J. micropalaeontol., **8**(1): 55–75, June 1989

Recent shallow marine Ostracoda of the Ikerssuak (Bredefjord) District, Southwest Greenland

DAVID N. PENNEY
Laboratoriet for Palæontologi og Stratigrafi, Geologisk Institut,
Aarhus Universitet, Dk-8000 Aarhus C, Denmark

ABSTRACT–From a study of 15 grab samples collected from the littoral and sublittoral of the Ikerssuak (Bredefjord) district, SW Greenland, one myodocopid and 18 podocopid ostracod species were recovered. These constitute an indigenous fauna and the majority have been recorded from Greenland before. *Leptocythere castanea* and *Leptocythere lacertosa* are new to Greenland, and have not previously been confirmed from the western Atlantic. Copulating pairs of *Hemicythere borealis* were found in an intertidal embayment near the town of Narssaq. This species reproduced just before the late summer-autumn maximum of primary production in the area, and at the warmest time of the year. *Semicytherura nigrescens*, which has been recorded previously in SW Greenland, may have a similar distribution pattern to certain Subarctic Mollusca in western Greenland.

INTRODUCTION

Fifteen grab samples were collected by L. Grum between 23rd June and 28th July 1980 from shallow waters in the Ikerssuak (Bredefjord) district, Southwest Greenland (Fig. 1). The object of this exercise was to examine the shallow water foraminiferal faunas of an Arctic fiord-system, but the samples were also found to contain sufficient numbers of both live and dead Ostracoda to enable an evaluation of their faunal composition.

Ikerssauk is located in the extreme southwest of Greenland, in an area that possesses a Subarctic climate (Putnins, 1970). This ENE-oriented fiord attains 725 m at its deepest part just north of Narssaq (Fig. 2), and lacks a proper sill at its entrance. The whole district is cut by many smaller fiords, oriented NNW, most of which are shallow, rarely attaining 200 m depth. The majority of samples examined in the present study were taken around the shallow margins of these fiords, and in one case the sampling station was located approximately 100 m from a glacier lobe of the main Greenland ice cap.

The approximate positions from which the samples were obtained are shown in Fig. 2. The samples were not homogeneous and details of each are given in Table 1. The sediment descriptions have been derived partly from L. Grum's original descriptions and partly from the character of the dried residues from which the ostracods were picked. Salinity and temperature were measured through the water column at most stations at the same time as the samples were taken (Table 2).

HYDROGRAPHY

The water masses of South Greenland consist of two components, both deriving from Southeast Greenland. Surface Polar waters transport cold (0° to −1.8°C), less saline water (30–33‰) northwards along the west coast of Greenland. While the coastal waters in southern Greenland remain largely open all year round, they are affected in spring and summer by "storis" drift ice that rounds Kap Farvel from the Denmark Strait (Speerschneider, 1931). The latter causes cool, cloudy, often foggy summers on the open coast, with maximum summer temperatures rarely exceeding +6° to +8°C. The sheltered inner fiord areas are not influenced by the storis and experience calm weather up to 55% of the year, resulting in warmer summers (+9°C to +11°C) and colder winters, although föhn gales effect the heads of many fiords. Shallow, protected inlets in the inner fiords (e.g. Narssap Ilua: station 5, Fig. 2) freeze over in winter months.

The deeper water layer consists of warmer (4–5°C) and more saline (34.75–35‰) Atlantic water transported by the Irminger Current, a branch of the North Atlantic Drift. Atlantic water penetrates the deep, open fiords without a proper sill (such as Ikerssuak) as a warm, saline bottom layer. While vertical mixing of water masses occurs in the winter on the open coast, the layers are stable in the fiords of South Greenland, a factor which prevents the effective replenishment of nutrients to the surface layer. This results in lower annual levels of primary production in the fiords than occur either on the open coast or in fiords further north (Schmidt, 1979). Summer heating of the surface waters, from which all the samples were taken in this study, results in two or more productive maxima from spring to late summer, the second maximum occurring in July-August (Schmidt, 1979).

The salinity and temperature data presented in Table

2 illustrate the influence of summer warming, tidal pumping, and freshwater inflows in the inner fiords. Summer warming can penetrate the surface layers to depths of 10 m or more by mid- to late summer. While freshwater inflows were observed at all stations in the upper 2–3 m of the water column, reduced salinities were also recorded down to between 8 and 10 m at certain stations. The actual depth of seasonal fluctuation varied from station to station, dependant on its location in relation to local currents and the ice-front, but the data gives us an overall picture of summer warming and reduced salinities to a depth of about 10 m. This is in general agreement with the results given by Moltke (1895) and Stephenson (1917) in the same district.

The spring tidal range at Narssaq is 2.6 m, while neap tidal range is 0.7 m (Admiralty Tide Tables, vol. 2). Only one of the sampling stations (no. 5, Fig. 2) occurred in the intertidal zone.

PREVIOUS STUDIES

In the past few decades, with increasing importance being placed on Ostracoda as a tool for the Quaternary palaeontologist, greater emphasis has been placed on the identification of meaningful environmental inferences in palaeoenvironmental analysis. It is unfortunate, therefore, that, with a few notable exceptions, little attention has been payed to Arctic and Sub-arctic faunas, thus creating difficulties in the interpretation of the faunas present in the Quaternary deposits of for example, the North Sea Basin.

Studies on Arctic Ostracoda have been, and are still being undertaken largely on an *ad hoc* basis, depending on one-off sampling, and paying little or no attention to population dynamics. The state of our knowledge of the marine Ostracoda of West Greenland was reviewed by Whatley (1982). After the early descriptive works of Brady (1866, 1868, 1878) and Norman (1877; Brady & Norman, 1889), which were summarized by Stephensen (1913, 1936), no further work was undertaken until Hazel (1967, 1970) reported on his investigations in Baffin Bay. Neale & Howe (1975) re-examined some of Brady's and Norman's samples from West Greenland in connection with their survey of the Novaya Zemlya faunas in the Barents Sea. More recently Hawley (MS, 1980: reported in Whatley 1982) and Whatley (1982) have investigated the ostracods present in the inshore areas of Ameralik (Lysefjord, 64°10′N) and Sisimiut (Holsteinborg, 66°57′N: Fig. 1) respectively. The 19th Century literature is only of limited value as neither Brady nor Norman gave any estimates or details of abundance, concentrating instead on taxonomy. Hazel (1970) gave an indication of abundance in generalized terms and Neale & Howe (1975), Hawley (MS 1980), and Whatley (1982) all presented absolute results.

To-date about forty-five marine benthonic species of

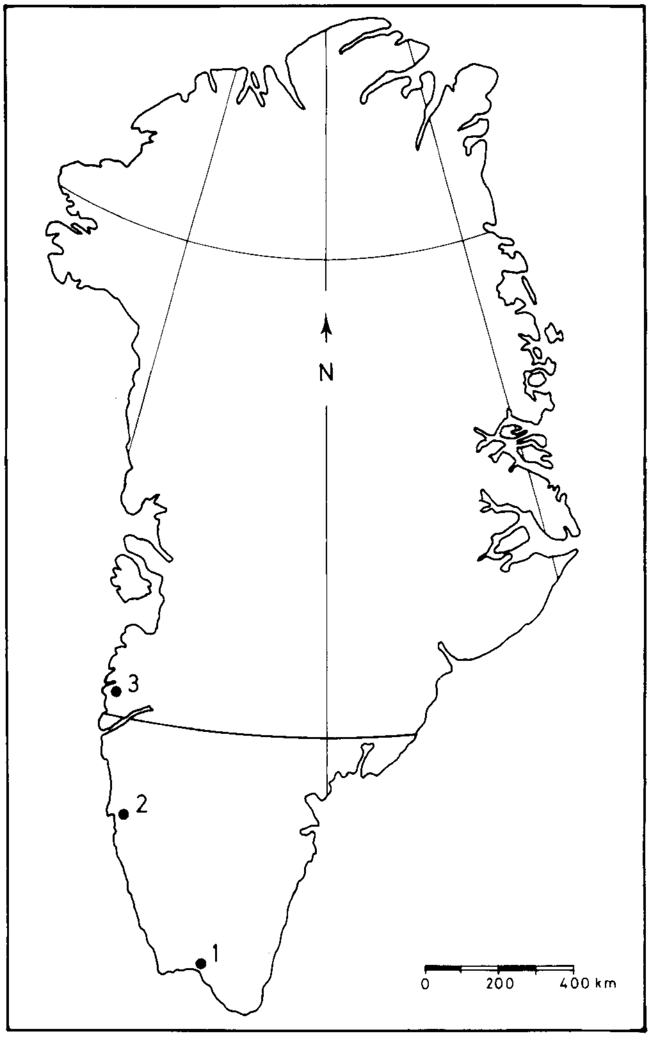


Fig. 1. Map of Greenland showing the locations of the most important ostracod studies referred to in the text: 1 = Ikerssuak (Bredefjord: this study), 2 = Ameralik (Lysefjord: Hawley MS, 1980), 3 = Sisimiut (Holsteinsborg: Brady, 1868; Neale & Howe, 1975; Whatley, 1982).

Ostracoda have been recorded in West Greenland (Whatley 1982), the majority of which are common amphiatlantic species of the Arctic Province (Neale & Howe, 1975). *Hemicythere borealis,* however, is restricted to the western Arctic, while both *Semicytherura nigrescens* and *Cytherura atra,* which Hawley (MS 1980) and Whatley (1982) recorded in West Greenland, have never been found in North America.

As such, the present study differs in no way from these investigations. It does, however, throw some light on ostracod distribution in the shallow inshore waters of SW Greenland. Suggestions are also made on the population dynamics of some of the species. It must, however, be emphasized that the actual life-cycles of

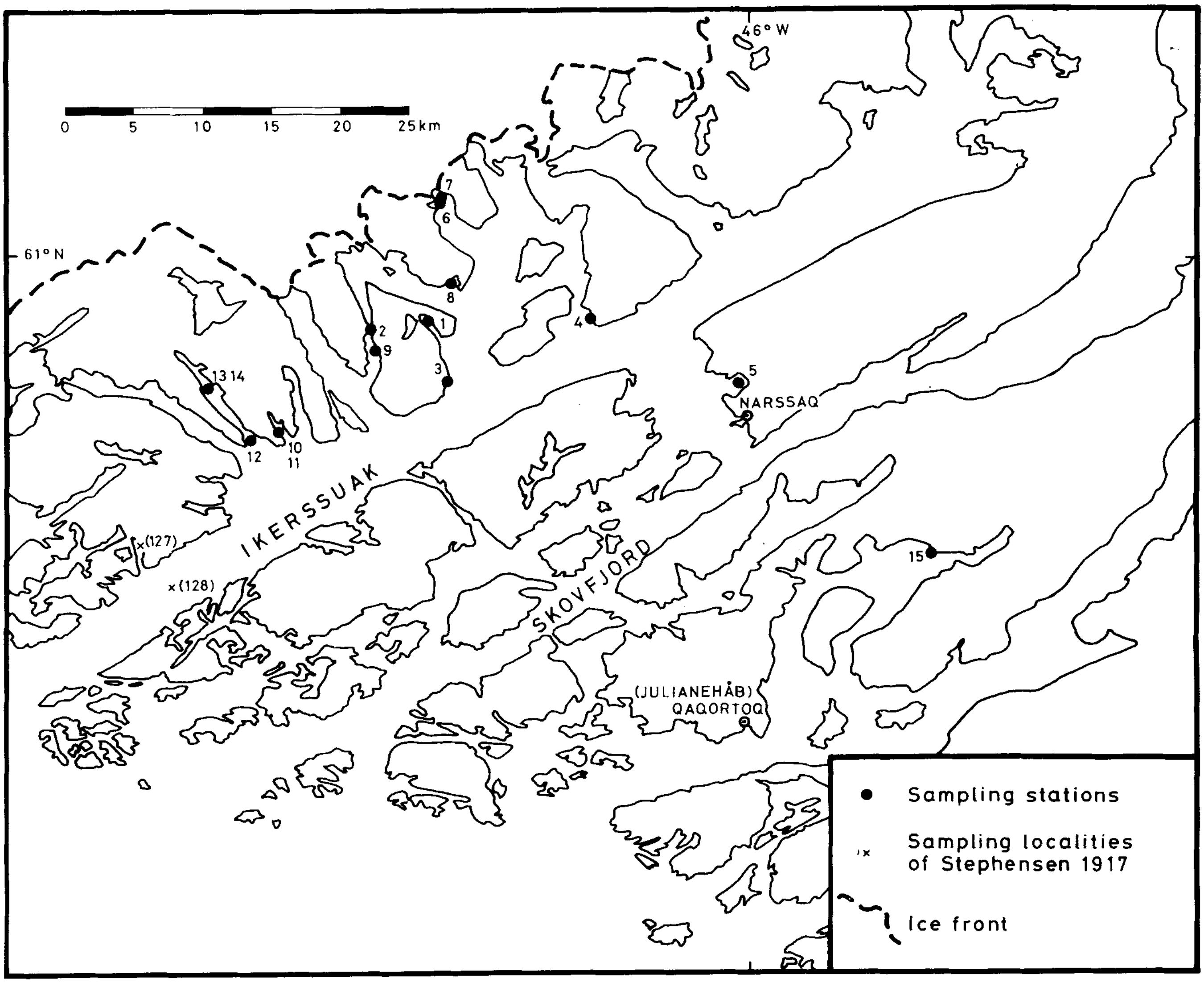


Fig. 2. Location of sampling stations in the Ikerssuak (Bredefjord) district.

these taxa have not been studied here, as this would require systematic collection on a seasonal basis at one or more of the sampling locations.

MATERIAL AND METHODS

Samples were obtained using a Van Veen grab. They were stained using Rose-Bengal and preserved in alcohol. In the laboratory the samples were washed through three sieves (mesh sizes 1.0 mm, 0.1 mm and 0.063 mm) and dried. As L. Grum was interested in investigating the Foraminiferida he subsequently separated the fraction between 1.0 mm and 0.1 mm using Carbon Tetrachloride. Most of the "live" ostracod carapaces floated off with the foraminifera using this technique, but the majority of the empty valves remained behind in the residues. The total ostracod assemblages were thus obtained by picking both the light foraminiferal concentrates and the heavy residues, and combining the results (Table 3).

The material used in this study has been named to the specific level and counted so as to distinguish between live and dead specimens, adults and juveniles, and males and females. All complete carapaces containing appendages were considered as live specimens. Certain problems arose in assessing the results quantitatively. Being presented with washed residues only, with no raw samples being available, it was impossible to estimate the original size of each sample. Thus, statistics on faunal density could not be calculated. Furthermore, being dependant on what material was available, all specimens were counted in order to obtain a more accurate representation of the actual occurrence of the species. A yard-stick for comparison of at least 300 specimens is generally accepted as satisfactory

SAMPLE	LAT	LONG	PLACENAME	DEPTH(m)	DESCRIPTION
1	60°58'N	46°28'W	None	8	Grey, fine sandy silt, algal debris, mollusc shells.
2	60°58'N	46°32'W	Quvnerssuaq	6	Gravelly sandy silt.
3	60°56'N	46°26'W	None	5	Fine sandy silt, mollusc shells.
4	60°58'N	46°15'W	Tugderûnat	15	Sandy silt rich in algal debris.
5	60°56'N	46°04'W	Narssap Ilua (Dyrnæs)	1	Coarse-medium pebbly sand, algal debris.
6	61°02'N	46°25'W	None	26	Grey clay.
7	61°03'N	46°25'W	None	10	Grey clay, a little shell debris.
8	61°00'N	46°26'W	Manîtsup tunua	12	Seagrass, very little sediment.
9	60°57'N	46°31'W	Quvnerssuaq	?	Clay.
10	60°54'N	46°39'W	None	11.5	Fine sandy silt.
11	60°54'N	46°39'W	None	11.5	Fine sandy silt.
12	60°53'N	46°42'W	Kangerdluatsiaq	8	Grey sandy sediment.
13	60°56'N	46°45'W	Kangerdluatsiaq	3	Clay rich in algal debris.
14	60°56'N	46°45'W	Kangerdluatsiaq	3	Clay rich in algal debris.
15	60°50'N	45°48'W	Qaqortup îmâ	11	Sand.

Table 1. Location of sampling stations and sediment descriptions.

when dealing with sample populations. All but one of the samples (no. 5) in this investigation fell short of this value, but the following considerations were deemed to outweigh these statistical draw-backs. Firstly, the literature covering Arctic ostracods is rather limited and widely scattered, and any further information is of significance for our understanding of species distribution within the Arctic. In particular, there is very little data available on ostracod distribution in Arctic inshore habitats. Secondly, with the exception of a few important contributions (e.g. Neale & Howe, 1975; Whatley, 1982), there are no estimates or details of abundance given in any of the published works relating to Arctic ostracods and only Whatley (1982) gave data on live occurrences in West Greenland. Finally and perhaps most significantly, physico-chemical parameters (salinity, temperature etc) have not been presented in the overwhelming majority of published accounts relating to Arctic Ostracoda, while this data was collected at most of the sampling stations in this study. At least 100 specimens were thus considered as acceptable for comparison purposes.

All figured specimens have been deposited in the collections of Micropalaeontology Laboratory, Earth Sciences Department, Aarhus University, Denmark.

THE IKERSSUAK FAUNAS

Of the fifteen samples originally collected by L. Grum, three were lost in transit (nos. 11, 13 and 14). Two samples were barren (no. 8 and 10), and one (no. 6) possessed only one live ostracod; these samples will not be considered further. The remaining samples contained between 12 and 1,937 individual ostracods (Table 3). One myodocopid and 18 podocopid ostracod species belonging to 12 genera were represented. The most important species was *Hemicythere borealis*, followed by *Leptocythere castanea* and *Finmarchinella logani*. These three taxa together accounted for 85% of the total live and 84.4% of the total death assemblages (Table 4). *H. borealis* was found live in 9 samples, though it was most important in nos. 2 and 5 (Table 3). *F. logani* was the most important live species in samples nos. 1, 14 and 15, while *L. castanea* was only important in the inter-tidal bay at Narssap Ilua (sample no. 5). The next four species accounted for 11.3% of the total live and 10.3% of the total death assemblage (Table 4). Of these taxa *Xestoleberis depressa* and *Semicytherura nigrescens* were relatively important in samples nos. 5 and 12 (Table 3). *Hemicythere emarginata* occurred mainly in sample no. 2, and *Semicytherura rudis* in sample no. 15. The remaining 12 species accounted for only 3.7% of the total live and 5.3% of the total death assemblage. Of these the myodocopid *Philomedes brenda* occurred only in sample no. 1, *Leptocythere lacertosa* only in sample no. 5, *Paradoxostoma arcticum* mainly in sample no. 12, and *Cytherura atra* mainly in sample no. 5

SAMPLE NO.	1	2	3	4	5	6	7	8	9	10,11	12	13,14	15
DATE	23/6	24/6	25/6	30/6	30/6	30/6	30/6	30/6	?	8/7	8/7	10/7	28/7
	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
DEPTH(m)	‰	‰	‰	‰	‰	‰	‰	‰	‰	‰	‰	‰	‰
0	7.8	-	4.6	-0.5	-	-	-	4.7	-	6.4	6.5	4.6	6.1
	24.6	-	20.3	22.0	-	-	-	27.2	-	23.9	22.2	12.6	27.0
1	7.0	6.3	2.7	0.0	-	-	-	-		4.1	4.2	3.3	5.8
	26.3	26.4	22.8	24.3	-	-	-	-		27.1	27.4	27.8	29.0
2	6.1	5.8	2.7	-		1.6	-	4.6		2.0	3.2	3.3	5.2
	28.8	27.2	26.2	-		31.8	-	27.7		28.4	28.6	27.9	31.3
3	5.8	4.6	2.4	-0.2		-	-	-		1.6	0.5	3.2	5.2
	30.0	29.3	26.8	26.2		-	-	-		28.4	28.6	27.9	31.3
4	4.6	4.4	1.8	-		1.4	-	4.4		1.4	0.2		4.5
	30.0	29.5	27.7	-		28.3	-	28.3		28.4	29.8		32.1
5	3.4	4.3	1.0	-		-	-	-		1.2	0.0		4.3
	30.0	29.6	28.8	-		-	-	-		28.5	29.8		32.5
6	3.2	4.0		-0.2		1.0	-	3.9		1.1	-0.3		3.6
	30.0	29.8		27.5		32.0	-	29.6		28.5	29.8		32.6
7	3.2	3.6		-		-	-	-		1.2	-0.4		3.6
	30.0	29.8		-		-	-	-		28.7	29.8		32.5
8	3.2			-0.3		0.9	-	3.4		1.3	-0.6		3.7
	30.0			28.5		32.0	-	31.0		28.6	29.6		32.4
9				-		-	-	3.3		2.0			3.7
				-		-	-	31.5		31.0			32.4
10				-0.3		0.8	-	2.0		2.2			3.8
				29.0		32.2	-	32.7		31.5			32.1
11				-0.2		-		-		2.0			4.6
				30.1		-		-		31.4			32.2
12				-		0.7		2.0					
				-		32.2		32.7					
13				0.0		-							
				30.4		-							
14				-		0.6							
				-		32.2							
15				0.0		-							
				30.4		-							
16						0.5							
						32.2							
⋮													
26						0.4							
						32.1							

Table 2. Physico-chemical data at the sampling localities. Temperature (°C) and Salinity (‰) data through the water column.

Live specimens accounted for 71.5% of the analysed material (Table 3). They were most abundant in sample no. 5 at Narssap Ilua (Fig. 2). The most important taxa in this intertidal embayment were *Hemicythere borealis* (47.1%) and *Leptocythere castanea* (44.8%), together with *Semicytherura nigrescens* (3.9%), *Xestoleberis depressa* (1.25%), and *Leptocythere lacertosa* (1.2%). Adults represented 25.6% of the total live fauna. This is considered to be an indigenous breeding population and there is no evidence to suggest sorting. The proportion of live adults of each taxon varied quite considerably. Particularly noticeable was the case of *Leptocythere castanea,* which had a large number of juveniles (10% adults: Fig. 3) present, whereas *Semicytherura nigrescens* was mainly represented by adults (63.5%). In addition, copulating pairs of *Hemicythere borealis* (35% adult) were present at the time of sampling (Plate 2, Fig. 4). These data are to some

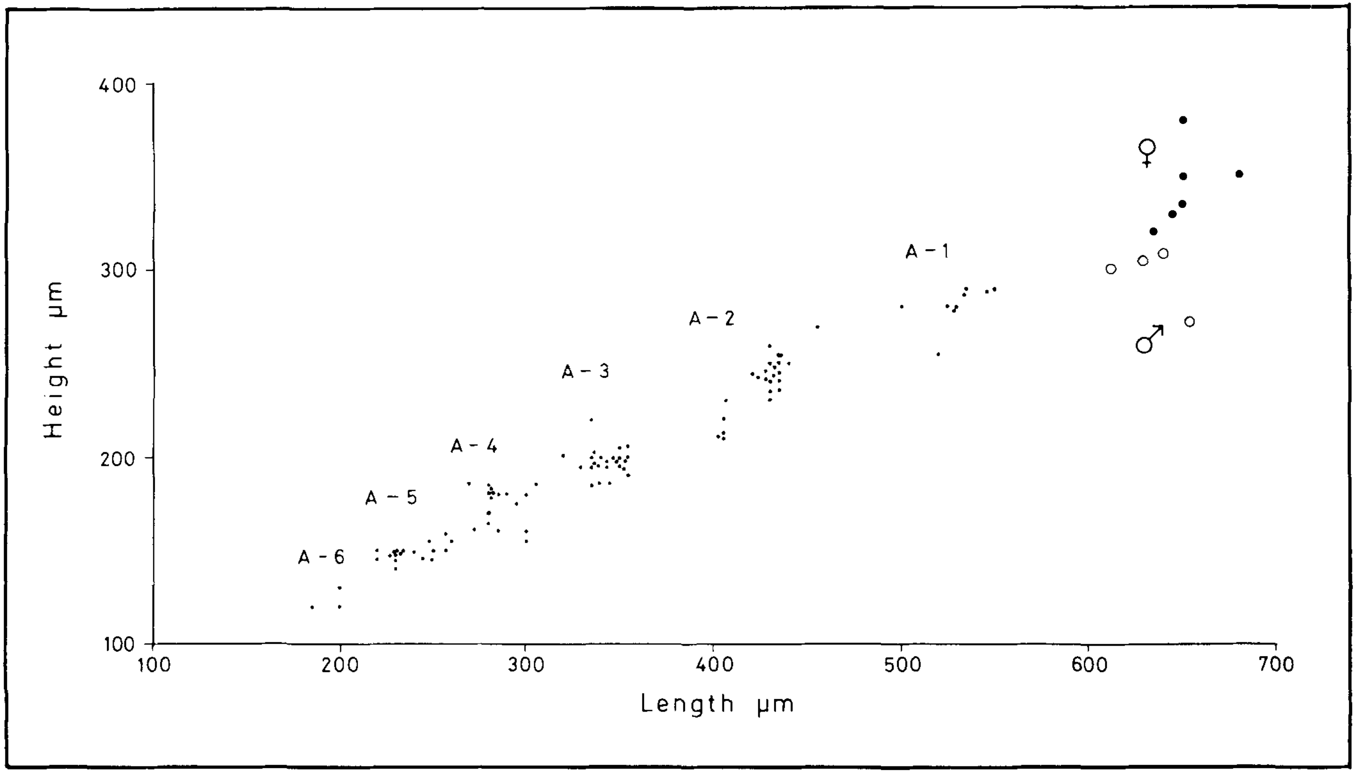


Fig. 3. Growth stages plotted from 105 live carapaces of *Leptocythere castanea* in sample no. 5 (Narssap Ilua).

extent a reflection of the particular breeding season for each species. Although the data presented here is the result of one-off sampling, and cannot be considered as providing information on the life-cycles of these species, some conclusions can be drawn from them which may have a bearing on our understanding of their population dynamics. Thus, *Hemicythere borealis* was clearly reproducing at the time of sampling, while the large numbers of adult *Semicytherura nigrescens* present could indicate that this species was approaching the end of its life-cycle. This species can produce as many as five generations a year in temperate climates depending on salinity (Hagerman, 1978). The data do not, however, provide any information on the length of each species' life-cycle.

Another aspect which was noted was the sex ratio. As a general rule a ratio of 1 male to 2 females can be anticipated for sexually reproducing taxa (Neale & Howe, 1975), though this may depend on habitat, the particular mating behaviour of the species, and seasonal fluctuations owing to a higher mortality amongst males (Kamiya, 1988). The results were much as expected for the three most abundant species in sample no. 5. *Semicytherura nigrescens* with 27.3% males showed the lowest ratio. *Leptocythere castanea* and *Hemicythere borealis* showed proportions of 40% and 45.7% respectively. These figures could be considered high, but in the case of *Hemicythere borealis* they were clearly effected by the presence of copulating pairs in the sample. The lower ratio for *S. nigrescens* could be related to its phytal habitat while males of benthic species have a better chance for survival because they inhabit a less rigorous environment (Kamiya, 1988).

The most important species in samples nos. 1 and 4 was *Finmarchinella logani*, which dominated the faunas at both stations (77% and 85% of the live faunas respectively). *Semicytherura rudis* (4% and 7%) and *Hemicythere borealis* (6% and 2%) were the only other species recorded live at both stations. Of interest was the presence of the myodocopid species *Philomedes brenda* in sample no. 1 and of the phytal *Paradoxostoma articum* in sample no. 4 (Table 3). *P. brenda* is the only species found in the present study which has previously been recorded in the Ikerssuak district (Stephensen 1917, and see Fig. 2). The large numbers of adult *Finmarchinella logani* present in sample no. 1 (54%) could indicate that this species was approaching the end of its life-cycle at the time of sampling, and may indeed have begun to reproduce (Fig 4.). Sample no. 4, which was collected a week later (Table 1), showed a decrease in the proportion of adult *F. logani*, while the smaller instar stages in particular showed an increase (Fig. 4). Following on from this it could be expected that the population age structure for *F. logani* in sample no. 15, which was collected over a month later, would show a further reduction in the proportion of live

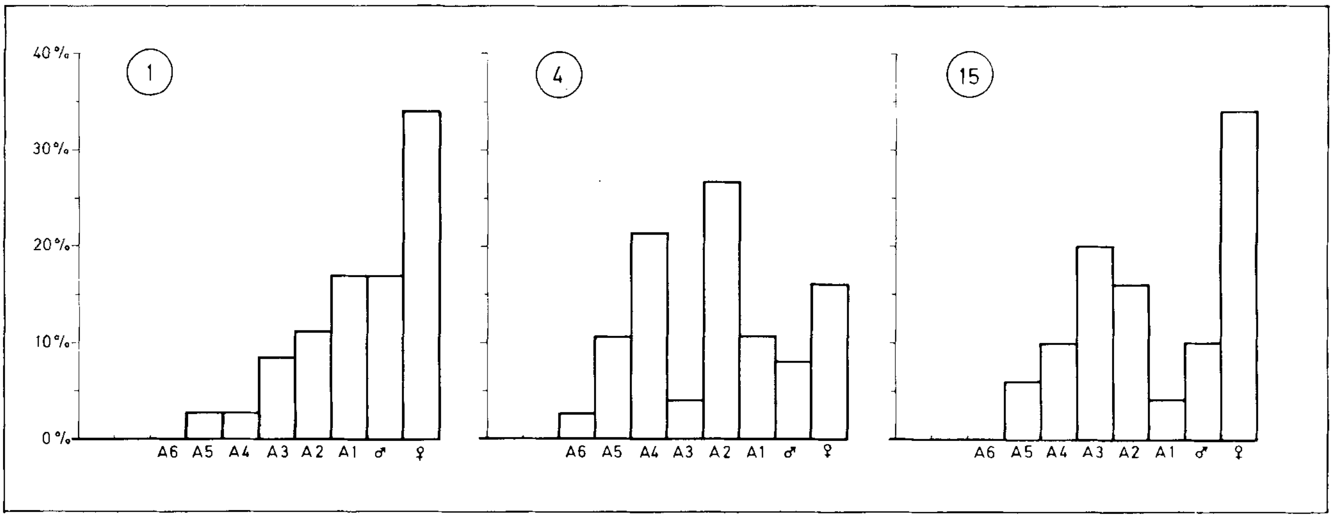


Fig. 4. Population age structure of *F. logani* from stations nos. 1 (collected 23/6/80), 4 (coll. 30/6/80), and 15 (coll. 28/7/80).

adults, if reproduction occurred simultaneously at the beginning of July. This was not the case, however, as live adults comprised 44% of the assemblage in this sample (Fig. 4). The picture is confused by the *ad hoc* nature of the sampling, and by the fact that these samples derive from different locations, but these data may indicate that *F. logani* does not reproduce at a specific time of the year, but over a period of unknown length. Furthermore, growth and reproduction may be dependant on favourable environmental conditions and the timing of the late summer-autumn peak in primary production in the district.

The sex ratio for *F. logani* was as would be expected for a sexually reproducing species. Sample no. 15 showed the lowest ratio (25%), while 33% of the adults were male in samples nos. 1 and 4.

Most of the live ostracods present in sample no. 2 were adults (80% of the live fauna). Of these *Hemicythere borealis* was the commonest species (47.4%), while *Xestoleberis depressa* (28.42%) and *Hemicythere emarginata* (19%) were also important. The absence of juveniles in this sample may have been caused by the relatively exposed location of the sampling station (Fig. 2), though other factors may also play a role. *Xestoleberis depressa,* for example, reproduces in midsummer in the western Baltic Sea, almost no juveniles being present before the end of July (Rosenfeld, 1979). The proportion of males in the sample was quite high for X. depressa (44%) and *H. borealis* (56.52%), while normal values were obtained for *H. emarginata* (35.7%)

Samples nos. 3, 6, 7 and 9 contained only very few live Ostracoda (Table 3). The sediment at these stations was very fine grained and bottom conditions may have been too soft to support a permanent live population. Moreover, stations nos. 6 and 7 were located close to a glacier lobe of the Greenland icecap, and the severe conditions prevailing in this ice-proximal environment (including iceberg scouring) may also have had a detrimental effect on the faunas.

Xestoleberis depressa was the commonest species present in sample no. 12 (32.3%). The next two species in order of abundance, *Semicytherura nigrescens* (18.3%) and *Paradoxostoma arcticum* (18.3%), are both phytal forms (e.g. Whatley, 1982), though neither the original sediment description of L. Grum, nor the appearance of the washed residues (Table 1) would suggest that algae or algal debris had been incorporated into the sample. Adult specimens of *X. depressa* (52.2%) were not quite as important in this sample as they were in sample no. 2, though the proportion of males (41.7%) was not significantly different.

Sample no. 15, which was located outside the Ikerssuak fiord-system, has been included in the present study as it was collected on the same expedition. *Finmarchinella logani* (48.9%) was the commonest species in this sample (see above). The next most important species was *Semicytherura rudis* (34.1%). These two forms accounted for over 80% of the total fauna in this sample, other taxa being represented by only a few specimens (Table 3)

LIVING vs. DEAD OSTRACOD POPULATIONS

A comparison of the proportions of live to dead specimens of each species was only undertaken on those samples where the total fauna exceeded 100 individuals (nos. 1, 2, 4, 5 and 15). The number of specimens present in the remaining samples was too low to allow a meaningful result to be extracted from the data. In addition, only a rough indication of

SPECIES		1	2	3	4	5	6	7	8	9	10	12	15	TOTAL
	Depth (m)	8	7	5	15	1	26	10	12	?	11.5	8	11	
	Temp (°C)	3.2	3.6	1.0	0.0	?	0.4	?	2.0	?	2.0	-0.6	4.6	
	Sal (°/oo)	30.0	29.8	28.8	30.4	?	32.1	?	32.1	?	31.4	29.6	32.2	
Cytheropteron nodosoalatum	Live	-	-	-	1	-	-	-	-	-	-	-	-	-1
	Dead	1	-	-	1	-	-	1	-	-	-	-	-	3
Cytherura atra	Live	-	-	-	-	13	-	-	-	-	-	1	-	14
	Dead	-	-	-	-	17	-	-	-	-	-	-	-	17
Finmarchinella (B) angulata	Live	-	-	-	-	7	-	-	-	1	-	-	2	10
	Dead	-	-	-	1	2	-	1	-	-	-	-	1	5
Finmarchinella (B) logani	Live	77	-	-	84	5	-	-	-	2	-	4	43	215
	Dead	156	2	-	65	3	-	-	-	-	-	-	46	272
Hemicythere borealis	Live	6	45	5	2	718	-	2	-	4	-	9	3	794
	Dead	21	10	-	3	318	-	1	-	1	-	2	2	358
Hemicythere emarginata	Live	5	18	-	-	1	-	-	-	-	-	2	5	31
	Dead	9	6	-	-	2	-	-	-	-	-	-	-	17
Leptocythere castanea	Live	-	-	1	-	683	-	3	-	1	-	2	1	691
	Dead	-	1	-	-	41	-	-	-	-	-	-	-	42
Leptocythere lacertosa	Live	-	-	-	-	18	-	-	-	-	-	-	-	18
	Dead	-	-	-	-	-	-	-	-	-	-	-	-	0
Paradoxostoma arcticum	Live	-	-	-	4	-	-	-	-	-	-	13	-	17
	Dead	-	-	-	1	-	-	2	-	-	-	1	-	4
Philomedes brenda	Live	3	-	-	-	-	-	-	-	-	-	-	-	3
	Dead	-	-	-	-	-	-	-	-	-	-	-	-	0
Robertsonites tuberculatus	Live	1	-	-	-	-	-	-	-	-	-	-	-	1
	Dead	2	-	-	-	-	-	-	-	-	-	-	1	3
Roundstonia globulifera	Live	-	-	-	-	-	-	-	-	-	-	-	-	0
	Dead	-	-	-	1	-	-	-	-	-	-	-	-	1
Sarsicytheridea punctillata	Live	-	-	-	-	-	-	-	-	-	-	-	1	1
	Dead	-	-	-	-	-	-	-	-	-	-	-	-	0
Sclerochilus sp. A.	Live	1	-	-	-	-	-	-	-	-	-	1	-	2
	Dead	-	1	-	-	-	-	3	-	-	-	-	-	4
Semicytherura concentrica	Live	-	-	-	1	-	1	-	-	-	-	-	-	2
	Dead	-	-	-	2	-	-	1	-	-	-	-	-	3
Semicytherura nigrescens	Live	2	4	-	-	59	-	-	-	-	-	13	1	79
	Dead	-	-	-	-	25	-	-	-	-	-	-	1	26
Semicytherura rudis	Live	4	-	-	7	-	-	-	-	-	-	-	30	41
	Dead	1	-	-	1	-	-	-	-	-	-	-	1	3
Semicytherura undata	Live	1	1	-	-	1	-	-	-	-	-	2	-	5
	Dead	-	1	-	1	-	-	-	-	-	-	-	-	2
Xestoleberis depressa	Live	-	27	2	-	19	-	-	-	2	-	23	2	75
	Dead	9	12	4	2	5	-	1	-	1	-	2	-	36
TOTAL	Live	100	95	8	99	1524	1	5	0	10	0	70	88	2000
	Dead	199	33	4	78	413	0	10	0	2	0	5	52	786
PERCENTAGE LIVE		33.4	74.2	66.7	55.9	78.7	100	33.3	0.0	83.3	0.0	93.3	62.9	71.5
NUMBER OF SPECIES	Live	9	5	3	6	10	1	2	0	5	0	10	9	18
	Dead	7	7	1	10	8	0	7	0	2	0	3	6	16

Table 3. Distribution of ostracod species in samples taken in the Ikerssuak (Bredefjord) district, Southwest Greenland.

within-sample variance could be extracted from those samples where the total fauna exceeded 100, as in only three of them (nos. 1, 4 and 5) did the numbers of either live or dead individuals exceed 100.

Little difference was discernible between the live and dead components of samples 1, 2 and 4 (Table 3), and there is, therefore, nothing to suggest that the death assemblages did not derive from the living faunas at these three stations. Greater disparity was seen between the live and dead components of samples 5 and 15, but there was no significant input of allochthonous taxa at either of these stations. These results were primarily effected by the relative importance of certain live species at each respective site. Only relatively few dead specimens of *Leptocythere castanea* were present in sample no. 5 (9.9%), whereas this species was a much more important element of the live population (44.8%). The reason for this may be related to the fact that the bulk of the population of *L. castanea* had not reached sexual maturity at the time of sampling, as indeed is indicated by the age structure of the live population (Fig. 3).

Finmarchinella logani was a much more important element of the death assemblage of sample no. 15 than of its live fauna. Indeed, this death assemblage was much more akin to the total (live or dead) faunas of samples nos. 1 and 4 than it was to its constituent live assemblage. It is difficult to see the reason for this discrepancy given the low numbers of both live and dead specimens present in this sample.

SYSTEMATIC COMMENTS

Subclass Ostracoda Latreille, 1806
Order Myodocopida Sars, 1866
Suborder Myodocopina Sars, 1866
Superfamily Cypridinacea Baird, 1850
Family Cypridinidae Baird, 1850
Subfamily Philomedinae G. W. Müller, 1912
Genus *Philomedes* Liljeborg, 1853
Philomedes brenda (Baird, 1850)

Distribution. This is a circumpolar species which is widespread in the Arctic and Subarctic (Kornicker, 1982). It has been recorded as far south as the British Isles and the northern North Sea in the eastern Atlantic and Nova Scotia in the western Atlantic.
Ecology. *P. brenda* has previously been recorded from depths of 3–300 m in Arctic waters, where it may be confined to the shelf and upper slope (Elofson, 1941). The Ikerssuak records (Stephensen, 1917 and herein) are from gravel with a little clay (No. 127, 10–15 m: Stephensen, 1917; see Fig. 2), sandy silt with algal debris (No. 1, 8 m, 30.0‰, +3.2°C; Fig. 2), and from a ringtrawl at 700 m depth (No. 128: Stephensen, 1917; see Fig. 2). The latter was collected from deep water of Atlantic origin with temperatures of over 3°C and a salinity greater than 34‰. The record of Stephensen (1936) from the Smith Sound, and most of those given by Kornicker (1982) from Greenlandic waters are of little value, as depth and locality were often not recorded.

Order Podocopida G. W. Müller, 1894
Suborder Podocopina G. W. Müller, 1894
Superfamily Cytheracea Baird, 1850
Family Leptocytheridae Hanai, 1957
Genus *Leptocythere* Sars, 1928

Leptocythere castanea (Sars, 1866)
(Pl. 1, Figs. 1–5)

Distribution. Published records of *L. castanea* from Europe range from North Norway to the Bay of Biscay. I have found this species in the Mondego Estuary, Portugal (Lat. 40°09'N., Long. 08°49'W: Aarhus collection). The species has also been recorded from Iceland (Brady & Norman, 1889; Stephensen, 1938), though Stephensen was not sure of the identity of the specimen he found in Isafjördur.
Ecology. This is an extremely eurythermal (0° to >+22°C) and euryhaline (>2–3‰) species, which is commonly found in abundance in lagoons and estuaries (Elofson, 1941). This was the second most important species after *Hemicythere borealis* in sample no. 5 (Narssap Ilua: Fig. 2). As sampling occurred here during the ebb tide, the station was probably exposed at low tide. It was also recorded down to 16 m, at salinities of 28.8–32.2‰ and bottom water temperatures of −0.6°C to +4.6°C. These observations show that *L. castanea*, while thriving best in cold-temperate, brackish waters, can survive both lower temperatures and greater salinities than have hitherto been realised.

Leptocythere lacertosa (Hirschmann, 1912)
(Pl. 1, Figs. 6, 7)

Distribution. This is a widespread species along the coasts of northwest Europe from the Portuguese coast (Mondego Estuary, Lat. 40°09'N., Long. 08°49'W: Aarhus collection) to The White Sea (Rudjakov, 1962). The present record is the first for this species from Greenland and represents a very considerable extension both westwards and northwards in its known range.
Ecology. *L. lacertosa* is a euryhaline species which is commonly found on sandy and muddy substrates in Northwest European estuaries and lagoons (e.g. Elofson, 1941; Rosenfeld, 1977). It has been recorded at 1 m depth on coarse sand in sample no. 5 (Narssap Ilua) in the present study. This record suggests that it may be a much more eurythermal species than has hitherto been realised.

SPECIES NAME	No. LIVE	% LIVE	No. DEAD	% DEAD
Cytheropteron nodosoalatum	1	-	3	0.38
Cytherura atra	14	0.70	17	2.14
Finmarchinella (B) angulata	10	0.50	5	0.62
Finmarchinella (B) logani	215	10.75	272	34.17
Hemicythere borealis	794	39.70	358	44.97
Hemicythere emarginata	31	1.55	17	2.14
Leptocythere castanea	691	34.55	42	5.28
Leptocythere lacertosa	18	0.90	0	-
Paradoxostoma arcticum	17	0.85	4	0.50
Philomedes brenda	3	-	0	-
Robertsonites tuberculatus	1	-	3	0.38
Roundstonia globulifera	0	-	1	-
Sarsicytheridea punctillata	1	-	0	-
Sclerochilus sp. A.	2	-	4	0.50
Semicytherura concentrica	2	-	3	0.38
Semicytherura nigrescens	79	3.95	26	3.27
Semicytherura rudis	41	2.05	3	0.38
Semicytherura undata	5	0.25	2	-
Xestoleberis depressa	75	3.75	36	4.52
TOTAL	2000	100.0	796	100.0

Table 4. Total numbers of Ostracoda from the Ikerssuak (Bredefjord) district.

Family Cytherideidae Sars, 1928
Genus *Sarsicytheridea* Athersuch, 1982

Sarsicytheridea punctillata (Brady, 1865)

Family Hemicytheridae Puri, 1953
Genus *Hemicythere* Sars, 1928
Hemicythere borealis (Brady, 1868)
(Pl. 1, Fig. 12; Pl. 2, Figs. 1–5)

Comment. According to Whatley (1982) *H. borealis* was first recorded by Brady (1868) from Iceland. The original description of Brady, however, gives the type locality as "6 feet below the low-water mark, at Lat. 67°17′N., Long. 62°21′W., in the Davis Strait, between southwest Greenland and eastern Baffin Island". Moreover, Hazel's (1970: pl. 46) distribution chart for this species includes no Icelandic record.

Distribution. *Hemicythere borealis* is a widespread inner neritic species in West Greenland from Dobbs Bay (79°35′N) in the North to Ikerssuak in the south (herein). It has also been recorded along the northeast coast of North America from Baffin Bay to the Gulf of Maine (Hazel, 1967; 1970) and Arctic Canada (Briggs, 1985; Cronin, pers. comm.). It is absent from East Greenland (Aarhus collection) and does not occur in the Beaufort Sea (Brouwers, 1982). Ignoring Brady and Robertson's (1872) dubious record from Northeast England, *Hemicythere borealis* is, thus, even more restricted geographically than suggested by Neale & Howe (1975), who used it to delimit the western part of their Arctic Province.

Ecology. Most records of *H. borealis* are from sandy substrates from 3–180 m depth, though the species has also been found on algae (Whatley, 1982). The present material was recovered from fine sand, gravelly sand, and silty sand at depths of 1–16 m. Salinity ranged from 28.8–32.2‰ and water temperature from −0.6°C to +4.6°C, where these parameters were measured. Thirty copulating pairs were captured in sample no. 5 on 30th June 1980 (Fig. 2).

Hemicythere emarginata (Sars, 1866).
(Pl. 2, Figs. 6, 7)

Comment. According to Horne & Whittaker (1983), this species should be retained in *Hemicythere* as it possesses only two frontal muscle scars as opposed to three in *Baffinicythere*.

Distribution. This is a widespread amphiatlantic species, which, although occurring further south, reaches its maximum abundance in the Arctic (Neale & Howe, 1975). As well as recording it from Ikerssuak, I have also found it at two localities in East Greenland (Kulsuk, 65°35′N, 37°11′W, 30 m; and Geologfjord-Nordfjord, approx. 73°40′N, 24°40′W, 2.5–35 m), and can confirm its presence in Spitzbergen (Klie, 1942).

Ecology. *H. emarginata* would appear to be associated mainly with substrates of coarse gravel and shell (Elofson, 1941), but it has also been found on algae (Hawley MS, 1980). The specimens found in the present study were from sandy and gravelly substrates. Salinity ranged from 29.9–32.2‰ where this was measured, and water temperature from −0.6° to +4.6°C.

Genus *Finmarchinella* Swain, 1963
Subgenus *Barentsovia* Neale, 1974

Finmarchinella (Barentsovia) angulata (Sars, 1866)
(Pl. 1, Fig. 8)

Distribution. The southerly limit of distribution of *F. angulata* in Europe is probably North Britain (Neale 1974). This is an abundant species in Scandinavian waters and in the Arctic (e.g. Elofson, 1941; Rosenfeld, 1977). It has previously been recorded from the Davis Strait (Neale & Howe, 1975), Sisimiut (Brady & Norman 1889; Whatley, 1982), and Ameralik (Hawley MS, 1980) in West Greenland, and I have obtained live specimens from Kulsuk, 65°35′N, 37°11′W (30 m) and the entrance to Geologfjord, 73°31′N, 24°40′W (8 m) in East Greenland.

Ecology. Elofson (1941) considered *F. angulata* to be a phytal species common in the Laminarian zone. He gave a temperature range of −2°C to +18° or +20°C, and a salinity range from normal marine to 18‰. Rosenfeld (1977) reported it down to 14‰ in the western Baltic. Live records from East Greenland (see above) are from coarse sediments at depths of 8–30 m. The Irkerssuak material is from gravelly and sandy substrates at 1–11 m depth.

Finmarchinella (Barentsovia) logani (Brady & Crosskey, 1871)
(Pl. 1, Figs. 9–11)

Comment. *Finmarchinella (Barentsovia) curvicostata* Neale (1974), an Arctic species described from West Greenland, is a junior synonym of *Cythere logani* Brady & Crosskey (Cronin, 1981).

Distribution. Neale & Howe (1975) used this species as an indicator of their Arctic Province, and our present knowledge of its distribution confirms this. Most records are from Greenlandic waters, including Sisimiut, Qeqertarsuaq (Godhavn), Hunde Ejland (Neale, 1974), and Ameralik (Hawley MS, 1980). I have found live specimens at the following localities in East Greenland: Kulsuk, 65°35′N, 37′11′W (30 m); Geologfjord-Nordfjord, approx. 73°40′N, 24°40′W (2.5–11.5 m), and have obtained dead specimens at Kap Stosch, 74°04′N, 21°45′W (28 m) and Clavering Island, 74°22′N, 21°55′W (30 m). Two surface samples from Spitzbergen housed in the Aarhus collection (Sarsbukta, 78°40′N, 11°40′E (7 m) and Wijdefjorden, 79°14′N, 15°40′E (8 m) also contained dead specimens of this species.

Ecology. Very little is known about the ecology of this species. The East Greenland records given above are from a variety of sediments, though the species may prefer sandy substrates. It was most abundant in Ikerssuak at stations nos. 1 (8 m), 4 (15 m), and 15 (11 m: see Table 3). The sediment at each of these stations was a fine silty sand with abundant shell and algal debris (Table 1). Salinity ranged from 30–32.2‰ and temperature from 0.0° to +4.6°C.

Familty Trachyleberidae Sylvester-Bradley, 1948
Genus *Robertsonites* Swain, 1963
Robertsonites tuberculatus (Sars, 1866)

Family Loxoconchidae Sars, 1866
Genus *Roundstonia* Neale, 1973

Roundstonia globulifera (Brady, 1868)

Family Cytheruridae G. W. Müller, 1894
Genus *Cytherura* Sars, 1866

Cytherura atra Sars, 1866
(Pl. 2, Figs. 9, 10)

Distribution. Originally described from the Lofoten Islands (Sars, 1866; 1928), *Cytherura atra* has also been recorded in the Baltic Sea (e.g. Rosenfeld, 1977), and from Heligoland (Klie, 1929) and the Shetland Islands (Sars, 1928). Further records from Danish waters include Aarhus Bay and the Limfjord (Aarhus collection). The specimen referred by Neale & Howe (1975: pl. 5, Fig. 6) to *Semicytherura* sp. nov. is a male of *C. atra* (cf. Pl. 2, Fig. 10). *C. atra* is now known from three localities in West Sisimiut (Whatley, 1982), and herein. I have also found live specimens at the entrance to Geologfjord, East Greenland, 73°31'N, 24°40'W (8 m), and dead specimens in Wijdefjorden, Spitzbergen, 79°14'N, 15°40'E (8 m).

Ecology. The majority of records are from sandy substrates at shallow depths although Whatley (1982) found it on algae. The Ikerssuak material was from sandy and gravelly substrates with algal debris at depths of 1–15 m. Salinity ranged from 29.6–30.9‰, where this was recorded, and bottom water temperature from −0.6° to +3.6°C. Most of the live specimens, however, were found in Narssap Ilua at 1 m depth, thus suggesting that *C. atra* can withstand a considerable reduction in salinity for longer periods of time.

Genus *Cytheropteron* Sars, 1866
Cytheropteron nodosoalatum Neale & Howe, 1973

Distribution. *Cytheropteron nodosoalatum* has previously been confused with both *C. latissimum* (Norman) and *C. pyramidale* Brady, and reliable records are limited to the Arctic (Whatley & Masson, 1979). I have obtained live specimens of this species at Kulsuk, 65°35'N, 37°11'W (30 m) and Geologfjord-Nordfjord, 73°40'N, 24°40'W (8–11.5 m) in East Greenland, and from Ikerssuak (herein). Dead specimens have been obtained from Kap Stosch, 74°04'N, 21°45'W (28 m), Myggbukta, 73°26'N, 21°28'W (10 m), and Scoresby Sund, 70°28'N, 21°59'W (25 m) in East Greenland, and at Trygghamma, 78°15'N, 13°40'W (18 m) and Wijdefjorden, 79°14'N, 15°40'W (8 m) from Spitzbergen (Aarhus Collection).

Ecology. This species is probably confined to the Arctic where it has been recorded from 3.4–200 m depth. Live records are, however, restricted to 8–30 m, from coarse substrates with salinities over 30‰. The single live specimen in sample no. 4 from Ikerssuak was from gravelly sand at 15 m depth. Salinity was 30.9‰ and bottom water temperature 0.0°C.

Genus *Semicytherura* Wagner, 1857
Semicytherura concentrica (Brady, Crosskey & Robertson 1875)
(Pl. 2, Fig. 8)

Explanation of Plate 1.

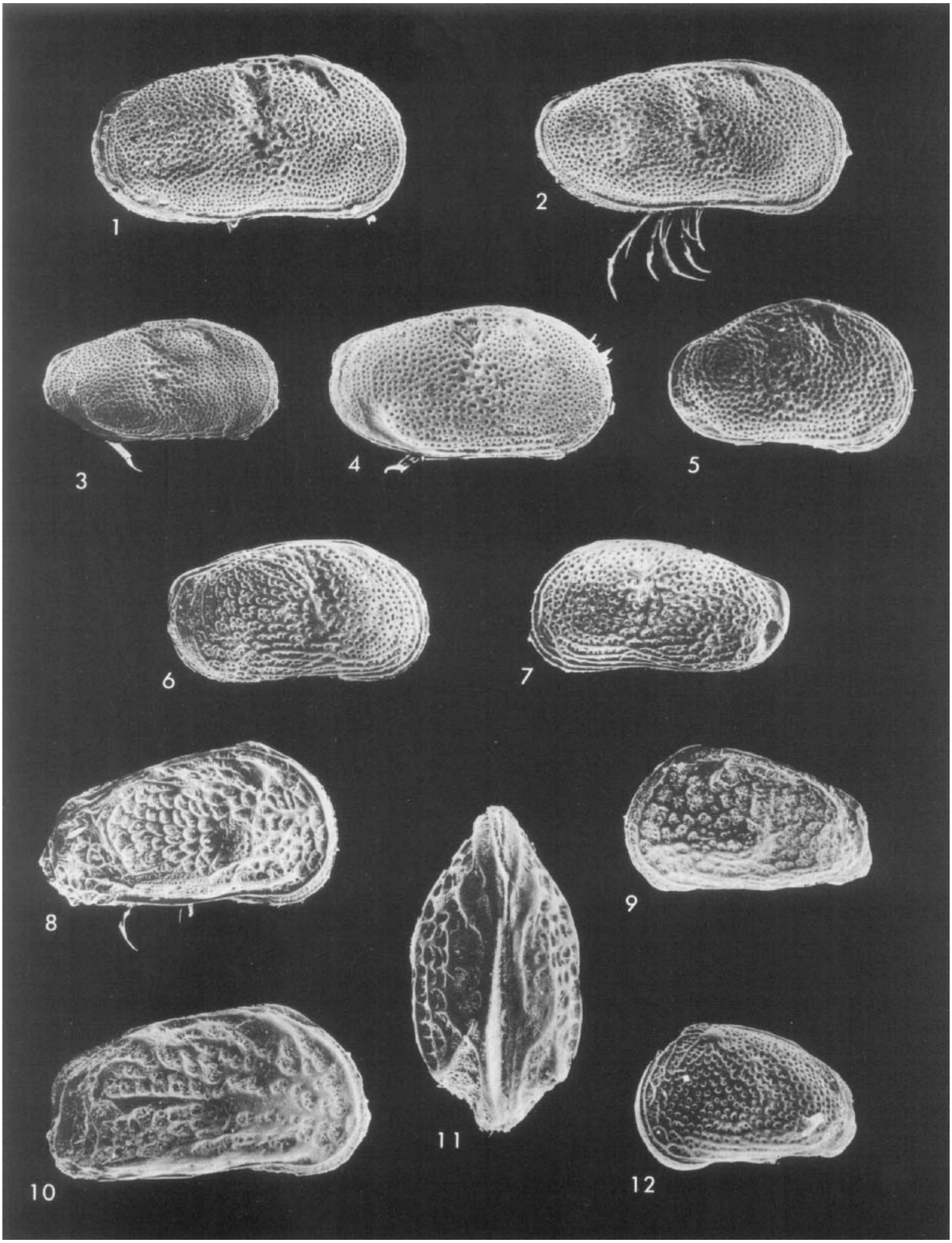
Figs. 1–5. *Leptocythere castanea* (Sars). Fig. 1, right view of female, sample no. 5, DNP-1987.s7.1 (x80); Fig. 2, right view of male, sample no. 5, DNP-1987.s7.2 (x80); Fig. 3, right view of juvenile (A-2), sample no. 5, DNP-1987.s7.3 (x84); Fig. 4, right view of juvenile (A-1), sample no. 5, DNP-1987.s7.8 (x85); Fig. 5, right view of juvenile (A-4), sample no. 5, DNP-1987.s7.7 (x143).

Figs. 6, 7. *Leptocythere lacertosa* (Hirschmann) (x85) Fig. 6, right view of juvenile, sample no. 5, DNP-1987.s7.4; Fig. 7, left view of male, sample no. 5, DNP-1987.s7.5 (x85).

Fig. 8. *Finmarchinella (Barentsovia) anqulata* (Sars). right view of male, sample no. 5, DNP-1987.s7.9 (x70).

Figs. 9–11. *Finmarchinella (Barentsovia) logani* (Brady & Crosskey). Fig. 9, left view of juvenile (A-2), sample no. 1, DNP-1987.s6.5 (x83); Fig. 10, right view of female, sample no. 1, DNP-1987.s6.4 (x65); Fig. 11, dorsal view of female, sample no. 1, DNP-1987.s6.3 (x65).

Fig. 12. *Hemicythere borealis* (Brady). left valve of juvenile (A-5), sample no. 5, DNP-1987.s6.14 (x120).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Distribution. Reliable records of this species are restricted to Greenland, Spitzbergen, the Gulf of St. Lawrence, and probably Norway. Neale & Howe (1975) recorded it from Russian Harbour (Novaya Zemlya). More southerly records are probably incorrect, as the species has been confused in the past with juveniles of *Hemicytherura cellulosa* (Norman) (Whittaker, 1973). I have also found this species in the Nordfjord-Geologfjord district of East Greenland (approx. 73°40′N, 24°40′W) from 6–11.5 m depth.
Ecology. Ignoring dubious southerly records this species can be considered a true arctic form, preferring shallow sublittoral conditions and a muddy substrate.

Semicytherura nigrescens (Baird, 1838)
(Pl. 2, Figs. 11, 12)

Distribution. This is a widespread species in Western Europe, ranging from the White Sea (Rudjakov, 1962) to the Bay of Biscay (e.g. Yassini, 1969). It has also been found at Ameralik (Hawley, MS 1980), Sisimiut (Whatley, 1982) and Ikerssuak (herein) in West Greenland.
Ecology. Elofson (1941) suggested a temperature range of 0° to +22°C and a salinity range down to <3‰ for this extremely eurythermal and euryhaline species. It is abundant in areas of algal growth, and Hagerman (1966) recorded it to be particularly associated with *Fucus serratus*. Hawley (MS, 1980) found live specimens in both sediment and algal samples, and Whatley (1982) obtained it mainly from *Cladophora* close to the low water spring tide level. The present material was from a variety of substrates with algal debris. It was particularly abundant in Narssap Ilua (station no. 5, Fig. 2), where it occurred in association with *Hemicythere borealis, Leptocythere castanea, L. lacertosa, Cytherura atra,* and *Xestoleberis depressa.*

Semicytherura rudis (Brady, 1868)
(Pl. 3, Figs. 1–6)

Comment. The specimens illustrated in Plate 3 are very similar to, if not the same as *Cytherura* sp.B from the Holocene of the Beaufort Sea (McDougall *et al,* 1986), and *Semicytherura* sp.A from the Postglacial of East Goldthwait Sea (Cronin, 1988). The only apparent difference between the present material and the description of *S. rudis* given by Brady & Norman (1889) is in the surface ornamentation. These authors did, however, acknowledge that there was some degree of intraspecific variation within this species.
Distribution. *Semicytherura rudis* is widely known from Greenlandic waters, and has also been recorded from Spitzbergen and the Canadian Arctic (e.g. Hazel, 1970; Neale & Howe, 1975). I have obtained live specimens of the species from Geologfjord-Nordfjord, approx. 73°40′N, 24°40′W (8–10 m) and Kulsuk, 65°35′N, 37°11′W (30 m) in East Greenland, and dead specimens at Kap Stosch, 74°04′N, 21°45′W (28 m) and Wijnefjorden, Spitzbergen, 79°14′N, 15°40′E (8 m).
Ecology. This is a true Arctic, shallow water species. Brouwers (in McDougall *et al,* 1986) associated it with a group of taxa belonging to a deeper inner neritic facies with a fairly stable environment. None of the other species of this group occur in the Ikerssuak district. Here it was found on sandy silt and sand from 8–15 m depth, with salinities of 30–32.4‰ and temperatures of 0°C to +4.6°C.

Semicytherura undata (Sars, 1866)
(Pl. 3, Fig. 7)

Distribution. This species has a wide latitudinal range in both the eastern and western Atlantic and it has been recorded as far north as Spitzbergen and Ellesmere

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Explanation of Plate 2

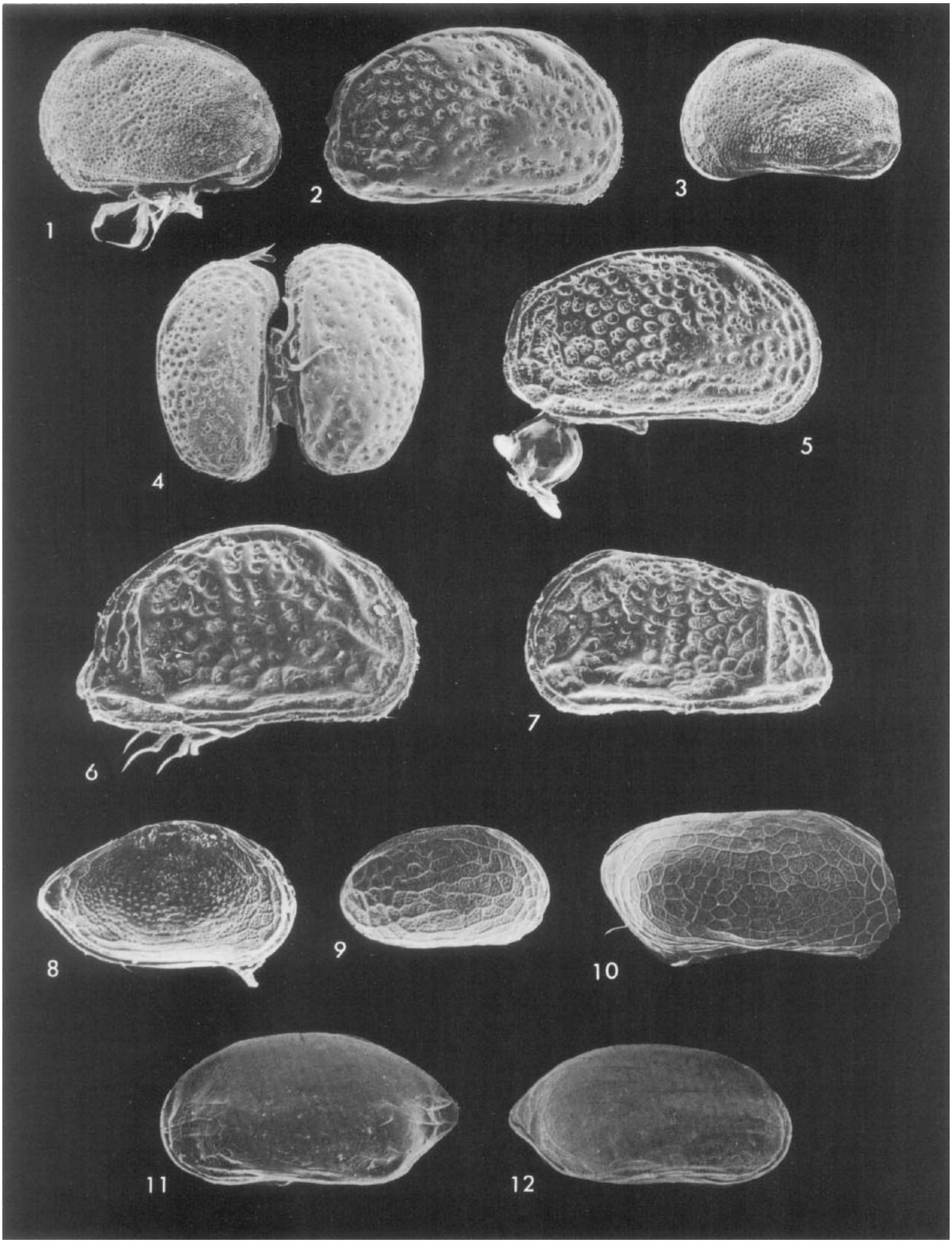
Figs. 1–5. *Hemicythere borealis* (Brady). Fig. 1, left view of juvenile (A-1), sample no. 5, DNP-1987.s6.15 (x65); Fig. 2, right view of female, sample no. 5, DNP-1987.s6.11 (x60); Fig. 3, left view of juvenile (A-2), sample no. 5, DNP-1987.s6.13 (x68); Fig. 4, copulating pair (right view of male, left view of female), sample no. 5, DNP-1987.s6.10 (x47); Fig. 5, right view of male, sample no. 5, DNP-1987.s6.12 (x65).

Figs. 6, 7. *Hemicythere emarginata* (Sars) (X65). Fig. 6, right view of female, sample no. 2, DNP-1987.s6.1; Fig. 7, (x65), left view of male, sample no. 2, DNP-1987.s6.2 (x65).

Fig. 8. *Semicytherura concentrica* (Brady, Crosskey & Robertson). right view of juvenile, sample no. 6, DNP-1987.s7.15 (x110).

Figs. 9, 10. *Cytherura atra* Sars. Fig. 9, right view of juvenile, sample no. 5, DNP-1987.s10.5 (x182); Fig. 10, right view of male, sample no. 5, DNP-1987.s10.4 (x100).

Figs. 11, 12. *Semicytherura nigrescens* (Baird) Fig. 11, left view of female, sample no. 5, DNP-1987.s6.17, (x108); Fig. 12, right view of male, sample no. 5, DNP-1987.s10.4 (x108).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Island (e.g. Elofson, 1941; Hazel, 1970). I have also obtained live specimens at two localities from East Greenland: Kulsuk, 65°35′N, 37°11′W (30 m) and at the entrance to Geologfjord, 73°31′N, 24°40′W (2.5–8 m), and dead specimens from Wijnefjorden, Spitzbergen, 79°14′N, 15°40′E (8 m).

Ecology. Elofson (1941) considered *S. undata* to be an extremely eurythermal (−2° to +22°C) and euryhaline (>10‰) circumpolar species. Sars (1928) noted that it occurred almost exclusively in the Laminarian zone on sandy substrates, though sediment type may not influence its distribution directly. The present material was obtained from a variety of substrates with abundant algal debris. Depth ranged from 1–8 m, salinity from 29.6–30‰, and temperature from −0.6° to +3.6°C.

Family Paradoxostomatidae Brady & Norman, 1889
Subfamily Paradoxostomatinae Brady & Norman, 1889
Genus *Paradoxostoma* Fischer, 1855
Paradoxostoma arcticum Elofson, 1941
(Pl. 3, Fig. 8)

Distribution. This species is restricted to the Arctic. It was described from East Greenland (Elofson, 1941) and has subsequently been recorded from Hunde Ejland (Neale & Howe, 1975), Sisimiut (Neale & Howe, 1975; Whatley, 1982) and Ameralik (Hawley MS, 1980) in West Greenland. I have obtained dead specimens of this species in Geologfjord-Nordfjord, East Greenland, approx. 73°40′N, 24°40′W. Neale & Howe used *P. arcticum* as an indicator of their Arctic Province.

Ecology. This is probably a phytal species as both Hawley (MS, 1980) and Whatley (1982) consistantly recorded it as being more abundant in algal samples. The present material was also from samples containing abundant algal debris at 8–15 m depth. Salinity at these stations (Tables 2 & 3) ranged from 29.6–30.4‰ and temperature from −0.6° to 0.0°C.

Genus *Sclerochilus* Sars, 1865
Sclerochilus sp. A.
(Figure 5, A–B)

Comment. The Ikerssuak material is very close to *Sclerochilus contortus sensu* Whatley (1982) (*non* (Norman)), but it differs from the true *S. contortus* in its outline and it possesses a narrower fused zone. The species is close to *S. gewemuelleri* Dubowsky, but is less elongate. *S. rudjakovi* Athersuch & Horne is also more elongate.

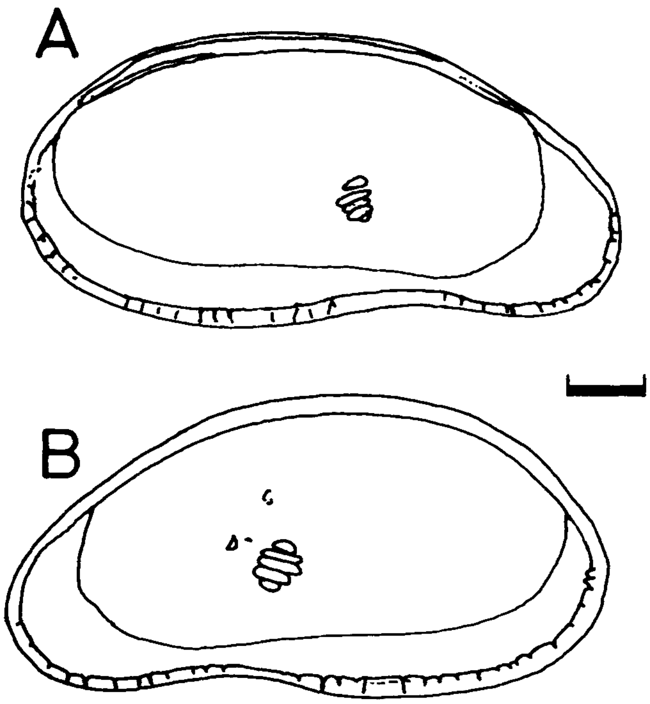


Fig. 5. *Sclerochilus* sp. A. (sample no. 1); A: female, right valve, B: female, left valve (Drawings by D. J. Horne), scale bar = 100 μm.

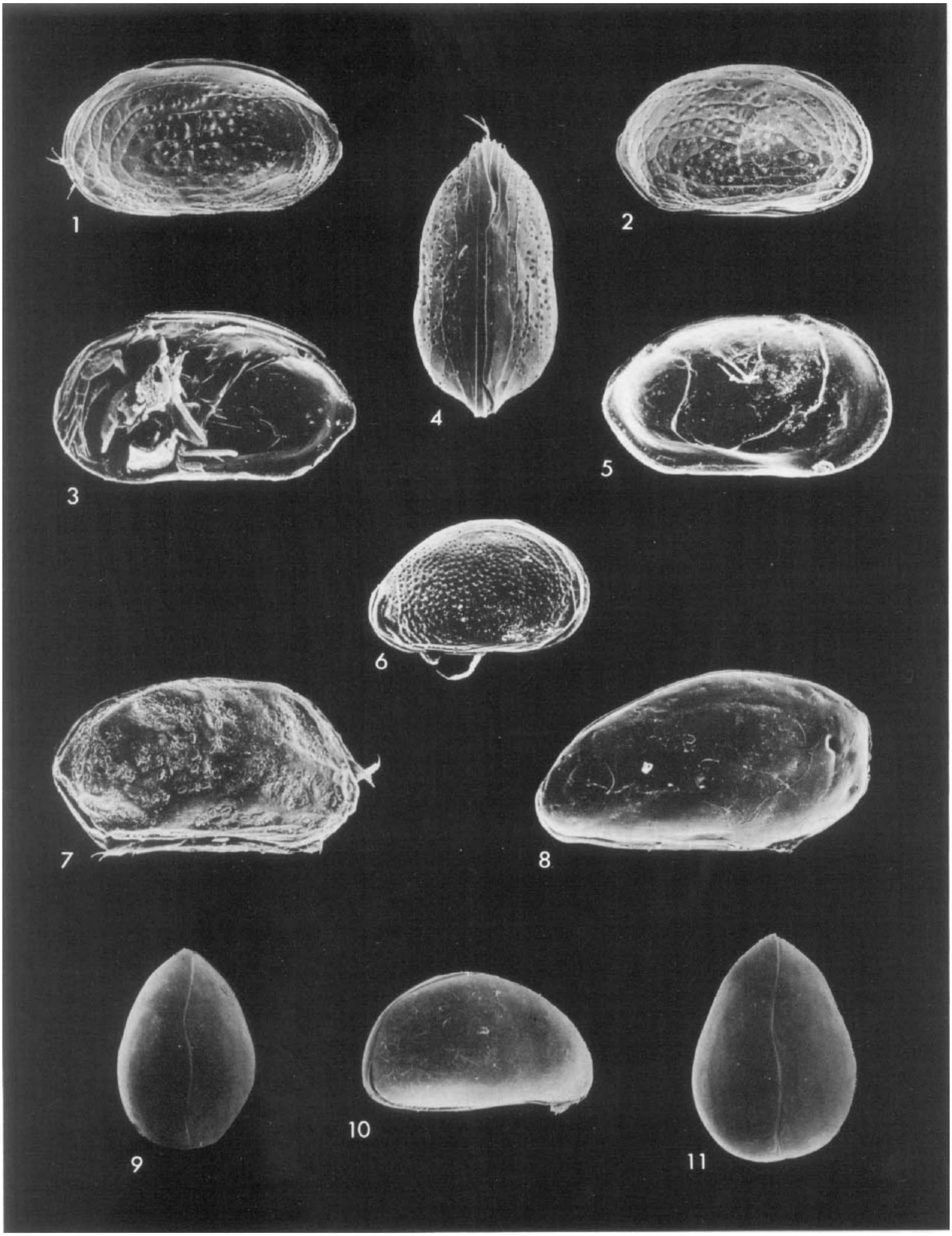
Explanation of Plate 3

Figs. 1–6. *Semicytherura rudis* (Brady). Fig. 1, right view of male, sample no. 4, DNP-1987.s6.9 (x92); Fig. 2, left view of female, sample no. 4, DNP-1987.s6.8 (x85); Fig. 3, internal lateral view of right valve of female, sample no. 1, DNP-1987.s10.2 (x102); Fig. 4, dorsal view of female, sample no. 15, DNP-1987.s8.2 (x98); Fig. 5, internal lateral view of left valve of female, sample no. 1, DNP-1987.s10.1 (x100); Fig. 6, right view of juvenile, sample no. 15, DNP-1987.s.8.4 (x130).

Fig. 7. *Semicytherura undata* (Sars) right view of female, sample no. 2 DNP-1987.s7.16 (x102).

Fig. 8. *Paradoxostoma arcticum* Elofson. right valve of female, sample no. 12, DNP-1987.s7.16 (x70).

Figs. 9–11. *Xestoleberis depressa* (Sars). Fig. 9, dorsal view of male, sample no. 2, DNP-1987.s7.11 (x65); Fig. 10, right view of male, sample no. 2, DNP-1987.s7.12 (x70); Fig. 11, dorsal view of female, sample no. 5, DNP-1987.s7.10 (x62).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Distribution. *Sclerochilus* sp. A. is so far only known from Sisimiut (Whatley, 1982), Ameralik (Hawley, MS, 1980), and Ikerssuak (herein) from West Greenland. Other records of *S. contortus* from the Arctic may also belong here.

Ecology. Whatley's (1982) specimens were mainly from algae. The two live specimens in the present study was obtained from sand at 8 m depth. Salinity was 29.6–30‰ and bottom water temperature −0.6° to +3.2°C.

Family Xestoleberididae Sars. 1928
Genus *Xestoleberis* Sars, 1866
Xestoleberis depressa Sars, 1866
(Pl. 3, Figs. 9–11)

Distribution. This is an Arctic species, though it extends southwards on both sides of the Atlantic (see Whatley, 1982). Previous records from Greenland extend from the Thule district (Hazel, 1970; Cronin, pers. comm.) to Ameralik (Hawley MS, 1980) and Lille Pendulum, 74°35′N, 18°23′W, from East Greenland (Elofson, 1941). I have obtained live specimens at Kulsuk, 65°35′N, 37°11′W (30 m) and the entrance to Geologfjord, 73°31′N, 24°40′W (8 m), and can confirm its presence in Spitzbergen (Müller, 1931).

Ecology. According to Elofson (1941) and Whatley (1982), this is a phytal species. The present material was exclusively from sediment, though it was more abundant in samples containing algal debris. It occurred at depths of 1–11 m, with salinities of 28.8–32.2‰, and bottom water temperatures of −0.6° to +4.6°C. Elofson (1941) considered *X. depressa* to be a eurythermal species (−2° to +22°C), and also regarded it as slightly euryhaline. The present results confirm his conclusions.

DISCUSSION

Although relatively low numbers of Ostracoda were collected in the present study, the fact that 19 species were represented is, for the Arctic, a reasonably high level of diversity. The number of species per sample was, however, considerably lower, ranging from one to eleven (Table 3). Previous studies from inshore areas in West Greenland have never yielded greater than 10 to 20 species. Whatley (1982), for example, found 18 species in his study of shallow water ostracods at Sisimiut (Holsteinborg), but the number of species per sample was much lower, ranging between one and seven. Hawley (MS, 1980) recorded only nine species from Ameralik (Lysefiord), though reduced salinity at his sampling localities could account for the reduced diversity of his fauna. All nine of the species found by Hawley (MS, 1980) and eight of those recorded by Whatley (1982) are also present at Ikerssuak. Caution should be exercised when comparing the Sisimiut and Ameralik faunas with those present at Ikerssuak, as both of these authors included samples of algae, while the material of the present study was confined to sediment samples. Whatley's (1982: p. 269) sediment samples were all of fine-coarse sand and it is interesting to note the sparseness of the faunas, despite the large size of his samples.

Neale and Howe (1975) recorded 14 species in a sample obtained from Sisimiut Harbour at 10 fathoms (18.2 m). Of these 10 were also present at Ikerssuak, but there is no guarantee that Neale and Howe's material represented a full fauna (cf. Neale & Howe, 1975: p. 386). Other West Greenland records are from deeper water and more exposed localities and contain only very few of the species found in the present study.

The majority of ostracod species recorded in this investigation are amphiatlantic forms, and include characteristic representatives of the Arctic Province, as well as species that are also known from warmer waters. The former include *Finmarchinella logani, Paradoxostoma arcticum,* and *Cytheropteron nodosoalatum. Hemicythere borealis* is confined to shallow waters in the western Arctic (e.g. Briggs, 1985; Cronin, pers. comm.), and the Ikerssuak specimens constitute its most easterly record to-date. *Finmarchinella angulata, Hemicythere emarginata,* and *Xestoleberis depressa* all occur further south, but reach their maximum abundance in the Arctic.

It is interesting to note the absence of *Elofsonella concinna* (Jones) in Ikerssuak. This species has only been recorded from two localities on the west coast of Greenland (Hazel, 1970), it being commoner to the south and west in Ungava Bay, off the Maine coast (Hazel, 1967; 1970), and in Chesterfield Inlet, northwestern Hudson Bay (Briggs, 1985). There is also an isolated record from East Greenland (Elofson, 1941) and one from off Spitzbergen (Brady & Norman, 1889). The species is common in the Norwegian Sea, North Sea, and Kattegat-Skagerrak (Elofson, 1941), and is also known from the western part of the Baltic Sea (Rosenfeld, 1977). It can, thus, be considered a typical member of the Norwegian and North Celtic Provinces in the eastern North Atlantic. While western Atlantic records also include Arctic localities, it is a commoner element of the Nova Scotian Province here than in the Arctic proper.

This investigation confirms the presence of *Semicytherura nigrescens* and *Cytherura atra* in Southwest Greenland. These two species are now known at three localities on this coast, Sisimiut (Whatley, 1982), Ameralik (Hawley MS, 1980), and Ikerssuak (herein). The distribution of *S. nigrescens* is of especial interest, as prior to its discovery in Greenland it was only known from Northwest Europe. Stephensen (1938) did not record it from Iceland, though the full Icelandic fauna remains to be studied in detail. According to Neale and Howe (1975: p. 410), *S. nigrescens* is an index species for recognizing the northern boundary of the Norwegian Province in the eastern Atlantic. The three records from Greenland all occur south of the 0°C mean annual marine isotherm and the southern limit of close-pack winter ice in Baffin Bay (Markham 1981), and lie well within the known ranges of the Subarctic indicator species *Balanus balanoides, Mytilus edulis,* and *Littorina rudis* (e.g. Lubinsky, 1980; Stephensen & Stephensen, 1972 and see Fig. 6). Clearly, further work on recent shallow ostracod faunas along the West Greenland coast should clarify whether *S. nigrescens* can also be used as an indicator of Subarctic marine conditions in this area.

The occurrence of both *Leptocythere castanea* and *L. lacertosa* in Ikerssuak constitutes the first indisputable record for these species in the western North Atlantic. While Elofson (1941) considered *L. castanea* to be amphiatlantic in distribution, all North American records must now be considered as doubtful. Some may belong to *Leptocythere quebecensis* Cronin (1981), while the species Swan and Kraft (1975) assigned to *Leptocythere* aff. *L. castanea* (Sars) clearly differs from that species in both its shape and ornamentation. It would be interesting to know if these two species have a wider distribution in West Greenland, or if the inner parts of the fiords in Southwest Greenland may form an oasis for species of a more southerly provenance (Fig. 5).

Future work on Arctic ostracod distribution should concentrate on two major fields of study. Firstly, as the study of Arctic Ostracoda is still largely at the data-collection stage, our knowledge would be aided significantly be the collection of new, primary data, particularly from areas most deficient in information. Secondly, and perhaps more importantly, details on the life-cycles of certain key Arctic species are urgently needed in the interests of both ecology and palaeoecology, as temperature limits within which ostracods reproduce may be considerably narrower than the limits for mere survival (Horne, 1983). This is a pertinent point when considering that copulating pairs of *Hemicythere borealis* were found in the intertidal environment in the present study. The relative warmth of the water here may, indeed, have stimulated this species to reproduce. Moreover, a detailed analysis of the population structures of several of the species encountered in the Ikerssuak district revealed no evidence for parthenogenesis. Such investigations in the Arctic would provide very useful comparisons with the existing data on life-cycles, which is largely confined to Northwest European and Mediterranean waters.

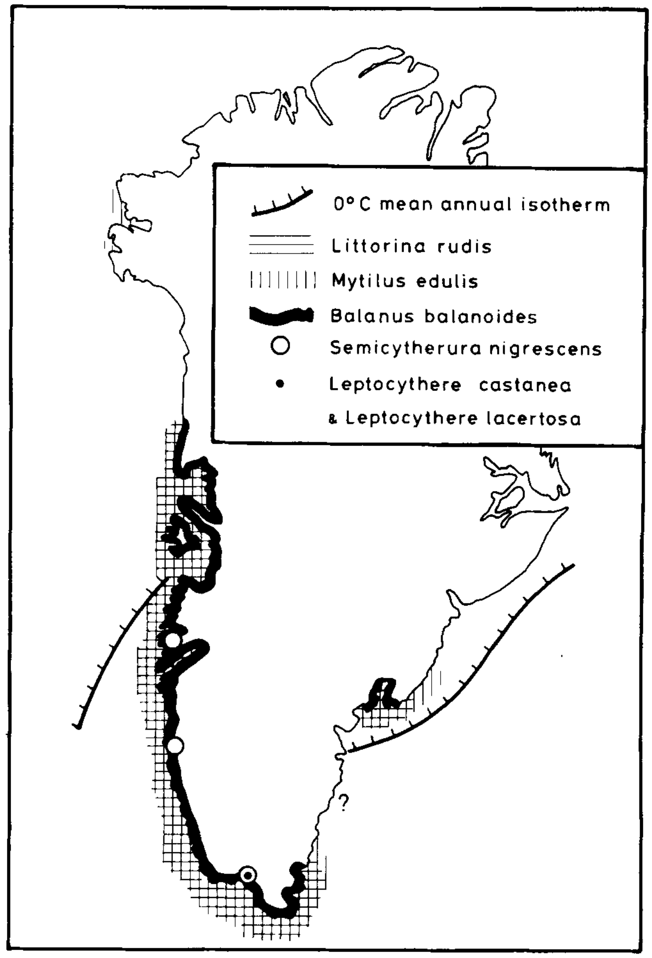

Fig. 6. The distribution of certain Subarctic littoral species of molluscs in Greenland compared with the distribution of *Semicytherura nigrescens, Leptocythere castanea,* and *L. lacertosa.*

ACKNOWLEDGEMENTS

The author wishes to thank L. Grum, who collected the samples in the Ikerssuak district, and for placing these and his field observations at my disposal. The material from East Greenland was collected by K. S. Petersen (Danish Geological Survey), and B. Larsen (Danish Technical High School). The material in the Aarhus collection was originally collected by R. W. Feyling-Hanssen (Spitzbergen and East Greenland), E. Kjemtrup (Limfjord) and K. Roug (Aarhus Bay). Thanks also to T. M. Cronin (United States Geological Survey) for permission to refer to unpublished data and to D. J. Horne (Thames Polytechnic, London) for checking the copulatory appendages of *Leptocythere castanea* and for making the drawings of *Sclerochilus* sp. A. I am indebted to J. G. Nielsen for drafting the diagrams.

Manuscript received April 1988
Revised manuscript accepted December 1988

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