	-

[a]Or bottom, whichever was least.
[b]Less than 1 individual · 100 m^{-3}.
[c]Excluding those accounted by P.

TABLE 9. Mean abundance (individuals·100 m^{-3}) of pteropods and pelagic polychaetes in five depth intervals in western Baffin Bay

Species	Depth interval (m) 50/0	150/50	250/150	1200[a]/250	1900/1200
Pteropoda					
Limacina helicina					
adults	38	2	3	1	-
veligers	2376	142	75	7	-
Clione limacina					
adults	17	-	P[b]	P	-
veligers	59	7	30	8	-
Total[c]	2490	151	108	16	-
Polychaeta					
Pelagobia longicirrata	1	3	1	13	1
Travisiopsis levinseni	P	2	3	2	-
Tomopteris sp.	-	-	P	P	-
Total[c]	1	5	4	15	1

[a]Or bottom, whichever was least.
[b]Less than 1 individual · 100 m^{-3}.
[c]Excluding those accounted by P.

Adults and veligers of the two species of pteropod (*Clione limacina* and *Limacina helicina*) present in the Canadian Arctic were common throughout the study area. They were most abundant in the upper 50 m and present in small numbers in deeper waters, at least to 250 m (Table 9).

Two species of pelagic polychaete, *Pelagobia longicirrata* and *Travisiopsis levinseni*, were present in small numbers as deep as the 1200 to 250 m sampling depth (Table 9). In addition, two individuals of *Tomopteris* sp. were recorded between 1200 and 150 m.

Two species of ctenophore, *Beroe cucumis* and *Pleurobrachia pileus*, occurred at all depth intervals sampled. No detailed analysis was possible because of the fragmented condition of the specimens collected.

Unidentified isopods were common in all depth intervals sampled, especially in the upper 50 m where their mean density was 10 ind·100 m^{-3}. Several genera, including *Gnathia*, were present.

Soft-shelled ostracods were abundant (mean of 215 ind·100 m^{-3}) below 250 m. The majority were probably *Conchoecia borealis*, which is the most commonly reported of the two arctic species (Shih *et al.*, 1971) and generally is more abundant in deep water (Shih and Laubitz, 1978).

Zooplankton Assemblages

Factor analysis identified 23 groups of species or stages of zooplankton (hereinafter called 'assemblages') that repeatedly tended to occur together. Examination of factor scores revealed the samples in which particular assemblages were prominent. Of these 23 assemblages, the first ten accounted for about 55% of the total variance. The dominant species or stages in these ten assemblages are listed in Table 10; their depth distributions are shown in Figure 4.

The larvae-copepodite group (Factor 1) represented primarily herbivorous species and/or stages; this group was rarely prominent below 50 m (Fig. 4) and its prominence coincided in both space and time with the arctic summer phytoplankton bloom. Two of the species whose early stages were major components of this assemblage, *Calanus glacialis* and *Pseudocalanus minutus*, have been reported to breed in the Arctic Ocean only at times of maximum phytoplankton abundance (Heinrich, 1961 in Grainger, 1965).

The older copepod-amphipod group (Factor 2) was also most prominent in the upper 50 m but was conspicuous in deep water at several stations (NB, A-2) late in the season (Fig. 4). Factor 2 represented primarily older copepodites, adult copepods, and two species of carnivorous amphipods (Table 10). The majority of these species were probably congregating in the surface waters during summer for reproduction and feeding. At least one of these species (*Calanus hyperboreus*) overwinters in deeper water.

Factor 7, which represented primarily the copepods *Cyclopina schneideri* and *Tisbe furcata* and the hydrozoan *Aglantha digitale*, was prominent only in the upper 50 m (Fig. 4), mainly at offshore stations.

Factor 9 (the isopod-harpacticoid assemblage) was most commonly prominent in surface water samples but was sometimes prominent at other depths. The Factor 10 group, representing *Metridia longa* V and adult females, was most prominent between 250 and 50 m.

Factors 3 to 6 represented assemblages that were strongly associated with deep water (Fig. 4, Table 10). Factor 8 also was mainly associated with deep water, but was sporadically conspicuous in surface waters. The primary species (*Euchaeta barbata*) has occasionally been found in seabird stomachs (Bradstreet, 1979); this tends to confirm that it is not entirely restricted to deep water.

TABLE 10. Zooplankton assemblages for species or groups with factor loadings greater than 0.5. Species but not stages are listed under each factor in decreasing magnitude of factor loading.

1. Larvae-Copepodite Group	**2. Older Copepod-Amphipod Group**
Bivalve larvae Polychaete larvae *Calanus glacialis* I-IV *Calanus finmarchicus* I-III *Pseudocalanus minutus* I, III-V Hydrozoan larvae Barnacle cyprids *Sagitta elegans* Echinoderm plutei *Limacina helicina* veligers *Clione limacina* veligers *Oithona similis*	*Calanus hyperboreus* II-V, female *Calanus glacialis* IV, V, female *Pseudocalanus minutus* female *Parathemisto libellula* *Parathemisto abyssorum*
3. *Metridia longa* Deep Water Group	**4. Deep Water Copepod-Shrimp Group**
Metridia longa I-IV, male *Microcalanus* spp. male, female Aetideidae I-III	*Scaphocalanus brevicornis* *Spinocalanus antarcticus* *Hymenodora glacialis* *Heterostylites major* *Undinella oblonga* *Spinocalanus longicornis* *Haloptilus acutifrons*
5. Deep Water Copepod-Chaetognath Group	**6. Deep Water Copepod-Mysid Group**
Spinocalanus longicornis *Heterorhabdus norvegicus* *Gaidius tenuispinus* *Chiridius obtusifrons* Myodocopids *Scolecithricella minor* *Sagitta maxima*	*Scaphocalanus magnus* *Boreomysis arctica* *Spinocalanus elongatus* *Oncaea* sp. *Scina borealis*
7. Surface Copepod-Hydrozoan Group	**8. *Euchaeta barbata* Group**
Cylopina schneideri *Tisbe furcata* *Aglantha digitale*	*Euchaeta barbata* *Lubbockia glacialis* *Haloptilus acutifrons* Oncaeidae sp.
9. Isopod-Harpacticoid Group	**10. *Metridia longa* Intermediate Group**
Isopods *Ectinosoma neglectum* *Harpacticus superflexus* Oncaeidae sp.	*Metridia longa* female, V

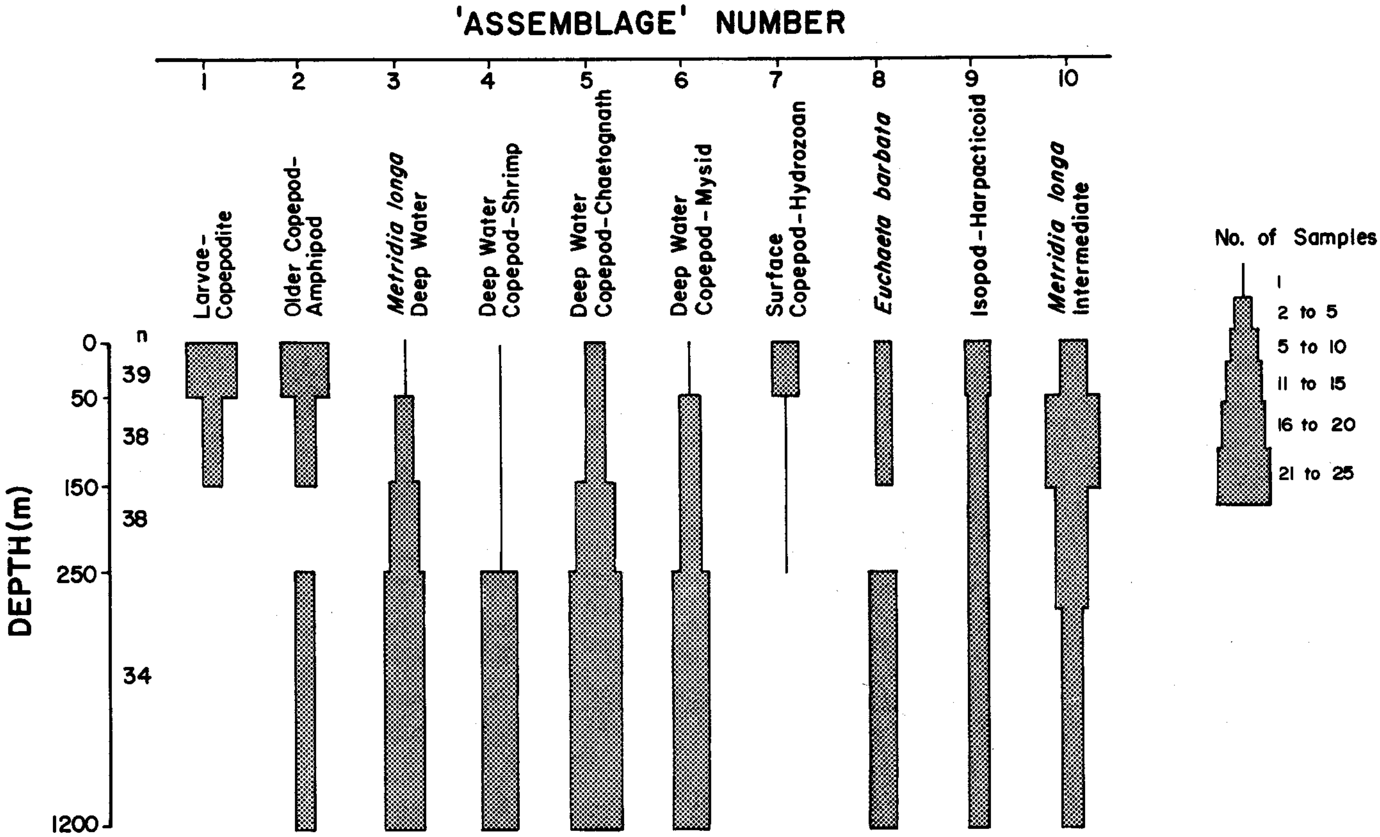

FIG. 4. Vertical distribution of ten zooplankton 'assemblages' defined for the eastern Lancaster Sound-western Baffin Bay region, July-October 1978. See Table 10 for list of the dominant species in each assemblage. Widths of bars indicate number of samples (out of a possible 34-39) in which the assemblages were prominent. An assemblage was considered to be prominent in a particular sample when the factor score was >0.5.

CONCLUDING REMARKS

The present study has been the most intensive zooplankton collection effort to date in the eastern Lancaster Sound-western Baffin Bay region, particularly in deep water. As a result, a relatively high number of new records for the area, undescribed copepod stages, and possibly new species were recorded. New records for the study area included the copepods *Spinocalanus horridus, Chiridiella reducta, Derjuginia tolli, Neoscolecithrix farrani?, Pachyptilus pacificus, Haloptilus longicirrus?, Mormonilla polaris* and *Monstrilla longicirrus*. Previously undescribed adult males of the copepods *Aetideopsis multiserrata* and *A. rostrata* and three apparently new copepod species were also collected.

As expected, the zooplankton community was dominated, both numerically and on a biomass basis, by the calanoid copepods *Calanus glacialis, C. hyperboreus, Pseudocalanus minutus, Metridia longa* and *Microcalanus* spp. and the cyclopoid copepod *Oithona similis*. Of particular interest was the occurrence of moderate numbers of copepodite Stage I and II of *Calanus finmarchicus* in the upper 50 m of the study area. There is now reason to believe that at least some successful breeding of the Atlantic species occurs in the eastern Canadian High Arctic.

In general, total zooplankton numbers and biomass were greatest in the upper 50 m (Fig. 2, 3). There the mean biomass (wet weight) was estimated to be 400 $mg \cdot m^{-3}$; this consisted primarily of calanoid copepods (83% of wet weight), chaetognaths (5%), gastropods (5%), and amphipods (4%). On a numerical basis, these four groups comprised, respectively, 63%, 1%, 5% and 0.3% of the animals present in the upper 50 m; other abundant groups were cyclopoid copepods (25% of numbers but only 0.4% of wet weight) and echinoderms (4% *vs.* <0.01%).

Some of the various zooplankton species and stages collected in the study area during the open-water season displayed marked depth preferences. Others were more or less evenly distributed throughout the water column. Factor analysis identified ten zooplankton assemblages that included a larvae-copepodite group that was confined to the upper 50 m, an older copepod-amphipod group that normally occurred in the upper 50 m, four deep-water groups (composed of deep-water copepods, most notably *Metridia longa* Stage I-IV, *Microcalanus* spp., *Scaphocalanus brevicornis, S. magnus, Spinocalanus longicornis*, the shrimp *Hymenodora glacialis*, the chaetognath *Sagitta maxima*, and the mysid *Boreomysis arctica*), a surface copepod-hydrozoan assemblage, an isopod-harpacticoid group commonly prominent in surface waters (but not entirely), and an intermediate depth group composed of *Metridia longa* Stage V and adult females.

ACKNOWLEDGEMENTS

This study was part of the Eastern Arctic Marine Environmental Studies (EAMES) program and was funded by Petro-Canada and coordinated by the Department of Indian Affairs and Northern Development (DIAND). Special thanks are due to Petro-Canada, particularly G. Glazier and H. Hume, and to Dr. N. Snow (formerly of DIAND) for their enthusiastic support throughout the study.

The captain and crew of the M/V *Theron* were instrumental in the successful completion of the work. Field assistance was provied by R. Barss, H. Bain and M.S.W. Bradstreet of LGL Ltd. Zooplankton identifications were provided by H.E. Stallard of LGL Ltd. and verifications by Dr. C.-T. Shih (copepods) and D. Laubitz (amphipods) of the National Museums of Canada, Ottawa. Computer analyses were conducted by Dr. G. Walder (then of LGL Ltd.).

We thank Dr. W.J. Richardson of LGL Ltd. for assistance with data analysis and editing, and B. Griffen and J. Brenton for typing the manuscript.

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