

Solitary ascidians (Tunicata, *Ascidacea* and *Sorberacea*) of the Faroes

Stakir sjóbjølgar (Tunicata, Ascidacea og Sorberacea) við Føroyar

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Úrtak

Allir teir støku sjóbjølgarnir, sum vóru innsavnaðir undir BIOFAR-verkætlanini eru rannsakaðir og navngreindir til lægstu møguligu flokkingarskipan. Innan BIOFAR-verkætlanin byrjaði í 1987, vóru 24 sløg av stakum sjóbjølgum staðfest innan fyri 200 fjórðinga sjómarkið. Eftir BIOFAR er talið økt til 36. Stakir sjóbjølgar eru staðfestir í 17 prosent av støðunum (225 av tilsamans 1325). Tólv eru staðfestir fyri fyrstu ferð: *Ascidia mentula* Müller, 1776, *Styela atlantica* (Van Name, 1912), *Styela similis* Monniot, 1970, *Styela theeli* Ärnäck-Christie-Linde, 1921, *Cnemidocarpa mollispina* Ärnäck-Christie-Linde, 1922, *Cnemidocarpa mortenseni* Hartmeyer, 1912, *Polycarpa porculus* Monniot C. and Monniot F., 1979, *Molgula herdmanni* Bjerkan, 1905, *Molgula mira* (Ärnäck, 1931), *Molgula occulta* Kuppfer, 1875, *Eugyra islandica* Millar, 1974, og *Asajirus arcticus* (Hartmeyer, 1923). Slektirnar *Cnemidocarpa* og *Asajirus* eru staðfestar fyri fyrstu ferð á økinum.

Abstract

All the solitary ascidian material collected during the BIOFAR programme has been worked through and identified to lowest possibly taxonomic level. Before the BIOFAR programme started in 1987, twenty four solitary ascidian species had been recorded within the Faroese Exclusive Economic Zone (EEZ). The BIOFAR sampling has increased this number to thirty six. Solitary ascidians are recorded at 17% of the stations (225 out of 1325).

Twelve species were recorded for the first time: *Ascidia mentula* Müller, 1776; *Styela atlantica* (Van Name, 1912); *Styela similis* Monniot, 1970; *Styela theeli* Ärnäck-Christie-Linde, 1921; *Cnemidocarpa mollispina* Ärnäck-Christie-Linde, 1922; *Cnemidocarpa mortenseni* Hartmeyer, 1912; *Polycarpa porculus* Monniot C. and Monniot F., 1979; *Molgula herdmanni* Bjerkan, 1905; *Molgula mira* (Ärnäck, 1931); *Molgula occulta* Kuppfer, 1875; *Eugyra islandica* Millar, 1974; and *Asajirus arcticus* (Hartmeyer, 1923). Two genera, *Cnemidocarpa* and *Asajirus*, are recorded for the first time in the area.

Introduction

Previous investigations on Faroese ascidians

The first species list with Faroese fauna was made by Svabo 1781 and 1782 (Svabo, 1959). At that time, the ascidians were placed within Mollusca. Although the molluscs are fairly well represented in the list, no ascidians were included. The earliest source on ascidians from the Faroes is the collections of the Zoological Museum of Copenhagen: a specimen of *Molgula complanata* (Alder and Hancock, 1870), identi-

fied by Steenstrup in 1858. The specimen was recorded from Miðvág, and might have been collected by Japetus Steenstrup who visited the Faroes in 1844 and took benthic samples around the islands from row boats (Tendal and Bruntse, 2001). The ascidians were categorized within the molluscs until the middle of the nineteenth century, but there are no ascidians in the mollusc species list of Mörch (1868). The first literature treating ascidians collected within the present-day Faroese EEZ is in a report of Herdman (1884) on the cruises of H.M.S. “*Lightning*” in August and September 1868 and H.M.S. “*Porcupine*” the year after. On each of the cruises ascidians were recorded at a single station out of a total of fourteen in 1868 and twenty in 1869. The sampling effort from these two pioneering cruises was concentrated around the Faroe-Shetland Channel, because of British oceanographic interests in the area at that time. Nearly a decade later from 1876 to 1878 a Norwegian Deep Sea-Expedition was accomplished with three stations within or close to the present-day Faroese EEZ, but no ascidians were recorded (Bonnievie, 1896).

Ascidians recorded in Vestmanna were identified by Klixbüll in 1880 (Hartmeyer, 1924). When these specimens were collected is uncertain, but some dredgings were done in 1878 and 1880 (the former year by C. F. Wandel) from the mail-ship from Denmark to Iceland and Faroes (Tendal and Bruntse, 2001); it is possible that the Vestmanna records are from one of these samplings. HMS “*Lightning*” visited the Faroes again in August-September 1882 and took benthic samples at ten stations at the south-

ern border of the Faroese EEZ (Carpenter, 1868). In two of these stations ascidians were recorded (Herdman, 1884). “*Fylla*” did some sampling in the Faroe-Shetland Channel in 1890; ascidians were recorded at two stations (Hartmeyer, 1923; 1924). In 1895-1896 twenty-two stations were positioned within the Faroese EEZ by the Ingolf Expedition (Bøggild, 1899), and ascidians were found at three of them (Hartmeyer, 1923; 1924). The fishery steam ship “*Michael Sars*”, took several benthic samples within the Faroese EEZ in 1904 and recorded ascidians at 12 stations (Bjerkkan, 1905).

The sparse number of samples from the latter half of the 19th century represents more or less coincidental occurrences of oceanic research vessels in the Faroese area on journeys with other destinations and purposes, and we must move well into the 20th century to find a large scale biological investigation of the Faroes.

Hartmeyer (1923; 1924) included most records from the Faroes until that time in his extensive work on the Arctic and boreal ascidians. Later in the 1920s a survey of the whole Faroese biota took place; the marine part was collected in 1924-1927. In autumn 1926 the fishery inspection vessel “*Beskytteren*” was employed for sampling and in 1927 “*Dana*”. The results were published in “*the Zoology of the Faroes*” (Ärnäck-Christie-Linde, 1952).

Since the 1920s, a number of samples have been taken in the Faroese area *e.g.* NORBI (Monniot and Monniot, 1979), but in none of these have I succeeded in finding any ascidian record within the Faroese EEZ.

<i>Gear</i>	<i>Stations</i>		<i>Solitary ascidians records</i>			
	Biofar 1	Biofar 2	Biofar 1 No.	%	Biofar 2 No.	%
Anchor dredge (heavy)	-	1	-	-	none	0
Bottom trawl (Alfredo)	3	-	none	0	-	-
Bottom trawl (shrimp)	29	-	3	10.3	-	-
‘Sneli’ sledge	164	13	18	11.0	2	15.4
Grab	211	3	2	0.9	none	0
Hand sampling	-	52	-	-	none	0
Meiofauna dredge	17	-	?	?	-	-
Ockelmann-sledge	-	6	-	-	1	16.7
Scallop dredge	21	-	7	33.3	-	-
Rothlisberg-Pearcy sledge	75	-	19	25.3	-	-
Scuba dive (hand plucked)	-	436	-	-	75	17.2
Scuba dive (photo)	-	6	-	-	none	0
Triangular dredge (heavy)	212	44	45	21.2	none	0
Triangular dredge (medium)	1	86	none	0	49	57.0
Triangular dredge (light)	11	-	4	36.4	-	-
Underwater camera	29	-	?	?	-	-
van Veen grab	4	2	none	0	none	0
Total	777	649	98	12.6	127	19.6

Table 1. Number of stations, gear used, and number of solitary ascidian records in the BIOFAR programme.

Thus, there is a time lag of sixty years between the BIOFAR programme and any former record of ascidians in the Faroese area. The BIOFAR sampling was accomplished in the years 1987-2000 and the cruises were carried out by the research vessels “*Magnus Heinason*” (Faroes), “*Håkon Mosby*” (Norway), and “*Valdivia*” (Germany).

Above, I have emphasized the ascidian records throughout the history of marine biological investigations of the Faroe Islands. For a general overview, I refer the reader to

Tendal and Bruntse (2001) and Spärck (1928).

The BIOFAR programme

After 60 years without any Faroese marine biological investigation, a need to bring up to date the old knowledge and fill out the grey areas was appropriate.

The sampling was performed in two stages. BIOFAR 1 focused beyond the 100 meter depth curve and lasted from 16 July 1987, until 11 May 1993. After the comple-

tion there was a need to complement the investigations from the 1920s, which almost entirely had been within the 100 meter depth contour. This led to the BIOFAR 2 programme for which sampling took place from 19 June 1995 to 31 August 2000.

Results

In all 1,426 deployments (referred to as stations) were conducted during the BIOFAR programmes (Nørrevang *et al.*, 1994; Sørensen *et al.*, 2001). In addition, there were other deployments, used for special purposes, such as examination of the animal diversity associated with horse mussel beds (Dinesen and Ockelmann, 2005), containing stations that are not included in the announced stations lists.

Some of the applied gear was, however, not suitable for collecting ascidians: In the case of the Alfredo Bottom trawl the foot-rope either runs over these organisms, or they slip through the meshes. The hand sampling in the Far-Coast Project was performed on too shallow habitat for these organisms. Apparently, no ascidians were collected in the meiofauna dredge or observed in the BIOFAR1 photos. Excluding those stations, there are 1,325 stations; in 225 (17 %) of these solitary ascidians were recorded (Table 1).

The gear types vary also with regard to obtained quality of the samples. The specimens sampled with the bottom trawl and the scallop dredges were generally in critical condition, having the branchial sac filled with sand. The best quality, apart from the hand collected material, was obtained by the Rothlisberg-Pearcy sledge.

See Table 1 for an overview of the gear used, stations and records of the BIOFAR programmes.

Before the BIOFAR programme started in 1987, twenty four solitary ascidian species had been recorded within the Faroese EEZ. As a result of BIOFAR the number has been raised to thirty six (Table 2); this is an increase by 50 %. The twelve new species to the area are: *Ascidia mentula* Müller, 1776; *Styela atlantica* (Van Name, 1912); *Styela similis* (Monniot, 1970); *Styela theeli* (Ärnäck-Christie-Linde, 1921); *Polycarpa porculus* (Monniot and Monniot, 1979); *Cnemidocarpa mollispina* (Ärnäck-Christie-Linde, 1922); *Cnemidocarpa mortensenii* (Hartmeyer, 1912); *Molgula herdmanni* (Bjerkman, 1905); *Molgula mira* (Ärnäck, 1931); *Molgula occulta* (Kuppfer, 1875); *Eugyra islandica* (Millar, 1974); and *Asajirus arcticus* (Hartmeyer, 1923).

Only three of the species previously recorded from the area were not recorded during BIOFAR. These species are *Corella borealis*, *Pelonaia corrugata*, and *Halcynothia pyriformis*.

Two of the genera *Cnemidocarpa* and *Asajirus* have been recorded for the first time within the Faroese EEZ.

The total number of individuals that I have identified to species in this project is 1,944.

Species list

The list includes the following parameters for each species:

Good description: Recommended literature

<i>Ciona intestinalis</i> *	<i>Dendrodoa aggregata</i> *
<i>Corella borealis</i>	<i>Dendrodoa grossularia</i> *
<i>Ascidia callosa</i> *	<i>Polycarpa fibrosa</i> *
<i>Ascidia conchilega</i> *	<i>Polycarpa pomaria</i> *
<i>Ascidia mentula</i> **	<i>Polycarpa porculus</i> **
<i>Ascidia obliqua</i> *	<i>Boltenia echinata</i> *
<i>Ascidia tritonis</i> *	<i>Halocynthia pyriformis</i>
<i>Ascidia virginea</i> *	<i>Microcosmus glacialis</i> *
<i>Ascidella scabra</i> *	<i>Pyura tessellata</i> *
<i>Styela atlantica</i> **	<i>Molgula citrina</i> *
<i>Styela coreacea</i> *	<i>Molgula complanata</i> *
<i>Styela gelatinosa</i> *	<i>Molgula herdmani</i> **
<i>Styela rustica</i> *	<i>Molgula mira</i> **
<i>Styela similis</i> **	<i>Molgula occulta</i> **
<i>Styela theeli</i> **	<i>Molgula siphonalis</i> *
<i>Pelonaia corrugata</i>	<i>Eugyra arenosa</i> *
<i>Cnemidocarpa mollispina</i> **	<i>Eugyra islandica</i> **
<i>Cnemidocarpa mortenseni</i> **	<i>Asajirus arcticus</i> **

Table 2. Solitary ascidians recorded from the Faroese EEZ.

(* = Species recorded from BIOFAR; ** = Species new to the area.

with good description of the species.

Previous records: Faroese records of the species prior to the BIOFAR programme.

BIOFAR station(s) and number of individual(s): Station number from which the species was recorded in the BIOFAR programme; the number of individuals at each station is indicated in parentheses.

BIOFAR area: The location of the BIOFAR records within the Faroese EEZ.

BIOFAR depth range: The depth range for the BIOFAR records.

BIOFAR temperatures: The temperature range (estimated or measured) from stations where the species was recorded.

BIOFAR water mass: A project, led by Håkan Westerberg of the University of Gothenburg in Sweden, to estimate the origin and location of the water masses

in the Faroese EEZ (Westerberg 1990).

The abbreviations are: NW = Norwegian Sea Water; AW = Atlantic water; AI = Atlantic Intermediate Water. Westerberg's results are generally in accordance with the results of Hansen and Østerhus (2000) and Hansen (2000). For species that were not recorded in the BIOFAR programme, I have estimated water mass based on Westerberg (1990) according to location and temperature under 'EEZ water mass'. The purpose of relating water mass to each station is of particular significance to biogeography.

North Atlantic/Nordic Seas distribution: The regional distribution in areas bordering the Faroes.

General distribution: The general distribution of the species.

General depth range: The general depth range of the species.

Remarks: Here, I have made remarks that I find relevant.

Class **ASCIDIACEA**
Order **APLOUSOBRANCHIA**
Family: **CIONIDAE**
Genus: *Ciona* Fleming, 1822

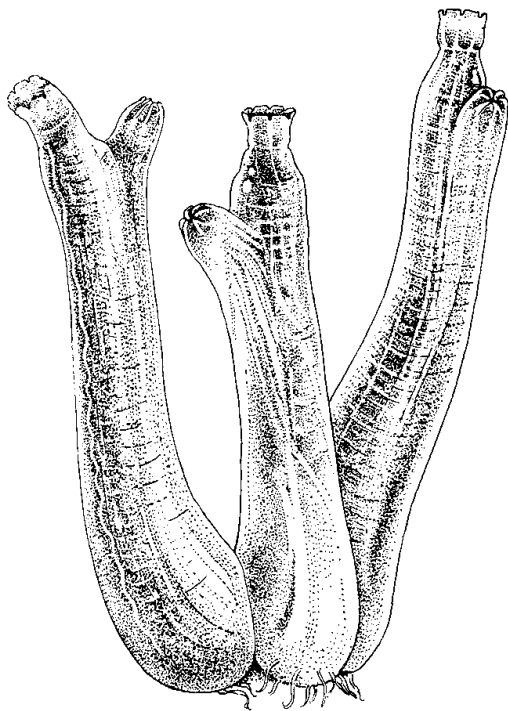


Figure 1. *Ciona intestinalis* (from Lützen, 1967).

***Ciona intestinalis* (Linnaeus, 1767)**

Good description: Hartmeyer, 1924: 90-104; Millar, 1953; 1966: 37-38, fig. 23.

Previous records: “*Diana*” 1884: Tórshavn (Hartmeyer, 1924). “*Diana*” 1884?: Tórshavn; Trongisvágur (identification by Fjelstrup in 1887); (Hartmeyer, 1924). “*Thor*” 1899: Off Borðuni 144 m; between Stong and Eystnes 180 m; Klaksvík 20 m (Hartmeyer, 1924); “*Michael Sars*” 1902: East of the Faroes 110 m (62°16'N-06°06'W); southeast of the Faroes 290

m (61°10'N; 05°46'W) (Bjerkan, 1905). “*Beskytteren*” 1926: North of the Faroes 82 m; Hvannasund 80 m; Funningsfjørður 60 m; Vestmanna; Sundini off Víkarnes 15-20 m; Nólsoy 180 m; Trongisvágur off Punthavn 8-10 m; Hvítanes 20-27 m; Ørðavík; Trongisvágur off Hvítanes 20-27 m; Vágsfjørður 44 m; Faroe Bank (61°08'N; 06°47'W) (Ärnäck-Christie-Linde, 1952). “*Dana*” 1927: Skálafjørður 58 m (62°07'N; 06°44'W) (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 89(1); 111(1); 118(1); 156(2); 158(1); 282(1); 303(1); 322(1); 327(1); 368(5); 373(1); 424(1); 484(1); 486(1); 544(2); 597(1); 604(2); 1006(2); 1014(1); 1027(1); 1030(2); 1139(1); 1140(1); 1162(1); 1163(1); 1198(1); 1199(1); 1201(2); 1204(1); 1205(1); 1216(2); 1235(2); 1237(2); 1239(2); 1242(1); 1245(1); 1377(1); 1413(1); 1431(2); 1434(4); 1451(1); 1453(1); 1484(2); 1506(1); 1517(7); 1521(12); 1543(4); 1562(8); 1587(4); 1590(1); 1595(1); 1597(1); 1606(1); 1610(1); 1612(9); 1614(1); 1625(11); 1632(1); 1636(1); 1637(5); 1638(2); 1642(3); 1644(1); 1662(2); 1664(8); 1665(2); 1674(1); 1675(2); 1676(1); 1710(1); 1746(4); 1750(8); 1789(1); 1791(7); 1797(4); 1801(34); 1807(3); 1808(1); 1811(1); 1813(1); 1815(2); 1818(1); 1837(1) (in addition to these records, a total of 29 individuals of *C. intestinalis* are identified, that cannot be located to station).

BIOFAR area: Shelf; Faroe-Iceland Ridge; Faroe-Shetland Channel; Faroe Bank slope; Wyville-Thompson Ridge, south western slope (Fig. 2).

BIOFAR depth range: 5-700 m.

BIOFAR temperatures: Estimated range 1.5 to 8.6 °C.

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: Svalbard; Bear Island; coast of Norway; western coast of Sweden; Denmark; North Sea; coasts of France; coasts of Spain; coasts of Great Britain; Shetland; Faroes; Iceland (Millar, 1966); northern North America (Van Name, 1912)).

General distribution: All the temperate regions of the world.

General depth range: From lower part of the shore to more than 1300 m (Lützen, 1967).

Remarks: The six records from the deeper parts off the shelf (plateau) are noteworthy. *C. intestinalis* f. *typica* is normally replaced below 500 m by the two Arctic forms (*gelatinosa* and *longissima*), and although not all temperatures estimated (t.e.) indicate it, water mass with Arctic origin does sometimes occur in all

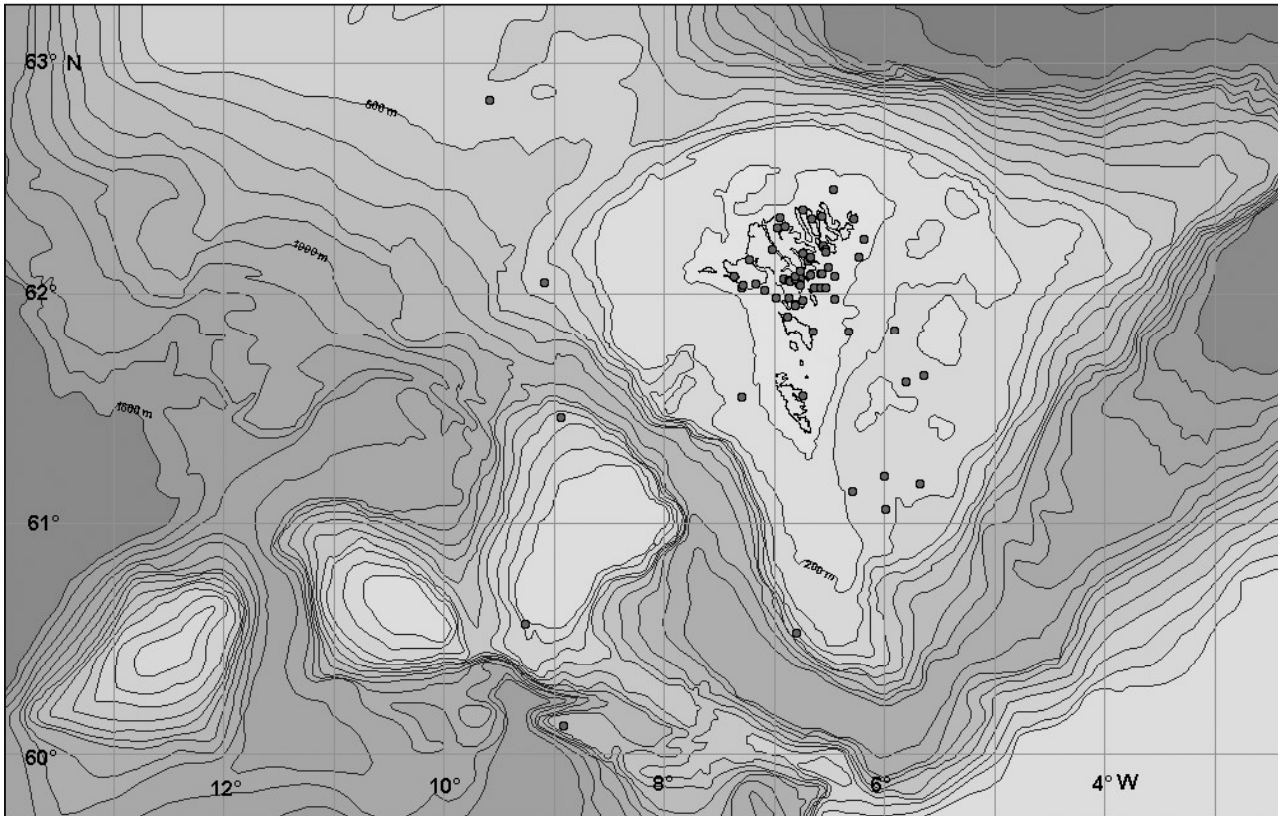


Figure 2. BIOFAR records of *Ciona intestinalis*.

of these six stations. The records from the Wyville-Thompson Ridge, south western slope at 700 m (t.e. 7.0 °C) and from the Faroe-Iceland Ridge 509 m (measured temperature -0.1 °C) have been revised by Dr. Lützen and identified as f. *typica*.

C. intestinalis is a European species that has colonized all the temperate regions of the world, by ship traffic dispersal (Hartmeyer, 1924; Årnbäck-Christie-Linde, 1934; Berrill, 1950; Brewin, 1950; Hewitt *et al.*, 2004). European origin is hypothesized based on restricted occurrence in harbours and marinas outside Europe in the early 20th century.

Previous records: “Fylla” 1890: On the Faroe-Shetland Channel slope, southeast of Suðuroyar Banki 459 m (61°23’N ; 05°04’W) (Hartmeyer, 1924).

Order PHLEBOBRANCHIA
Family: CORELLIDAE
Genus: *Corella* Alder and Hancock,
1870

Corella borealis Traustedt, 1886

Good description: Traustedt, 1886; Van Name, 1912: 593-594; pl. 65, fig. 123; Hartmeyer, 1924:14-17.

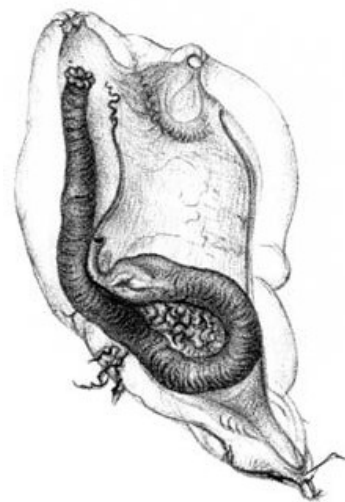


Figure 3. *Corella borealis* (from Traustedt, 1886).

BIOFAR station: Not recorded during BIOFAR.

EEZ area: Faroe-Shetland Channel.

EEZ depth range: 459 m.

Temperatures: If sampled in summer 4-6 °C (Westerberg, 1990).

EEZ water mass: AI (Westerberg, 1990) or East Iceland Current (Hansen and Østerhus, 2000).

North Atlantic/Nordic Seas distribution: Svalbard; Faroes; western coast of Greenland, northern North America (Millar, 1966).

General distribution: As above.

General depth range: From 50-459 m (Hartmeyer, 1924; Millar, 1966).

Remarks: *C. borealis* is a rare species which presumably is indigenous to the Arctic region, from where it has been recorded only a few times (Kola Fjord, Svalbard, eastern and western coast of Greenland, and Baffin Island) (Traustedt, 1886; Hartmeyer, 1903, 1923). In addition there is one record (Herdman, 1891) from the boreal eastern Atlantic region (Faroe-Shetland Channel) and an uncertain record (Van Name, 1912) from the boreal western Atlantic region (near Cape Ann, Massachusetts); a small and mutilated specimen. The record from the slope of the Faroe-Shetland Channel is evidently a result of southern dispersal with the East Iceland Current or Norwegian Sea Deep Water.

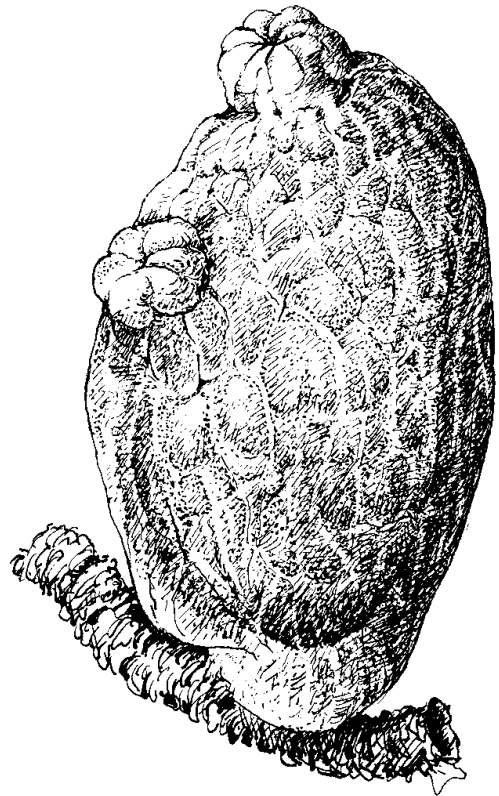


Figure 4. *Ascidia callosa* (from Lützen, 1967).

Family ASCIDIIDAE

Genus: *Ascidia* Linnaeus, 1767

Ascidia callosa Stimpson, 1852

Good description: Hartmeyer, 1924: 41-53; pl. 1, figs. 15-16; Van Name, 1945; Millar, 1966: 55, fig. 35.

Previous records: “*Beskytteren*” 1926: Miðvágur (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 1023(1); 1153(1); 1616(1).

BIOFAR area: Ørðavík; Kolturssund; Kaldbaksfjørður (Fig. 5).

BIOFAR depth range: 5-60 m.

BIOFAR temperatures: Unknown.

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Svalbard; coast of Norway; western coast of Sweden; Faroes; Iceland; coasts of Greenland; northern North America (Van Name, 1945; Millar, 1966).

General distribution: Arctic basin; Bering Sea; Okhotsk Sea; Northern Pacific.

General depth range: From shallow water to about 300 m (Millar, 1966).

Remarks: The BIOFAR records seem to indicate that *A. callosa* is sparsely distributed in the Faroese EEZ. This trend is also apparent in Iceland, along the Norwegian coast, and the western coast of Sweden, while this species is not present in the southern part of the boreal eastern Atlantic. *A. callosa* is also rare in the Sea of Japan (two records). This species is, on the other hand, very common in the Arctic Basin, the Bering Sea and the Sea of Okhotsk (Sanamyan, 2000); and *A. callosa* together with *Boltenia echinata* and *B. ovifera* make up almost fifty percent of the ascidian fauna in the Arctic waters of Canada (Trasón, 1964). It obtains largest size in the higher latitudes (Hartmeyer, 1924).

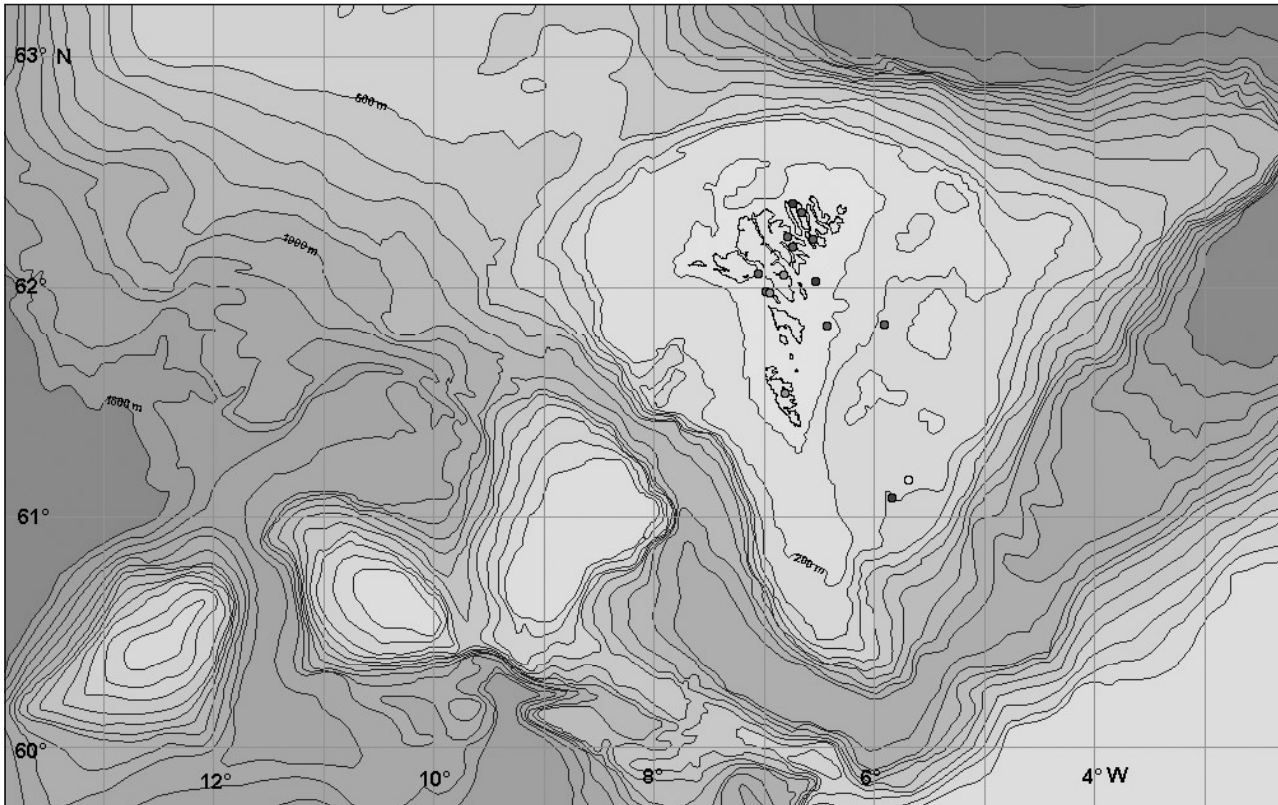


Figure 5. BIOFAR records of *Ascidia mentula* ●, *A. virginea* ●, *A. callosa* ●, and *A. tritonis* ○.

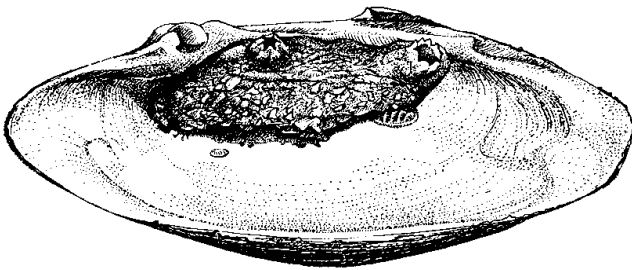


Figure 6. *Ascidia conchilega* (from Lützen, 1967).

Ascidia conchilega Müller, 1776

Good description: Hartmeyer, 1924: 75-78; Millar, 1966: 51, fig. 30.

Previous records: "Thor" 1899: Between Stong and Eystnes 180 m, identified by Th. Mortensen (Hartmeyer, 1912). "Margrethe" 1913?: Between Stong and Eystnes 180 m (Hartmeyer, 1924). "Beskytteren" 1926: East side of Haraldsund 20 m; southeast of Kunoyargalvi 10-15 m (Ärnback-Christie-Linde, 1952). Record from summer 1929: Kalsoyarfjørður (Ärnback-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 44(9); 48(1); 97(1); 106(1); 205(1); 223(1); 279(1); 283(1); 304(1); 333(1); 371(1); 475(1); 486(3); 529(1); 604(2); 621(3); 1607(3); 1630(1); 1642(1); 1664(1); 1667(1); 1705(1); 1744(4); 1747(2); 1750(3); 1791(1); 1797(1); 1799(1); 1800(1); 1801(10); 1814(1) (in addition to these records, 2 individuals of *A. conchilega* are identified, that cannot be located to station).

BIOFAR area: Coastal and off shore records mainly on the eastern part of the plateau. One record south of Bill Bailey Bank (Fig. 7).

BIOFAR depth range: 10-1061 m.

BIOFAR temperatures: Estimated range 3.6 to 8.1 °C.

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: Coast of Norway; western coast of Sweden; coast of France; coasts of Great Britain; Shetland; Faroes (Millar, 1966).

General distribution: *A. conchilega* is exclusive to the European area. It has its distribution in the Mediterranean, Lusitanian and boreal areas, being relatively common throughout its distribution area, the Faroe Islands included.

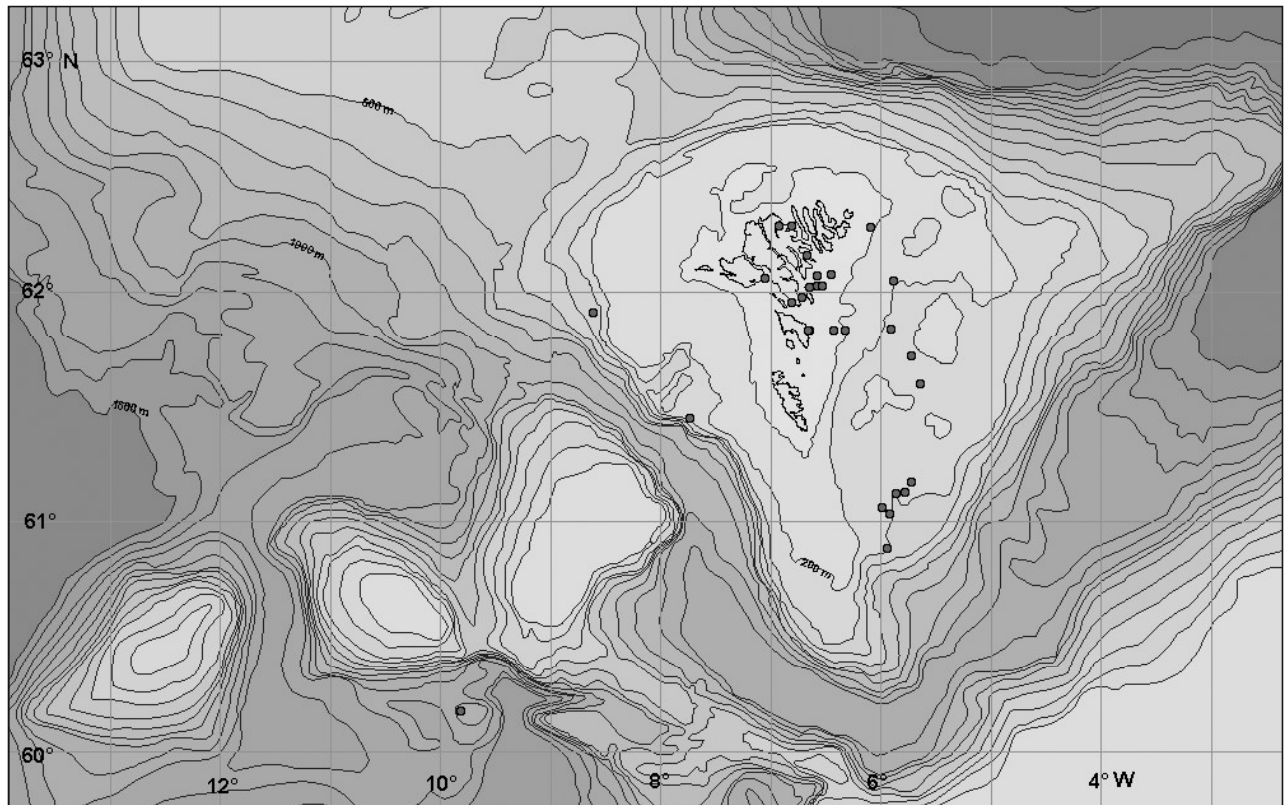


Figure 7. BIOFAR records of *Ascidia conchilega*.

General depth range: From lower parts of the shore to depths of more than 1000 m (Millar, 1966).

Remarks: Although common in the Faroes, this area, together with Tromsø in Norway constitute the northern boundaries of distribution for *A. conchilega*. In the Mediterranean it is only recorded in the western part (Thompson, 1932; Millar, 1966), a possible indication of recent introduction from the Lusitanian region for this indigenous European species.

***Ascidia mentula* Müller, 1776**

Good description: Hartmeyer, 1924: 71-75; Millar, 1966: 48, fig. 29.

Previous records: None.

BIOFAR stations (number of individuals in parentheses): 45(1); 368(1); 1801(1) (in addition to these records, 1 individual of *A. mentula* is identified, that cannot be located to station).

BIOFAR area: east of Munkagrinninum; Kalsoyar-fjørður; east of Nólsoy (Fig. 5).

EEZ depth range: 55-290 m.

BIOFAR temperatures: Estimated range 7.0 to 7.9 °C.

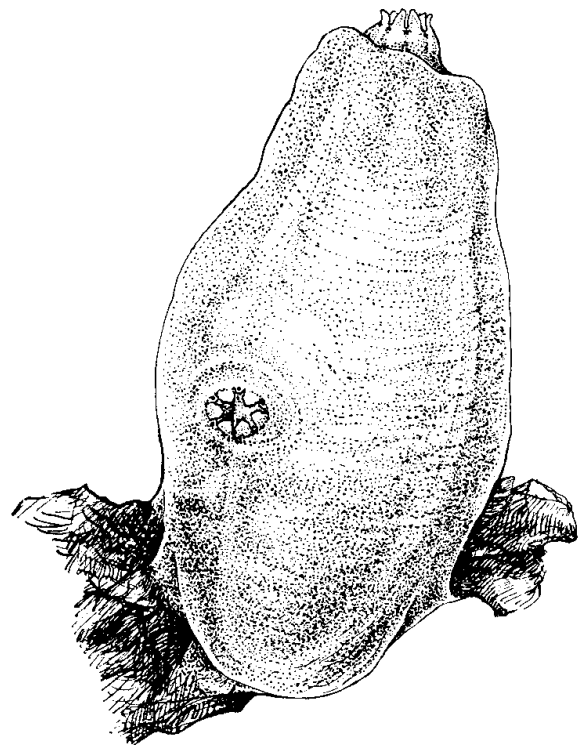


Figure 8. *Ascidia mentula* (from Lützen, 1967).

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Southern coasts of Norway; western coast of Sweden; coast of France; coasts of Great Britain; Orkney; Shetland; Faroes (Millar, 1966).

General distribution: *A. mentula* is exclusive to the European region. It has its distribution in the Black Sea, Mediterranean, Lusitanian and boreal areas. The northern boundaries are the Faroes and Molde Fjord in Norway.

General depth range: It occurs from the lower part of the shore to about 200 m (Millar, 1966).

Remarks: During the BIOFAR programme, *A. mentula* was recorded for the first time in the Faroes. The locality south east of the islands (east of Munkagrinninum) at 290 m of water depth is the deepest record hitherto.

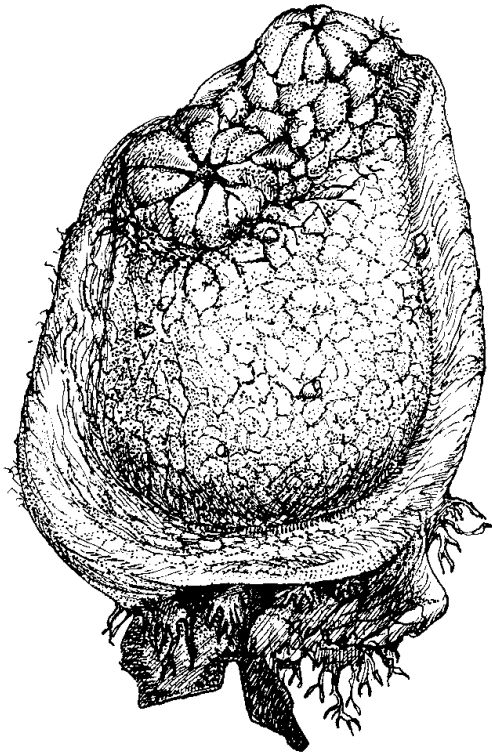


Figure 9. *Ascidia obliqua* (from Lützen, 1967).

Ascidia obliqua Alder, 1863

Good description: Hartmeyer, 1924: 57-68; Van Name, 1945; Millar, 1966: 55, fig. 34.

Previous records: Danish mail-ship 1878? Probably "Diana": Vestmanna 18 m (identification by Klixbüll in 1880 (Hartmeyer, 1924)). "Diana" 1884?: Local-

ity not specified (identification by Fjelstrup in 1887). "Diana" 1901: Vestmanna 9-23 m (Hartmeyer, 1924); "Michael Sars" 1902: Mýlingsgrunnurin 110 m (62°29'N ; 07°37'W) (Bjerkman, 1905); "Thor" 1904: Eastern slope of Faroe Bank 875 m (61°15'N ; 09°35'W) (Hartmeyer, 1924). "Beskytteren" 1926: North of Viðareiði (1926); Hvannasund 80 m (1926) (Ärnäck-Christie-Linde, 1952). "Dana" 1927: Húsagrynnan 111 m (62°04'N ; 06°13'W); Norðhav-ið 82 m (62°65'N ; 06°22'W) (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 1(1); 33(1); 49(3); 56(1); 106(1); 111(2); 156(2); 163(2); 368(7); 371(3); 425(1); 474(4); 483(1); 1025(1); 1235(1); 1247(1); 1388(1); 1434(1); 1527(1); 1562(1); 1607(6); 1612(1); 1628(2); 1632(3); 1638(1); 1662(1); 1663(1); 1669(1); 1744(1); 1750(8); 1786(1); 1801(1); 1810(1); 1820(1).

BIOFAR area: Coastal and off shore records on the plateau east of the islands; one record from the Faroe-Iceland Ridge (Fig. 10).

BIOFAR depth range: 5-509 m.

BIOFAR temperatures: Estimated range 1.6 to 8.0 °C.

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: Svalbard; Bear Island; coast of Norway; western coast of Sweden; northern North Sea; Shetland; Faroes; Iceland; coasts of Greenland; northern North America (Millar, 1966).

General distribution: *Ascidia obliqua* occurs in the Arctic region of the north Pacific from the Siberian Sea westward to Greenland and on both sides of the boreal Atlantic.

General depth range: From shallow water down to more than 1000 m depth (Millar, 1966).

Remarks: In northern Norway this species is one of the most common ascidians (Bjerkman, 1908) and *A. obliqua* is frequent also in the Faroes. It has the largest eggs within the family (Ärnäck-Christie-Linde, 1934).

Ascidia tritonis Herdman, 1883

Good description: Herdman, 1883: 96-98; pl. 16, figs. 1-6; Hartmeyer, 1924: 68-71; pl. 1, fig. 18).

Previous records: "Triton", 1882: South west of the Wyville Thomson Ridge, 1042 m (59°51'N; 08°18'W) (Herdman, 1883; Tizard, 1883). "Michael Sars" 1902: Western slope of the Faroe Bank 750 and 840 m (61°07'N; 09°33'W and 61°08'N; 09°46'W respectively) (Bjerkman, 1905).

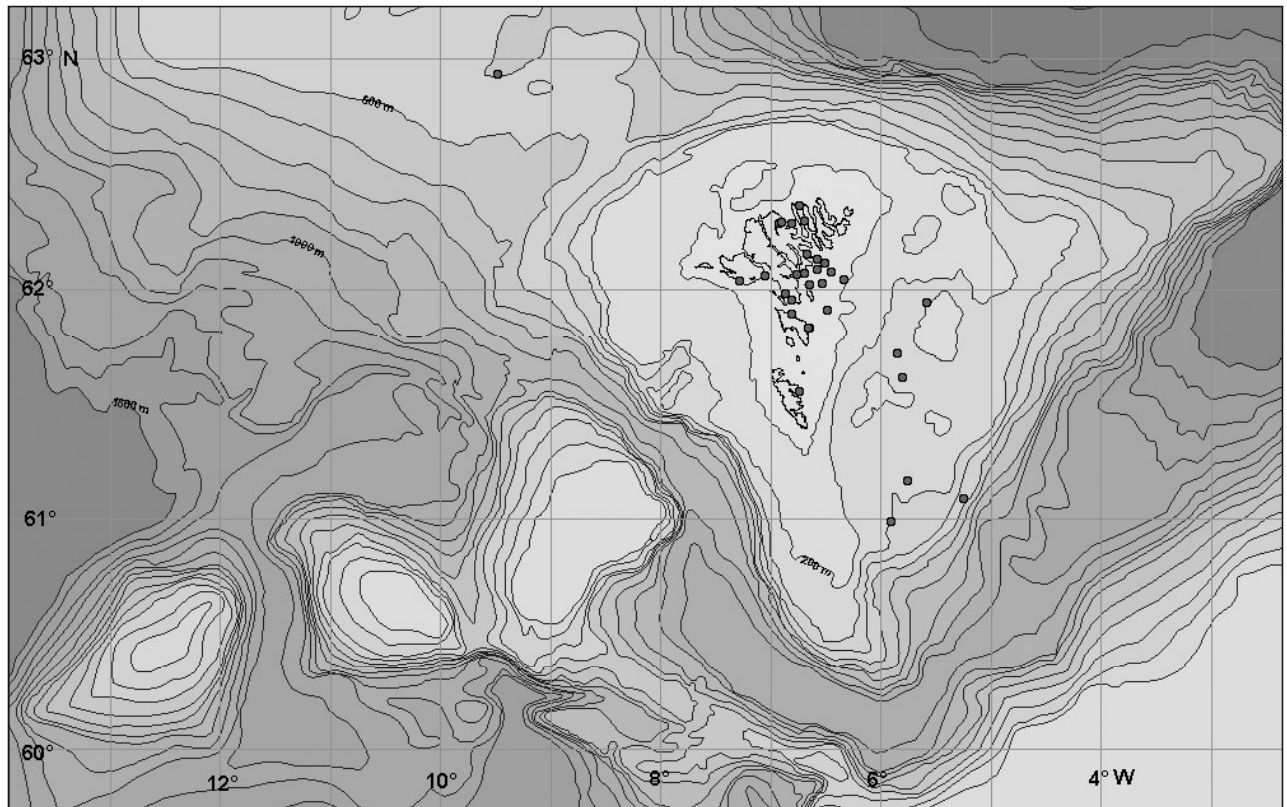


Figure 10. BIOFAR records of *Ascidia obliqua*.

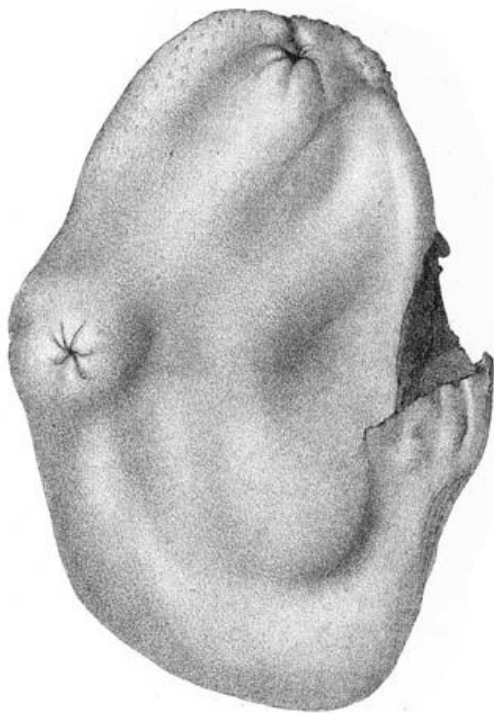


Figure 11. *Ascidia tritonis* (from Herdman, 1883).

BIOFAR station: 559(4).

EEZ area: Western slope of the Faroe Bank, and southwest of the Wyville Thomson Ridge (old records); west of Munkagrinninum (present study) (Fig. 5).

BIOFAR depth range: 254 m.

EEZ depth range: 254 to 1042 m.

EEZ temperature: Measured onboard on "Triton" to 7.6 °C; present study estimated to 7.90 °C.

EEZ water mass: AW.

North Atlantic/Nordic Seas distribution: Off Bergen, southern Norway; southwest of Ireland; Wyville Thomson Ridge; southwest of the Faroes; Reykjanes Ridge, southwest of Iceland (Millar, 1966).

General distribution: In addition to above it is recorded off the Azores (Monniot, 1974).

General depth range: From 254 (present study) to 1278 m (Millar, 1966).

Remarks: The specimens were recorded on the sponge *Stryphnus ponderosus*, and identified by Claude Monniot (Klitgaard, 1995). This is a rare species found mostly in deeper waters; the total of seven records is inadequate to ascertain its distribution area.

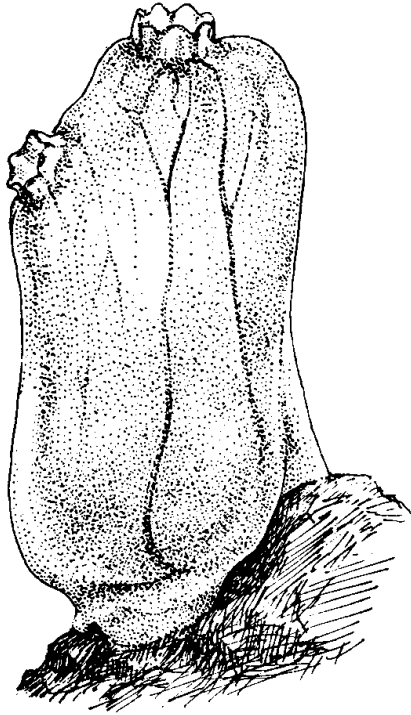


Figure 12. *Ascidia virginea* (from Lützen, 1967).

***Ascidia virginea* Müller, 177**

Good description: Hartmeyer, 1924: 78-81; Millar, 1966: 51, fig. 32.

Previous records: "Fylla", 1884: Locality not assigned (Hartmeyer, 1924).

BIOFAR stations (number of individuals in parentheses): 604(1); 1377(1); 1517(1); 1548(5); 1607(2); 1613(1); 1646(2); 1799(1); 1800(1).

BIOFAR area: Scattered coastal and off shore records on the plateau east of the islands (Fig. 5).

BIOFAR depth range: 5-260 m.

BIOFAR temperatures: Estimated range 7.3 °C (based on stn. 604).

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Svalbard; Bear Island; coasts of Norway; western coast of Sweden; English Channel; western coast of Great Britain; the western coast of Ireland; Orkney; Shetland, Faroes (Millar, 1966).

General distribution: In addition to above: The northern part of the central Mediterranean and the Lusitanian region.

General depth range: From shallow water to about 400 m depth (Millar, 1966).

Remarks: *A. virginea* occurs only in Western Europe;

the Arctic records are restricted to Svalbard and Bear Island.

Genus: *Ascidiella* Roule, 1883



Figure 13. *Ascidiella scabra*. Individuals indicated with arrows are *A. aspersa* (from Lützen, 1967).

***Ascidiella scabra* (Müller, 1776)**

Good description: Millar, 1966: 58, fig. 38; Lützen, 1967: 83-84, fig. 32.

Previous records: "Fylla", 1884: Locality not assigned (Hartmeyer, 1924). Record from 1897 or earlier: Hvalvík (identification by H. Jónsson in 1897, (Hartmeyer, 1924)). "Thor" 1899: Klaksvík 20 m; Akraleiti 274 m; north of Nólsoy 180 m (Hartmeyer, 1912). "Diana" 1901: Tórshavn 22-29 m (Hartmeyer, 1924). "Diana" 1902: Tórshavn (Hartmeyer, 1924). "Dana" 1927: North of Sundalagið 27-30 m (Ärnback-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 43(9); 106(1); 152(1); 205(1); 371(3); 486(1); 1122(3); 1130(2); 1218(1); 1484(1); 1555(1); 1562(1); 1607(1); 1625(1); 1637(2); 1642(1); 1663(2); 1675(1); 1710(4); 1747(1); 1750(1).

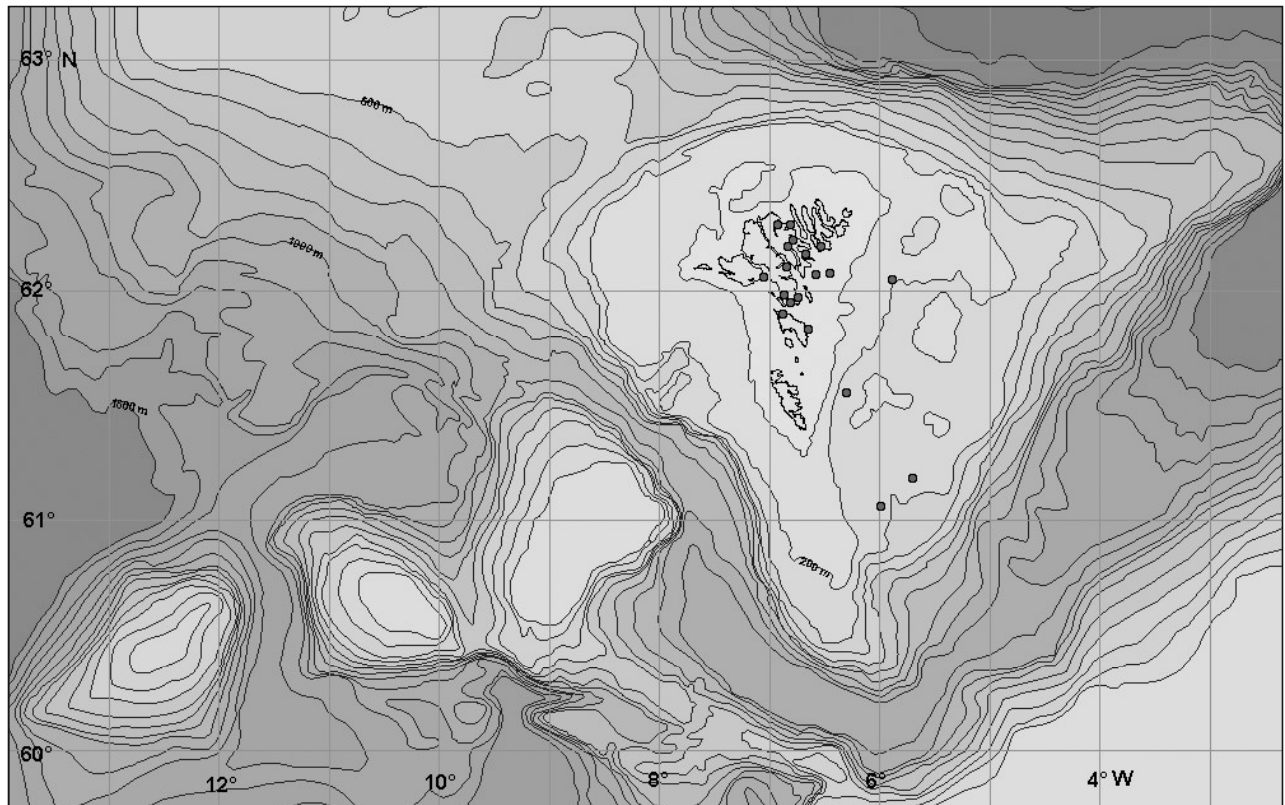


Figure 14. BIOFAR records of *Ascidiella scabra*.

BIOFAR area: Mainly coastal records; a few off shore records on the plateau east of the islands (Fig. 14).

BIOFAR depth range: 5-300 m.

BIOFAR temperatures: Estimated range 6.7 to 8.1 °C.

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: *Ascidiella scabra* has its area of distribution along the southern coasts of Norway south of Trondheim, western coast of Sweden, the entire North Sea area, the coasts of Great Britain and Ireland, Shetland, and Faroes (Millar, 1966).

General distribution: In addition to above, it occurs along the coasts of the Lusitanian region; in the Mediterranean it occurs along the northern coasts, and it is recorded in the Black Sea.

General depth range: From shallow water to 400 m (Ärn-bäck-Christie-Linde, 1934).

Remarks: Hartmeyer (1924) identified all the Faroese *Ascidiella* records as *A. aspersa*; the two European forms were not regarded as different species at that time. Since subsequent records all are identified as *A. scabra*, I assume that the early records of Hartmeyer also are of the form *scabra*. Naturally, this

ought to be confirmed by re-examination of the specimens at the Zoological Museum in Copenhagen.

Aside from the European records, *A. scabra* was recorded in Nagasaki, south of the Japan Sea in 1861, and termed *Ascidiella virginea* (Müller). A re-examination by Nishikawa and Otani (2004) stated that the specimens were identical with *A. scabra*; given the fact that the species never has been recorded since, the records of *A. scabra* in Nagasaki probably reflect an ephemeral occurrence.

Order **STOLIDOBRANCHIA**

Family: **STYELIDAE**

Genus: *Styela* Fleming, 1822

Styela atlantica (Van Name, 1912)

Good description: Van Name, 1912: 552-555; pls. 59, 60, and 68; Van Name, 1945; Millar, 1966: 70, fig. 45.

Previous records: None.

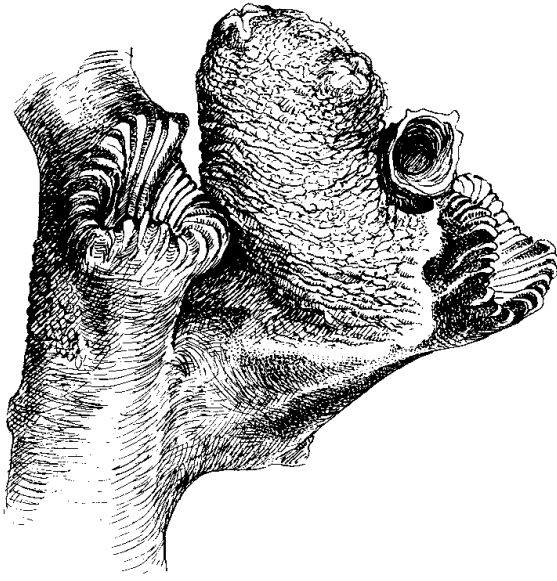


Figure 15. *Styela atlantica* attached to the coral *Lophelia pertusa* (from Lützen, 1967).

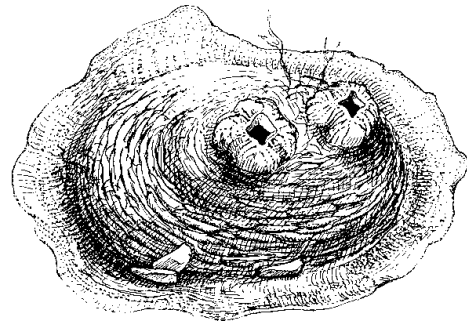


Figure 16. *Styela coriacea* (from Lützen, 1967).

BIOFAR stations (number of individuals in parentheses):
604(1); 1664(1).

BIOFAR area: Western slope of Sandoy Bank (of coast on the plateau east of the islands (61°50'N; 05°53'W)) (Fig. 27).

BIOFAR depth range: 15 and 260 m.

BIOFAR temperature: Estimated to 7.3 °C.

BIOFAR water mass: AW (Westerberg, 1990); EIW (Hansen and Østerhus, 2000).

North Atlantic/Nordic Seas distribution: Hjeltefjord near Bergen in Norway; Skagerak; northern North America (Millar, 1966).

General distribution: It is a strictly boreal species, occurring in all four northern boreal zoogeographic regions, i.e., it is amphi Atlantic and amphi Pacific.

General depth range: From 15 m (present study) to 750 m (Millar, 1966).

Remarks: *S. atlantica* is a rare species and the BIOFAR records are the first within the Faroese EEZ. Because of its rarity, it might have a larger distribution area than known at present; apparent absence from the Arctic could, e.g., result from low sampling effort.

***Styela coriacea* (Alder and Hancock, 1848)**

Good description: Hartmeyer, 1923:220-234; Van Name, 1945; Millar, 1966: 65, fig. 41.

Previous records: Danish mail-ship 1878?: Sandavágur 9-36 m (identification by Steenstrup. Identified by

Traustedt (1880) as *S. rustica* (Hartmeyer, 1923). "Diana" 1884?: Trongisvágur (identification by Fjeldstrup in 1887, (Hartmeyer, 1923)). Sampled 1897 or earlier: Skálafjørður 7-18 m (identification by H. Jónsson in 1897) (Hartmeyer, 1923). "Diana" 1898?: Vágsfjørður identified by H. Jónsson 1898 (Hartmeyer, 1923). "Thor" 1899: Between Stong and Eystnes 180 m, identified by Th. Mortensen (Hartmeyer, 1912). "Michael Sars" 1902: Wyville Thomson Ridge 426 m (60°23'N; 8°55'W), east of Munkagrúnninum 290 m (61°10'N; 5°46'W) (Bjerkkan, 1905). "Margrethe" or "Thor" 1913?: Trongisvágur 0-4 m (identification by Strubberg in 1913) (Hartmeyer, 1923). "Dana" 1927: Vestmannasund 45 m; Ørðavík; Trongisvágur, between Pladen and Tjaldavíkshólm, about 20 m. "Hvidbjørnen" 1931?: East of Nólsoy 75 m (62°2'N; 6°29'W); east of Sandoy Bank 229 m (61°46'N; 5°05'W) (Thompson, 1931).

BIOFAR stations (number of individuals in parentheses): 156(2); 486(1); 589(2); 1022(2); 1543(2); 1605(2); 1612(10); 1615(6); 1620(1); 1628(1); 1659(10); 1663(1); 1664(29); 1665(5).

BIOFAR area: Scattered coastal and off shore records on the plateau east of the islands; one record from the Bill Bailey Bank (Fig. 17).

BIOFAR depth range: 5-272 m.

BIOFAR temperatures: Estimated range 7.0 to 8.4 °C.

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Svalbard; coast of Norway; Kattegat; Sound; Belt Sea; Baltic to Bornholm; North Sea; northern coast of France; coasts of Great Britain; coasts of Ireland; Shetland; Faroes; Iceland; coasts of Greenland; northern North America (Millar, 1966).

General distribution: *S. coriacea* is widely distributed in

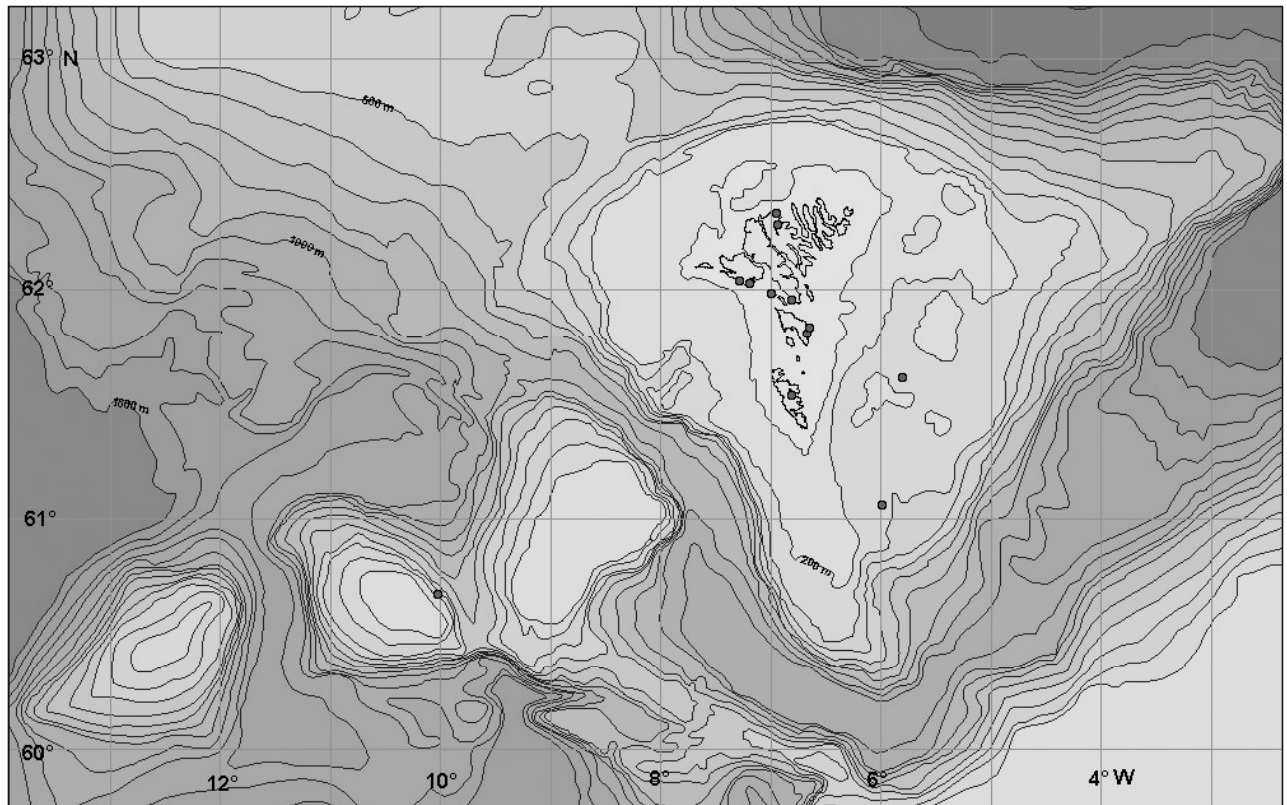


Figure 17. BIOFAR records of *Styela coriacea*.

the Arctic and all the northern boreal regions, and common within the Faroese EEZ.

General depth range: From shallow water to at least 600 m (Millar, 1966).

Remarks: *S. coriacea* has two forms of external appearance, a low dorso-ventrally compressed form and a tall, cylindrical form (Kjær, 1893; Ärnäck-Christie-Linde, 1922). This variation might be an expression of various environmental conditions, a point which is supported by the occurrence of all intermediate forms (Bjerkan, 1905; 1908). Moreover, the species is known to be highly contractile and able to change its shape greatly when alive (Van Name, 1912; 1945), hence the degree of contraction varies in preserved specimens; contraction occurs frequently regardless how careful specimens are relaxed before preservation (Gretchen Lambert pers. comm.).

***Styela gelatinosa* Traustedt, 1886**

Good description: Traustedt, 1886: 429; pl. 36, figs. 8-10; pl. 38, fig. 27; Hartmeyer, 1923; pl. 1, figs. 9-11; Millar, 1966: 67, fig. 43.

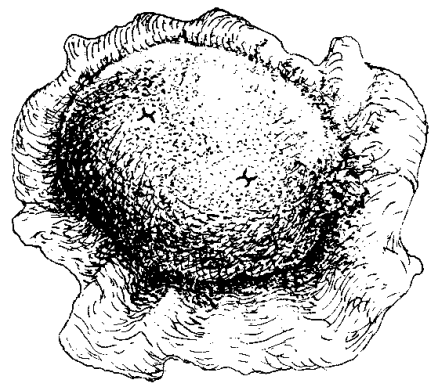


Figure 18. *Styela gelatinosa* (from Lützen, 1967).

Previous records: "Fylla" 1890: The slope of the Faroe-Shetland Channel 924 m (61°23'N;4°49'W) (Hartmeyer, 1923). "Michael Sars" 1902: Faroe-Iceland Ridge 480 m (63°14'N;9°46'W); Faroe-Shetland Channel 1130 m (60°19'N;5°06'W) (Bjerkan, 1905). Sampled 1904 or earlier: Southern end of the Faroe-Shetland Channel 588 m (60°37'N;05°42'W) (Michealsen, 1904 (in Hartmeyer, 1923)).

BIOFAR stations (number of individuals in parentheses):
425(1); 495(1); 1615(2).

BIOFAR area: Faroe-Iceland Ridge, and the channel between Faroe Bank and Bill Bailey Bank (Fig. 27).

BIOFAR depth range: 509 and 584 m.

BIOFAR temperatures: Estimated range 1.6 and 8.2 °C.

BIOFAR water mass: AW/AI.

North Atlantic/Nordic Seas distribution: Svalbard; coast of Norway; Norwegian Channel; Skagerak; Faroes; Iceland; coasts of Greenland (Millar, 1966).

General depth range: From about 100 m to 1300 m (Millar, 1966).

Remarks: The records from the channel between Faroe Bank and Bill Bailey Bank are the first records of this species on the western slope of the Greenland-Scotland Ridge, and the t.e. of 8.2 °C on these stations is the highest that hitherto is recorded for *S. gelatinosa*. This coldwater species has an Arctic distribution from western Greenland to the Kara Sea. In the boreal eastern Atlantic part of the Norwegian Sea the vertical distribution is confined to the slopes below 500 m, while in the Arctic it occurs at depths to about 100 m. (Hartmeyer, 1923). This probably reflects its ecological niche regarding temperature (see distribution map in Millar, 1966: 68).

The records on the Faroe-Iceland Ridge and between Faroe Bank and Bill Bailey Bank are textbook examples of overflow-dispersal. The occurrence of *S. gelatinosa* between the above mentioned banks supports oceanographical results that indicate an irregular overflow over the Wyville-Thomson Ridge and a subsequent westward flow caused by this overflow through the channels between the three banks southwest of the Faroes (Hansen and Østerhus, 2000). Records of *S. gelatinosa* in the Norwegian Channel and Skagerak are likewise a consequence of the penetration of the cold Norwegian Sea Deep Water into these areas.

Styela rustica (Linnaeus, 1767)

Good description: Hartmeyer, 1923: 196-213; Van Name, 1945; Millar, 1966: 67, fig. 42.

Previous records: Sampled 1870 or earlier: Locality not specified (identification by Müller in 1870 (1 specimen) and by Capt. Suenson in 1870 (2 specimens) (Traustedt, 1880). “*Diana*” 1884: Tórshavn (Hartmeyer, 1923). “*Thor*” 1899: Between Stong and Eystnes 180 m (Hartmeyer, 1912); off Borðoyarvík 37-55 m. Identified by Th. Mortensen (Hartmeyer, 1923). “*Margrethe*” or “*Thor*” 1913?: Trongisvágur 0-4 m (identification by Strubberg in 1913) (Hart-

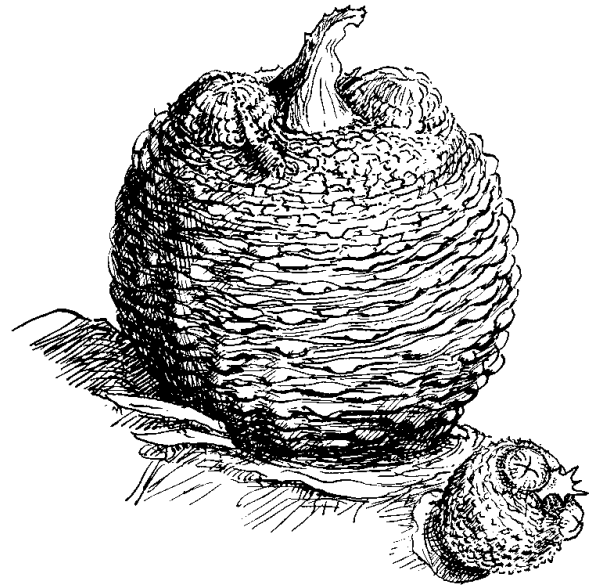


Figure 19. *Styela rustica* (from Lützen, 1967).

meyer, 1923). “*Beskytteren*” 1926: Sundalagið at Bátshøvda 6-10 m (Ärnäck-Christie-Linde, 1952). “*Dana*” 1927: East of Enniberg (62°27'N;6°26'W); southwest of Svínøy 80 m (62°13'N;6°23'W); off Gøtuvatvík (62°09'N;6°37'W) (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses):
152(1); 370(1); 548(1); 1022(1); 1023(1); 1025(4);
1027(1); 1030(1); 1176(2); 1205(1); 1245(1);
1341(1); 1377(1); 1431(1); 1451(1); 1517(1);
1521(1); 1543(1); 1562(2); 1612(7); 1613(2);
1616(3); 1628(3); 1638(1); 1646(1); 1659(1);
1664(9); 1665(5); 1667(1); 1675(1); 1744(1);
1786(2); 1791(1); 1797(1); 1801(9); 1810(1).

BIOFAR area: Mainly coastal records in shallow water, few scattered off shore records on the plateau east of the islands (Fig. 20).

BIOFAR depth range: 5-300 m.

BIOFAR temperatures: Estimated range 6.7 to 8.2 °C (based on three BIOFAR 1 stations).

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: Svalbard; Bear Island; coast of Norway; Skagerak to Sound; Faroes; Iceland; coasts of Greenland; northern North America (Millar, 1966).

General distribution: *S. rustica* is a circum-Arctic species. It is additionally found on both sides of the boreal Atlantic; on the Pacific side it occurs in the Bering Sea, the Sea of Okhotsk, and in the Sea of Japan; it is also recorded in the east Pacific south of the Bering Sea.

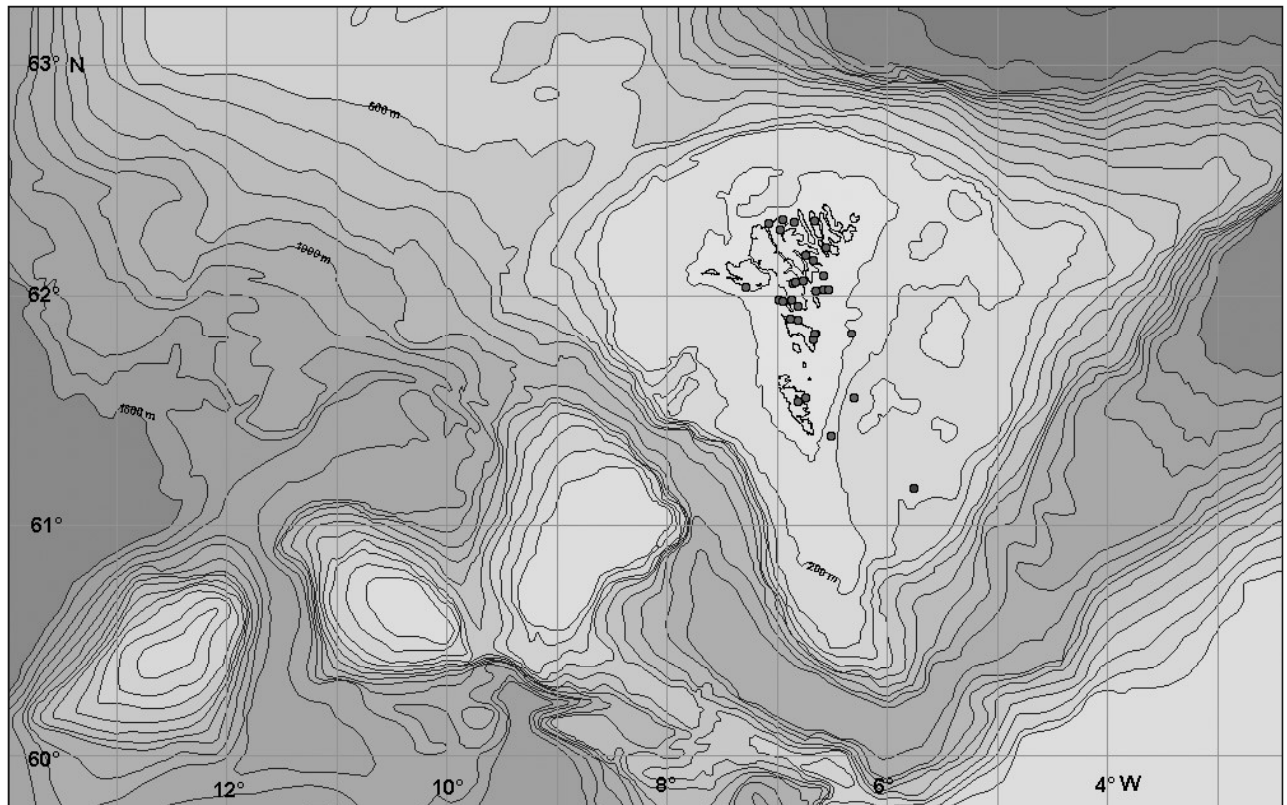


Figure 20. BIOFAR records of *Styela rustica* ● and *S. similis* ●.

General depth range: From shallow water to more than 400 m (Millar, 1966).

Remarks: The specimens found off the Kola Peninsula in the Arctic and the Gulf of Saint Lawrence between Pictou and Cape Bear in the boreal western Atlantic have a more rounded dorso-ventrally flattened body form contrary to the elongated cylindrical shape in specimens from other areas (Ärnback-Christie-Linde, 1922; Van Name, 1912). The reasons for these external variations might be ascribed variations in the physical environment and thereby exclusively phenotypic, or they may be caused by the same reason as mentioned for *S. coreacea* (see above), and thereby without genetic significance. Molecular analyses would state whether these specimens are different genetically from the typical form of *S. rustica*.

***Styela similis* Monniot, 1970**

Good description: Monniot, 1969a: 1143; fig. 4 a-d + pl. I.

Previous records: None.

BIOFAR station (number of individuals in parentheses): 476(1) (Fig. 20).

BIOFAR area: West of Munkagrunninum (Fig. 20).

BIOFAR depth range: 252 m.

BIOFAR temperatures: Estimated to 7.00 °C.

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Faroes, west of Ireland, and Bay of Biscay.

General distribution: Also recorded in Angola (33°22'S; 02°40'E).

General depth range: 250 to 4600 m (Monniot and Monniot, 1985).

Remarks: According to Klitgaard (1995), a single juvenile specimen, identified by Claude Monniot, was recorded on the sponge *Isops phlegraei* Sollas, 1880.

Taxonomic remarks: I have not examined the specimen. A translation of Monniot's (1969a) description is as follows: Small specimens of *S. similis* are completely covered with foraminiferans, larger specimens in lesser extent. Up to 1.5 cm long; siphons are slightly projecting. The tunic is always delicate; it is sufficiently resistant on the dorsal side, whilst the ventral part that fixes the animal to the substrate is invisible and extremely delicate. The mantle contains muscles only on the dorsal side; also the mantle is invis-

ible on the ventral side. There are about 20 to 25 irregularly disposed tentacles of 3 to 4 orders. The dorsal tubercle is situated in a deep depression. The branchial sac of the large specimens has four folds; in younger specimens the forth fold is frequently rudimentary. The longitudinal bars of a 1.5 cm specimen were counted:

Dorsal lamina 10 **13** 7 **15** 9 **15** 11 **12** 4 Endostyle

There is in average two stigmata between the longitudinal bars. The branchial sac is globular. The esophagus leads to a fairly globular stomach with 15 to 20 longitudinal folds and a small pyloric caecum. The intestinal loop is S-shaped. Anus is lobed with about 15 fine glands. There is one gonad on each side of the body; a long slightly sinuous tubular ovary round the lower end of which are grouped 6 to 20 testicular follicles. The sperm channels join to form a single sperm duct. There are a small number of endocarps dispersed mainly dorsally. The atrial siphon is surrounded by small filiform tentacles.

***Styela theeli* (Ärnbeck-Christie-Linde, 1921)**

Good description: Ärnbeck-Christie-Linde, 1921: 18-21; pl. 1, figs. 5-9.

Previous records: None.

BIOFAR station (number of individuals in parentheses): 090(4).

BIOFAR area: Southern point of the plateau (Fig. 26).

BIOFAR depth range: 252 m.

BIOFAR temperatures: Estimated 8 °C.

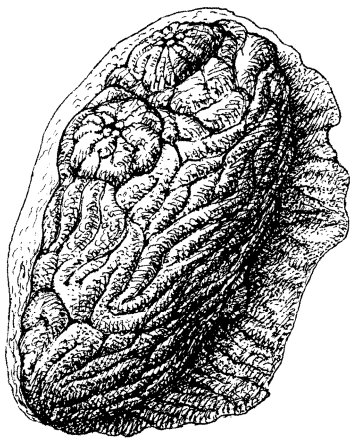


Figure 21. *Styela theeli* (from Lützen, 1967).

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Faroes; Bergen and Hardanger Fjord, Norway; and Koster Channel, Sweden.

General distribution: As above.

General depth range: 252 (present study) to 640 m (Ärnbeck-Christie-Linde, 1921).

Remarks: Confusion remains regarding this rare species which resembles in some respects *S. coriacea*; it has been recorded at only three localities, all within the boreal eastern Atlantic.

Of external differences it is notable that *S. theeli* is larger in size and attached by the left side of the body. Of internal differences the main characteristic separating these two species is in the numbers of gonads (one on left and two on right side in *S. theeli*, and one gonad on each side in *S. coriacea*); also the form of (bent along a sharp angle in *S. theeli* whilst sinuously curved or L-shaped in *S. coriacea*) and size of the gonads (larger in *S. theeli*) are different in the two species. See Ärnbeck-Christie-Linde (1922) for a comparison between the species.

S. theeli was synonymized with *S. coriacea* by Monniot (1969b). In order to clarify whether Monniot is correct, a re-examination, especially of the gonads of these specimens is necessary. In relation to this it is worth mentioning that some rare specimens of *S. rustica* have duplicate gonads on one side, however, not considered as a separate species since it is considered that this is an abnormality (Karen Sanamyan pers. comm.).

In the near future, in order to determine the status of this species, I plan to re-examine the four specimens that were recorded on four dead *Lophelia pertusa* blocks (Jensen and Frederiksen, 1992).

Genus: *Pelonaia* Goodsir and Forbes, 1841

***Pelonaia corrugata* Goodsir and Forbes, 1841**

Good description: Hartmeyer, 1923: 187-195; Van Name, 1945; Millar, 1966: 85, fig. 57.

Previous records: The Faroes referred to as a locality (Traustedt, 1880).

BIOFAR station: Not recorded by BIOFAR.

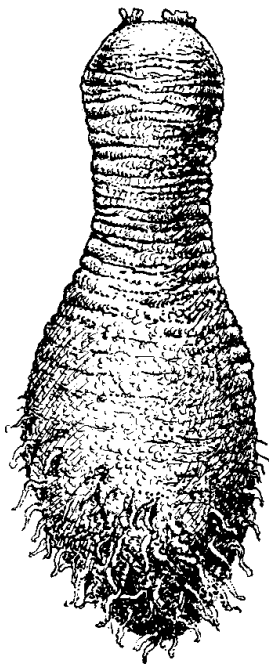


Figure 22. *Pelonaia corrugata* (from Lützen, 1967).

EEZ area: Kollafjørður and Skálafjørður (Nolsø, unpubl.)
EEZ depth range: 13 and 37 m (Nolsø, unpubl.).
EEZ temperature: Estimated 9-10 °C (Nolsø, unpubl.).
EEZ water mass: AW.

North Atlantic/Nordic Seas distribution: Svalbard; coasts of Norway; western coasts of Sweden; North Sea; northern coasts of Great Britain; Orkney; Shetland; Faroes; Iceland; coasts of Greenland; northern North America (Millar, 1966).

General distribution: Boreal western Pacific; Sea of Okhotsk; Bering Sea; Arctic basin; boreal western Atlantic; boreal eastern Atlantic.

General depth range: From shallow water down to 200 m (Millar, 1966).

Remarks: A certain Faroese record is only recently located (Nolsø, unpubl.). Traustedt (1880) referred the Faroes as a habitat of the species, but failed to specify the locality. His article is based on material from the Zoological Museum of Copenhagen. However, no individual of *P. corrugata* recorded from the Faroes exists in the museums collection. Traustedt did, on the other hand, identify a number of individuals that had been recorded from Iceland! Hence it seems that the Faroes were incorrectly assigned as habitat for *P. corrugata*.

Genus: *Cnemidocarpa* Huntsman, 1912



Figure 23. *Cnemidocarpa mollispina* (from Lützen, 1967).

Cnemidocarpa mollispina Ärnäck, 1922

Good description: Ärnäck-Christie-Linde, 1922: 28-29; pl. 2, figs. 23-26.

Previous records: None.

BIOFAR stations (number of individuals in parentheses): 19(1); 27(47); 29(1); 73(3); 168(2); 188(3); 271(2).

BIOFAR area: Scattered records off shore on the plateau east and north of the islands. One record from the northern slope of Faroe Bank (Fig. 24).

BIOFAR depth range: 170-990 m.

BIOFAR temperature: Estimated 6.5 °C.

BIOFAR water mass: NW/AW/AI.

North Atlantic/Nordic Seas distribution: Kara Sea, Øresund (Ärnäck-Christie-Linde, 1922) and Faroes (present study).

General distribution: As above.

General depth range: 15-100 (Gulliksen, 1974) and 170-990 m (present study).

Remarks: The location and water mass of Faroese records indicate that *C. mollispina* has an arctic area of distribution, rather than a boreal (Fig. 24). If so, the deep records from the Faroes reflect an example latitudinal submergence.

Dr. Francoise Monniot has confirmed my determination of the specimens.

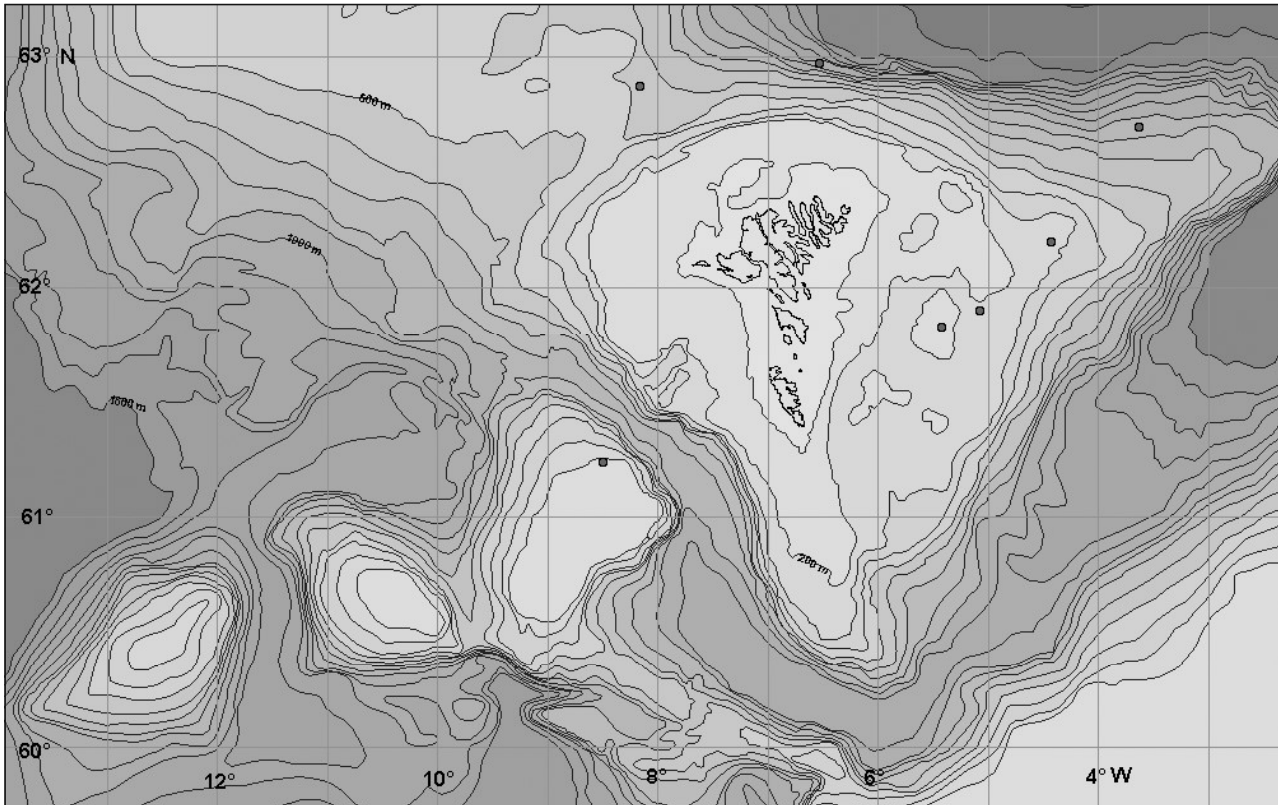


Figure 24. BIOFAR records of *Cnemidocarpa mollispina*.

***Cnemidocarpa mortenseni* (Hartmeyer, 1912)**

Good description: Van Name, 1912: 565-567; pl. 61, figs. 98-100; Hartmeyer, 1923: 253-256; Van Name, 1945.

Previous records: None.

BIOFAR station (number of individuals in parentheses): 692(39).

BIOFAR area: Lousy Bank (60°25'N; 12°49'W) (Fig. 26).

BIOFAR depth: 300 m.

BIOFAR temperature: Estimated 8.6 °C.

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Southern coasts of Norway; Skagerak; south west of Iceland; south eastern Greenland; northern North America (Millar, 1966).

General distribution: Davis Strait; boreal western Atlantic; boreal eastern Atlantic.

General depth range: From 62 to 1064 m (Hartmeyer, 1923).

Remarks: This is a rare amphi-Atlantic species, which in the Arctic has been recorded only once at the southern entrance of Davis Strait (Van Name, 1945).

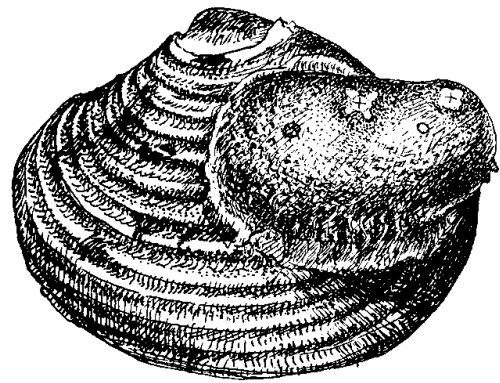


Figure 25. *Cnemidocarpa mortenseni* (from Lützen, 1967).

Genus: *Dendrodoa* MacLeay, 1825

***Dendrodoa aggregata* (Rathke, 1806)**

Good description: Hartmeyer, 1923: 288-310; Van Name, 1945; Millar, 1966: 63, fig 40.

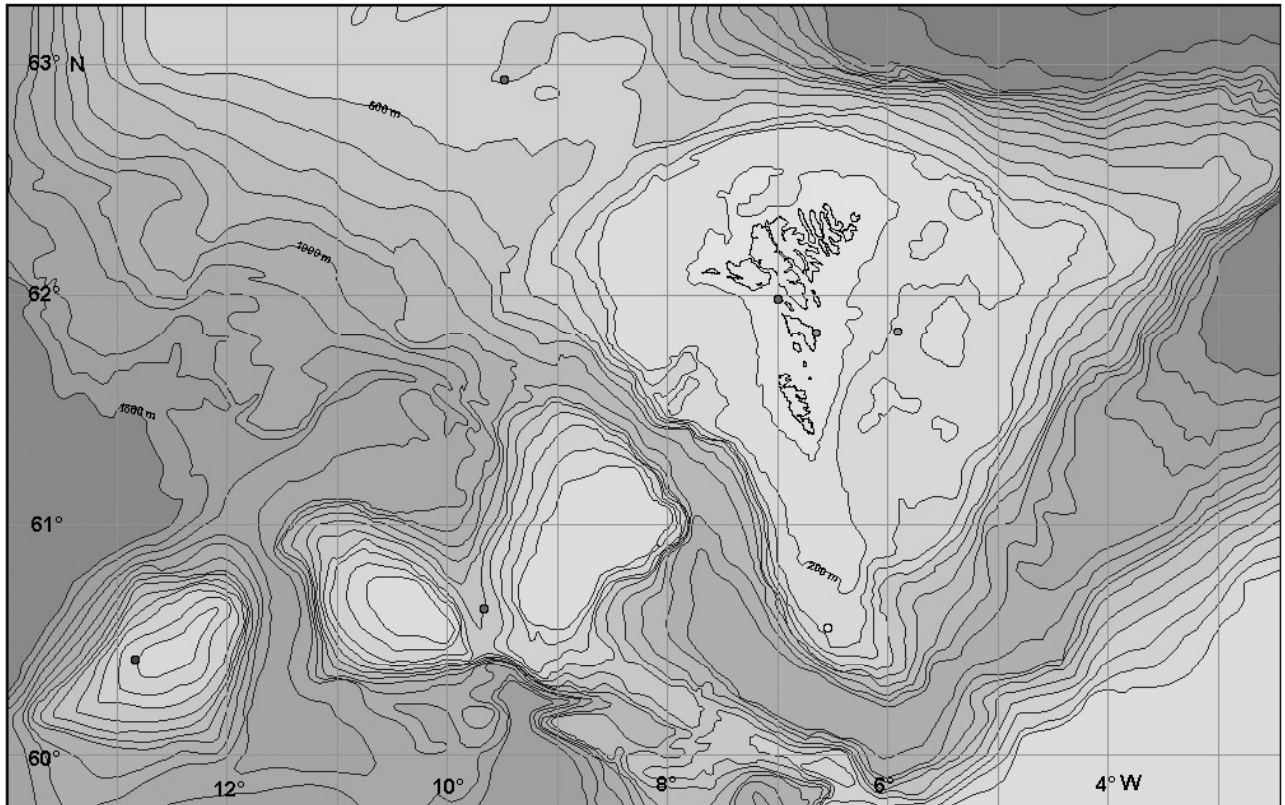


Figure 26. BIOFAR records of *Styela atlantica* ●, *S. gelatinosa* ●, *S. theeli* ○, and *Cnemidocarpa mortenseni* ●.

Previous records: “*Thor*” 1899: Between Stong and Eystnes 180 m (Hartmeyer, 1912). “*Beskytteren*”: Locality not specified (identification by Müller in 1902, (Hartmeyer, 1923)). “*Michael Sars*”, 1902: Eastern slope of the Faroe-Iceland Ridge 550 m (64°58'N; 11°12'W); Faroe Bank 151 m (60°46'N; 8°10'W) (Bjerkas, 1905). “*Beskytteren*” 1926: North of the Faroes 70 m; off Gøtúvík (62°09'N; 6°37'W); Skúvoy 54-75 m (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 152(1); 156(1); 269(3); 279(2); 1234(3); 1616(1); 1628(8); 1632(1); 1663(2); 1664(1); 1665(98).

BIOFAR area: Coastal records; on the plateau (Dalagrynnan; Suðuroyar Banki; Sandoyar Banki); Faroe-Iceland Ridge (Fig. 28).

BIOFAR depth range: 5-510 m.

BIOFAR temperatures: Estimated range 2.9 to 7.0 °C.

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: Svalbard; Bear Island; coast of Norway (predominantly northern part); Faroes; Iceland; coasts of Greenland; northern North America.

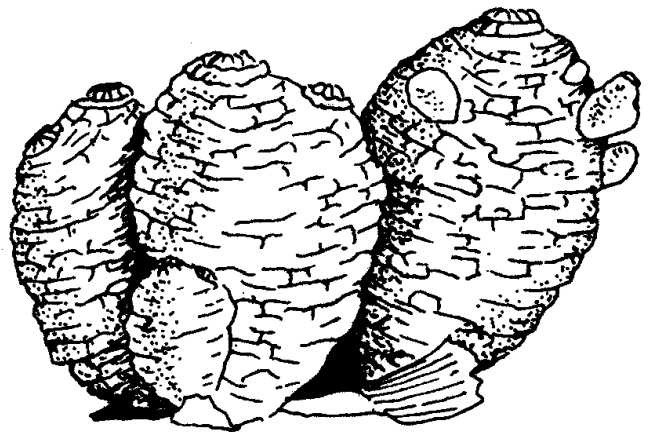


Figure 27. *Dendrodoa aggregata* (from Millar, 1966).

General distribution: *D. aggregata* is widely distributed in Arctic- and boreal waters. In the Arctic the species is circum-polar (Van Name, 1945) occurring also in the Bering Sea, where it is one of the most common ascidians (Sanamyan, 2000), and in the Sea of

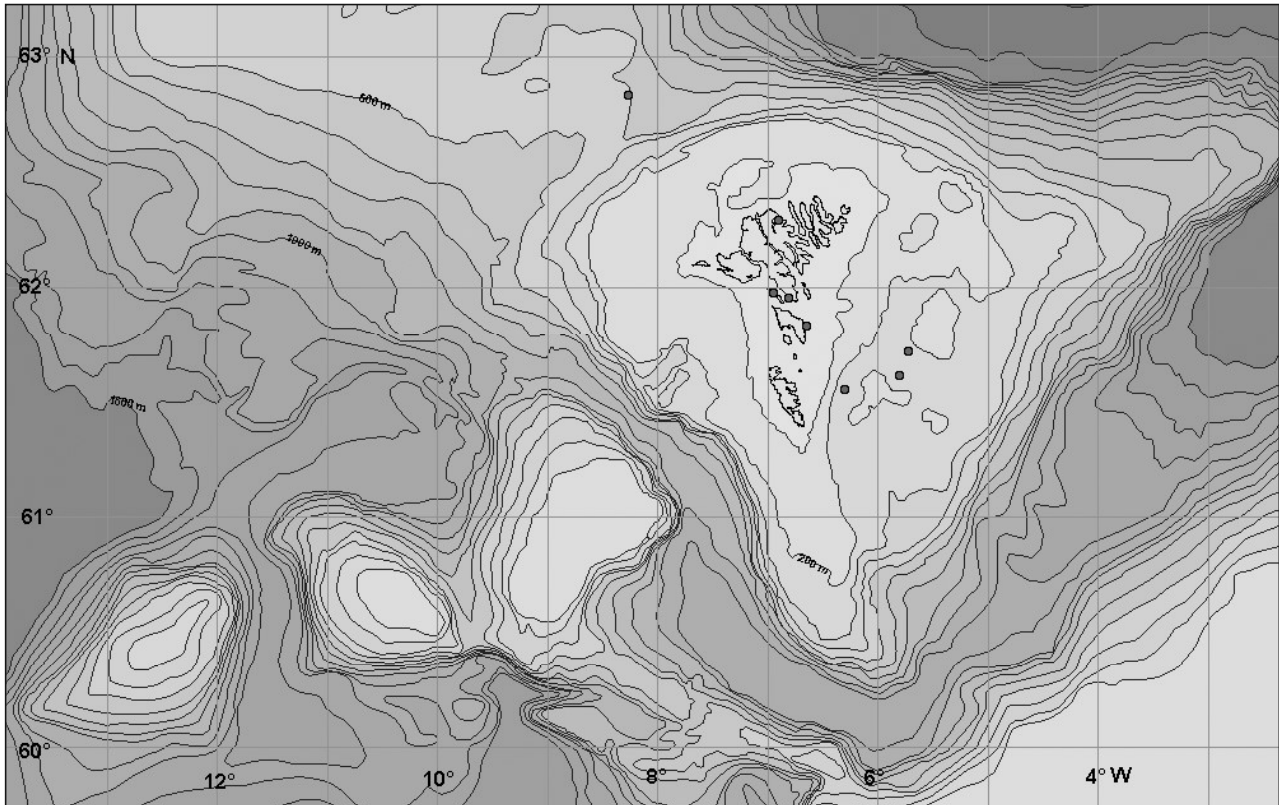


Figure 28. BIOFAR records of *Dendrodoa aggregata*.

Okhotsk. In the Pacific it occurs south to about 42°N in the Sea of Japan on the western side, while on the eastern side it has been recorded south to about Kodiak Island (about 57°N). In the boreal eastern Atlantic, the Faroes constitute the southern border of its distribution area.

General depth range: From shallow water to more than 500 m (Millar, 1966).

Remarks: The large species diversity in the Arctic of the genus *Dendrodoa* is notable. Of all known nine species of the genus *Dendrodoa* are eight (*D. aggregata*, *D. grossularia*, *D. carnea* (Rathke, 1806), *D. minuta* (Bonnievie, 1896), *D. annectens* (Hartmeyer, 1921), *D. lineata* (Traustedt, 1880), *D. pulchella* (Rathke, 1806) and *D. uniplicata* (Bonnievie, 1896) recorded from the Arctic, while *D. abotti* Newberry, 1984 is endemic to California (Newberry, 1984).

***Dendrodoa grossularia* (Van Beneden, 1846)**

Good description: Hartmeyer, 1923: 314-330; Millar, 1966: 62, fig. 39.

Previous records: “*Porcupine*” 1869: Wyville Thomson Ridge, eastern slope 653 m (59°56’N;06°27’W) (Herdman, 1884). “*Thor*” 1899: Between Stong and Eystnes 180 m, identified by Th. Mortensen (Hartmeyer, 1912). “*Beskytteren*” 1926: North of the Faroes 204 m; Funningsfjørður, 85 m; Skálafjørður, 7-14 m; Skálafjørður, 18-20 m; Sundalagi south of Ljósáir 20-25 m; Sundalagi off Skarvsøre, about 25 m; Trongisvágur off Punthavn about 8-10 m; Trongisvágur off Hvítanes, 20-27 m; Ørðavík; Trongisvágur, east off Tjaldavíkshólm 15-20 m (Árnþáck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 152(2); 156(26); 163(2); 281(2); 282(8); 357(2); 419(2); 466(1); 473(1); 482(2); 506(1); 507(2); 587(2); 602(1); 621(3); 1017(4); 1040(2); 1146(4); 1230(9); 1234(99); 1597(1); 1628(1); 1663(10); 1664(2); 1665(175); 1674(1).

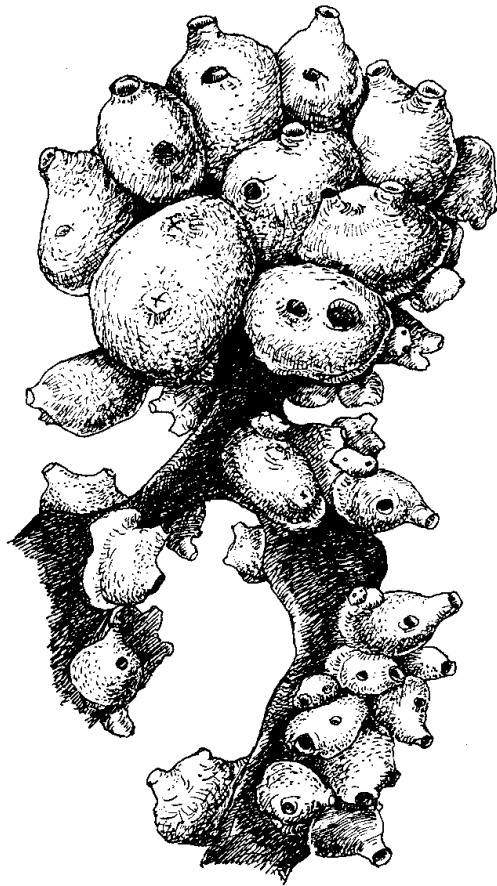


Figure 29. *Dendrodoa grossularia* (from Lützen, 1967).

BIOFAR area: Coastal records; off shore records on the eastern part of the plateau except for three records: One on southern and one on eastern slope of Faroe Bank, and one record on the western slope of the Faroe-Iceland Ridge (Fig. 30).

BIOFAR depth range: 5-702 m.

BIOFAR temperature: Estimated range 1.0 to 8.5 °C.

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: Svalbard; Bear Island; coast of Norway; western coast of Sweden; Denmark; English Channel; coasts of Great Britain; Ireland; Shetland; Faroes; Iceland; Jan Mayen; coasts of Greenland; northern North America (Millar, 1966).

General distribution: Western boreal Atlantic; Arctic; eastern boreal Atlantic; Bering Sea; Sea of Okhotsk.

General depth range: From the lower part of the shore (Millar, 1966) to 702 m (present study).

Genus: *Polycarpa* Heller, 1877

Polycarpa fibrosa (Stimpson, 1852)

Good description: Hartmeyer, 1923: 263-272; Van Name 1945: 254-256; pl. 2, fig. 6; Millar, 1966: 73, fig. 48.

Previous records: “*Lightning*” 1868: Western slope of the Wyville-Thomson Ridge 954 m (south of the Faroese EEZ 59°36’N;07°20’W) (Herdman, 1884). “*Ingolf*” 1896: Faroe Island Ridge, eastern slope 847 m (62°45’N;07°35’W) (Hartmeyer, 1923). “*Michael Sars*” 1902: Faroe Island Ridge 330 m (62°45’N; 07°35’W) (Bjerkan, 1905). “*Beskytteren*”? 1909: Northeast of the Faroes 1236 m (border of EEZ 61°42’N;02°W) (Ärnäck-Christie-Linde, 1952). Sampled 1923 or earlier: West of Sumbiargrynnu (61°22’N;07°20’W) (Ärnäck-Christie-Linde, 1952). “*Hvidbjørnen*”? 1931: Norðhavið 104 m (62°28’N; 07°02’W) (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 56(1); 158(2); 167(9); 169(7); 170(2); 188(16); 299(5); 381(2); 382(30); 397(1); 418(1); 424(1); 473(2); 478(2); 489(1); 494(10); 690(81).

BIOFAR area: Scattered off shore records on the plateau and the slopes of the plateau. One record in the Faroe-Shetland Channel; on the Wyville-Thomson Ridge; between Faroe Bank and Bill Bailey Bank; Lousy Bank; north of Bill Bailey; and on the Faroe-Iceland Ridge (Fig. 32).

BIOFAR depth range: 77-1200 m.

BIOFAR temperatures: Estimated range -0.85 to 8.6 °C.

BIOFAR water mass: NW/AW/AI.

North Atlantic/Nordic Seas distribution: Svalbard; coast

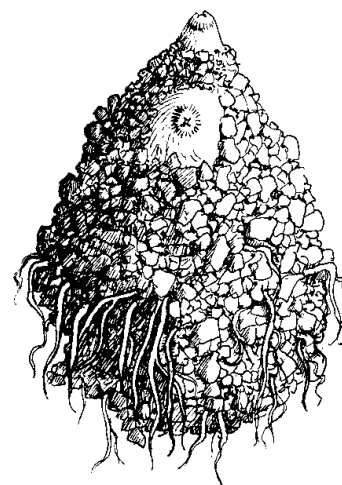


Figure 30. *Polycarpa fibrosa* (from Lützen, 1967).

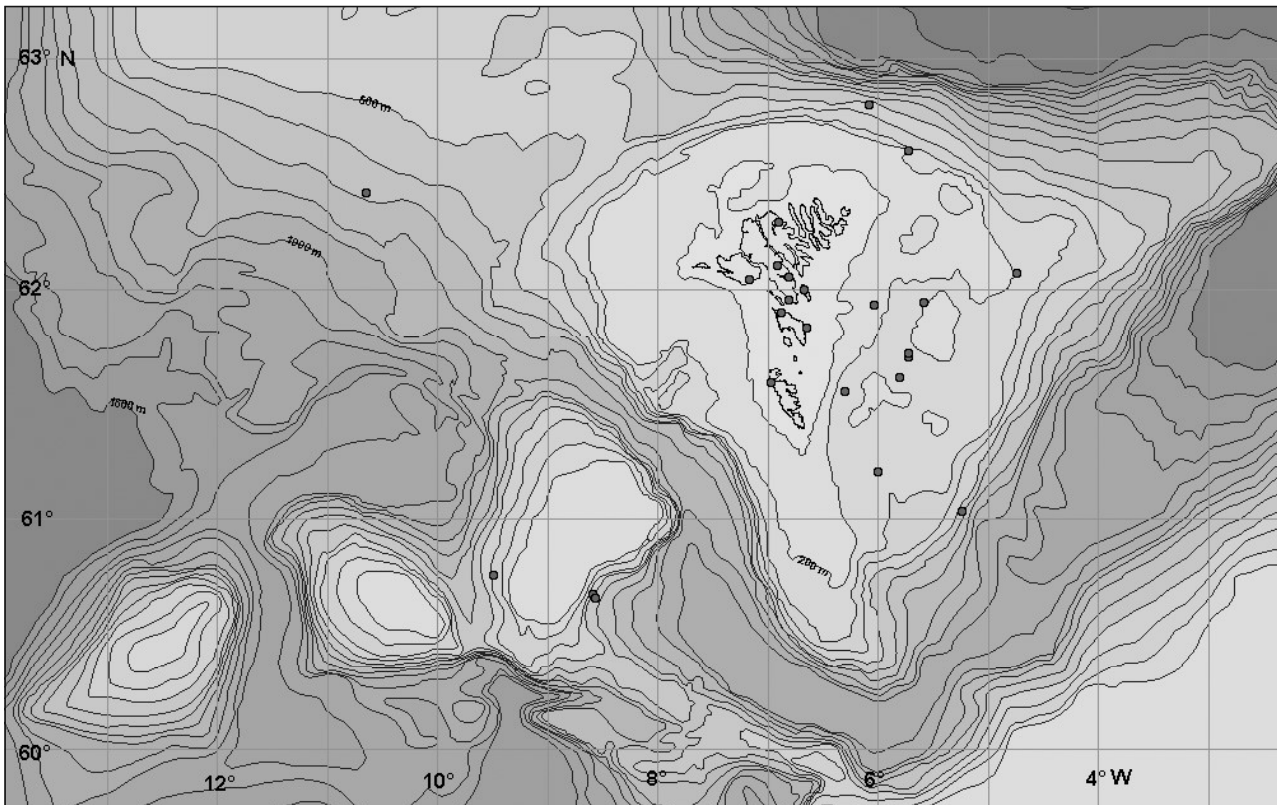


Figure 31. BIOFAR records of *Dendrodoa grossularia*.

of Norway; western coast of Sweden; Skagerak; Kattegat; North Sea; coast of the Netherlands; coast of Belgium; northern coast of France?; coasts of Great Britain; Ireland; Shetland; Faroes; Iceland; coasts of Greenland; northern North America (Millar, 1966).

General distribution: The boreal western Atlantic; boreal eastern Atlantic; Lusitanian; Mediterranean; and the Arctic.

General depth range: From low tide level (Berrill, 1950) to 1600 m (Lützen, 1959).

Remarks: *P. fibrosa* is also common in the boreal western Atlantic, where it probably dispersed either from the Arctic or the boreal eastern Atlantic, a topic discussed by Lützen (1959). The genus has a number of other representative species further south along the eastern coast of America in the Carolina region (Van Name, 1945); however, *P. fibrosa* is the only boreal western Atlantic representative *Polycarpa*.

***Polycarpa pomaria* (Savigny, 1816)**

Good description: Hartmeyer, 1923: 273-283; Millar, 1966: 76.

Previous records: Danish mail-ship 1878?: The Faroes

referred to as a locality (Traustedt, 1880). “*Triton*” 1882: Northwestern part of the Wyville-Thomson Ridge 147 m (60°40′–0 9°06′W) (Herdman, 1883; Tizard, 1883). “*Thor*” 1899: Between Stong and Eystnes 180 m, identified by Th. Mortensen (Hartmeyer, 1912). “*Beskytteren*” 1926: Funningsfjørður 82 m; Hvannasund, 80 m; off Gøtuvík (62°09′N; 6°37′W); Trongisvágur, between 6 m Pladen and Tjaldavíkshólm, about 20 m; Trongisvágur east of Tjaldavík 15-20 m (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 43(4); 44(3); 100(1); 105(1); 106(4); 152(5); 156(33); 158(7); 163(19); 282(3); 322(2); 328(1); 368(1); 371(18); 372(12); 547(1); 548(1); 599(1); 604(12); 621(1); 1017(3); 1230(2); 1235(1); 1377(3); 1517(1); 1519(1); 1521(9); 1553(1); 1562(5); 1602(1); 1620(2); 1628(12); 1637(3); 1659(4); 1662(2); 1663(2); 1664(45); 1665(39); 1667(2); 1675(1); 1744(1); 1750(3); 1786(4); 1791(4); 1801(29); 1815(1); 1816(1); 1834(1).

BIOFAR area: Coastal records; off shore records on the plateau east of the islands; one record in the Faroe Bank Channel; one record on southern slope of Faroe Bank (Fig. 34).

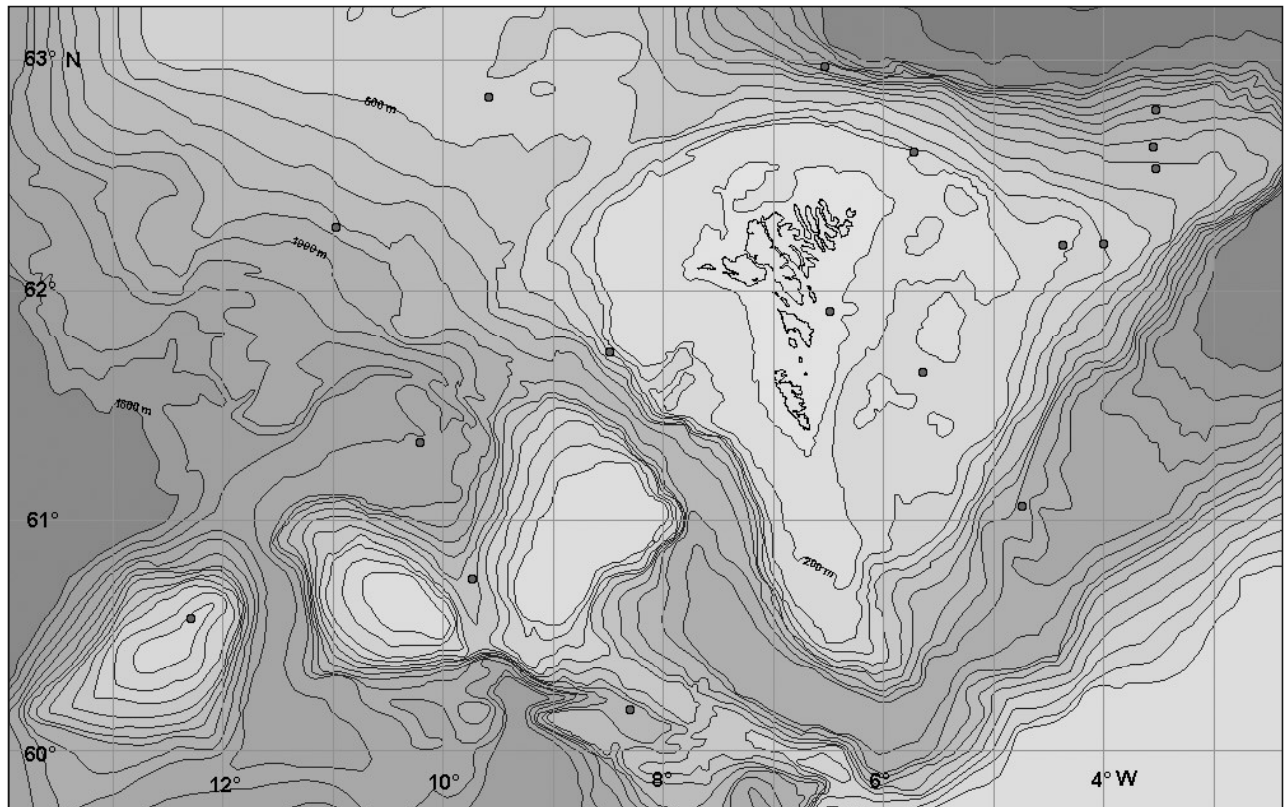


Figure 32. BIOFAR records of *Polycarpa fibrosa*.

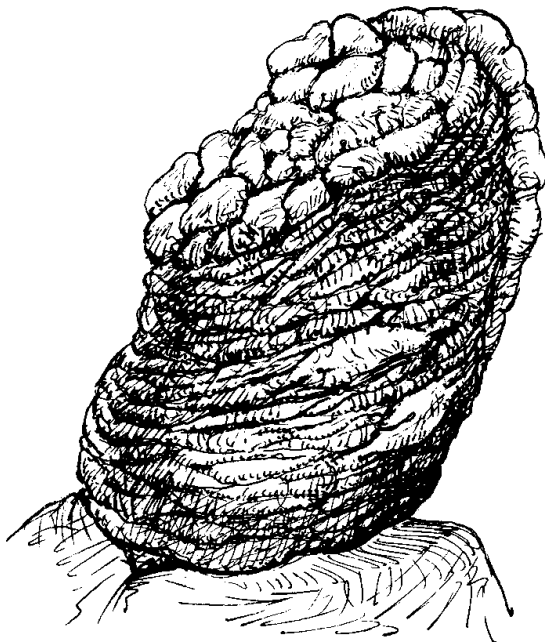


Figure 33. *Polycarpa pomaria* (from Lützen, 1967).

BIOFAR depth range: 5-400 m.

BIOFAR temperature: Estimated range 6.0 to 8.4 °C.

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: Svalbard; coast of Norway; western coast of Sweden; Kattegat; Denmark; North Sea; coast of France; coast of Spain; coasts of Great Britain; Orkney; Shetland; Faroes; Iceland (Millar, 1966).

General distribution: Boreal eastern Atlantic; Lusitanian; Mediterranean; and Svalbard.

General depth range: From shallow water to 450 m (Millar, 1966).

Remarks: The 'pomaria group', named by *P. pomaria*, is an ensemble of closely related *Polycarpa* species characterized by possession of a hard test without fibrils, featuring endocarps and polycarps scattered all over the inner body wall surface, and being attached to hard substrata (Vazquez *et al.*, 1995). Three species within this group are found in the three European regions: *P. pomaria*; *P. mamillaris* (Gaertner, 1774); and *P. scuba* Monniot, 1970 (syn. *P. rusticum*).

P. pomaria is the only species within the 'pomaria group' that with two records from Svalbard is

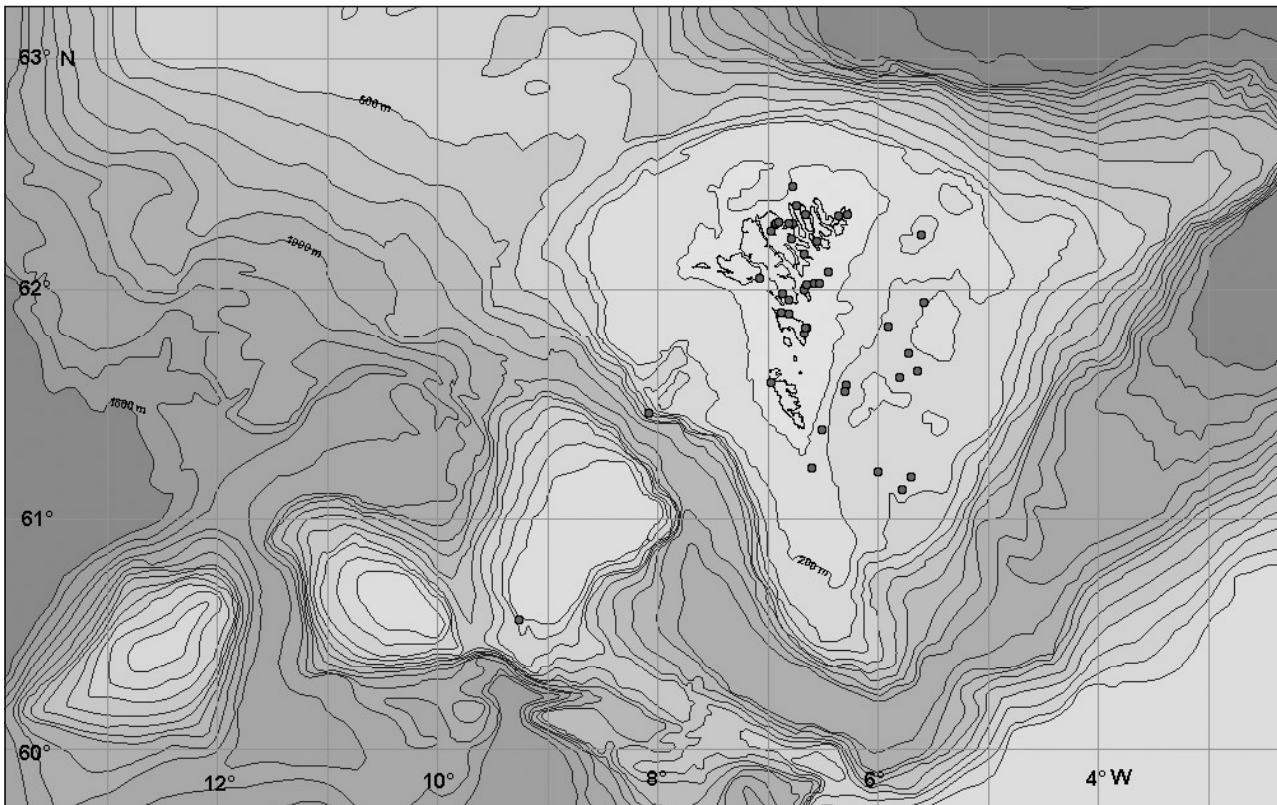


Figure 34. BIOFAR records of *Polycarpa pomaria*.

recorded in the Arctic region (Ärnäck-Christie-Linde, 1922). Dispersal into this region most likely occurred via the North Atlantic Current.

P. pomaria and *P. mamillaris* are difficult to separate; see Vazquez *et al.* (1995) for a comparison between these two species. I did not identify the *P. pomaria* according to the instructions recommended by these authors, thus a re-examination is necessary to clarify whether *P. mamillaris* is present among the material.

***Polycarpa porculus* Monniot C. and Monniot F., 1979**

Good description: Monniot and Monniot, 1979: 568-569, figs 2 B-C and 4 B.

Previous records: None.

BIOFAR stations (number of individuals in parentheses): 376(1); 550(1).

BIOFAR area: In association with sponge occurrences (Klitgaard, 1995) on the northern slope of Suðuroy Bank and south of this bank (Fig. 36).

BIOFAR depth range: 250 and 251 m.

BIOFAR temperature: Estimated 7.00 °C.

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Off Bergen, Norway; Faroes.

General distribution: Boreal eastern Atlantic, Lusitanian, and Mediterranean (each side of Gibraltar).

General depth range: From 250 m (Monniot and Monniot, 1979; present study) to 1163 m (Monniot and Monniot, 1988).

Remarks: The specimens were recorded on the sponge species *Thenea levis* and *Thenea valdiviae*, and identified by Claude Monniot (Klitgaard, 1995).

Family: PYURIDAE

Genus: *Boltenia* Savigny, 1816

***Boltenia echinata* (Linnaeus, 1767)**

Good description: Hartmeyer, 1923: 149-162; Millar, 1966: 92, fig. 62.

Previous records: Danish mail-ship 1878?: Locality not specified (Traustedt, 1880). “*Thor*” 1899: Between Stong and Eystnes 180 m, identified by Th. Mortensen (Hartmeyer, 1912). “*Diana*” 1901: Outer roads of Tórshavn 21–29 m. (identification by R. Hörning in 1901, (Hartmeyer, 1923)). “*Diana*” 1902?: Off Mykineshólm 102 m; Vestmanna (identification by Ditlevsen in 1902, (Hartmeyer, 1923)). “*Beskytteren*” 1926: Off Gøtuvík (62°09′N;6°37′W); Skálafjørður, at the shore; Vestmannasund, 45 m; Vestmannasund, south of Egilsnes 20–25 m; Miðvágur; Trongisvágur, between 6 m Pladen and Tjaldavíkshólm, about 20 m (Ärnäck-Christie-Linde, 1952). Sampled summer 1929: Kalsoyarfjørður (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 371(1); 1023(1); 1025(1); 1245(1); 1562(2); 1605(1); 1606(2); 1617(1); 1625(1); 1638(2); 1659(1); 1664(10); 1665(9); 1675(1); 1712(1); 1744(2); 1746(1); 1801(3); 1820(1).

BIOFAR area: Coastal records (Fig. 36).

BIOFAR depth range: 5–80 m.

BIOFAR temperature: Estimated 7.9 °C (based stn. 371).

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Svalbard; Bear Island; coast of Norway; western coast of Sweden; Denmark; northern coasts of Great Britain; Orkney; Shetland; Faroes; Iceland; coasts of Greenland; northern North America (Millar, 1966).

General distribution: *B. echinata* is distributed throughout the Arctic and in all four northern boreal regions, i.e., it is amphi Atlantic and amphi Pacific.

General depth range: From shallow water to 350 m (Millar, 1966).

Remarks: There are two arctic *Boltenia* species: *B. ovifera* (Linnaeus, 1767) and *B. echinata*. The distri-

bution of *B. ovifera* extends from boreal western Atlantic, Arctic Canada, Greenland, Alaskan coast of the Arctic Basin, Bering Sea, and the Sea of Okhotsk. In Japan waters *B. echinata echinata* is replaced by the subspecies *B. echinata iburi* (Sanamyan, 1996), which does not occur sympatrically with the common *B. echinata echinata* (Sanamyan, 1996).

Genus: *Halocynthia* Verrill, 1879

Halocynthia pyriformis (Rathke, 1806)

Good description: Hartmeyer, 1923: 163–171; Van Name, 1945; Millar, 1966: 99, fig. 68.

Previous records: Sampled 1900 or earlier, locality not specified (possibly Icelandic specimen); Tórshavn (identification by Müller in 1900, (Hartmeyer, 1923)).

BIOFAR station: Not recorded by BIOFAR.

EEZ area: Tórshavn.

EEZ depth range: Not specified.

EEZ temperature: Unknown.

EEZ water mass: AW.

North Atlantic/Nordic Seas distribution: Svalbard; Bear Island; coast of Norway; Faroes; Iceland; western coasts of Greenland; northern North America (Millar, 1966).

General distribution: The species has a northern distribution, being found in the Arctic basin and in both boreal regions of the Atlantic.

General depth range: From shallow water to about 200 m (Millar, 1966).

Remarks: Two species are known from the Arctic and the northern boreal regions; a third is found in the Mediterranean, Lusitanian and Mauritanian areas. These three species (*H. aurantium* (Pallas, 1787), *H. pyriformis* and *H. papillosa* (Linnaeus, 1767)) form a close species complex, distinct in the number of gonads, a character which is not constant for each species (Ärnäck-Christie-Linde, 1928).

Genus: *Microcosmus* Heller, 1877

Microcosmus glacialis (Sars, 1859)

Good description: Hartmeyer, 1923: 178–182; Van Name, 1945; Millar, 1966: 94, fig. 64.

Previous records: Sampled 1886 or earlier: Wyville Thomson Ridge 792 m (60°06′N;08°14′W) (Herdman, 1886 in Hartmeyer, 1923).

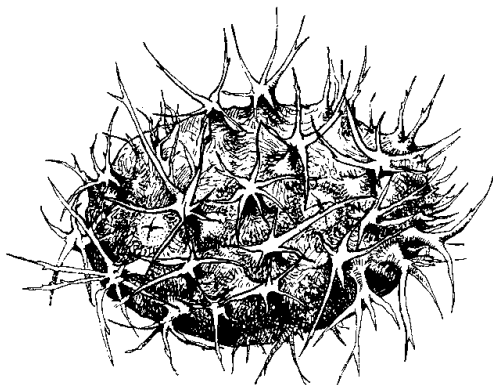


Figure 35. *Boltenia echinata* (from Lützen, 1967).

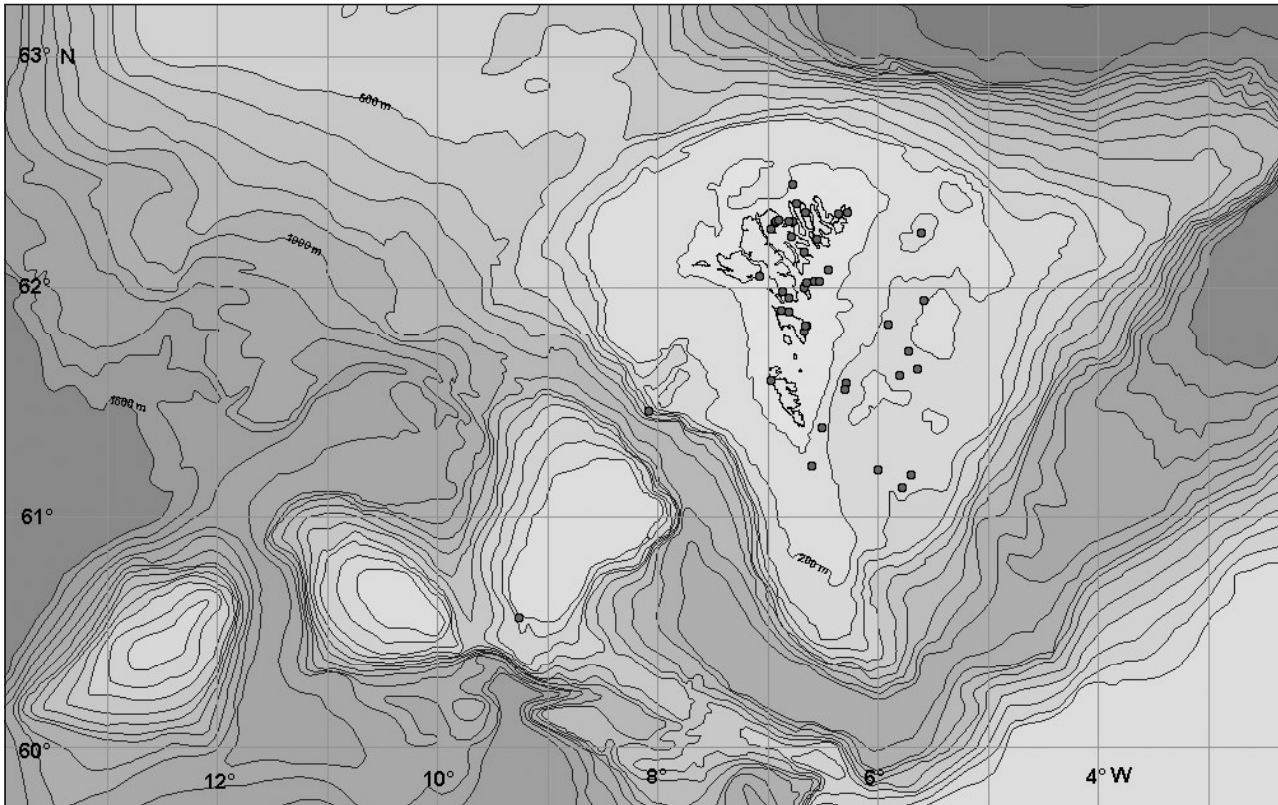


Figure 36. BIOFAR records of *Boltenia echinata* ● and *Polycarpa porculus* ●.

BIOFAR stations (number of individuals in parentheses):
137(1); 228(1); 315(1); 424(2); 477(1); 478(1);
480(1); 1607(2).

BIOFAR area: A single coastal record; four records from

the Faroe-Shetland Channel; one from the Faroe Bank Channel; one from the northern slope of Bill Bailey Bank; and one record from the Faroe-Iceland Ridge (Fig. 38).

BIOFAR depth range: 52-1150 m.

BIOFAR temperature: Estimated range -0.9 to 8.2 °C.

BIOFAR water mass: Mainly NW.

North Atlantic/Nordic Seas distribution: Coast of Norway; Kattegat?; Wyville Thomson Ridge; Faroes; Iceland; south eastern Greenland; northern North America (Millar, 1966).

General distribution: *M. glacialis* is recorded on both sides of the boreal Atlantic and in the lower Arctic area in the vicinity of the boreal Atlantic (White Sea, N. E. Greenland, and Davis Strait).

General depth range: From shallow water down to nearly 800 m (Millar, 1966).

Remarks: *M. glacialis* is a rare species with scattered records. I cannot point out any close relative to *M. glacialis* within the genus.

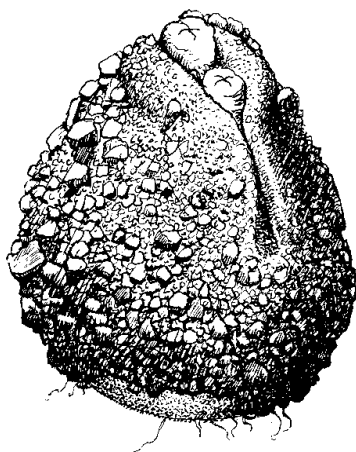


Figure 37. *Microcosmus glacialis* (from Lützen, 1967).

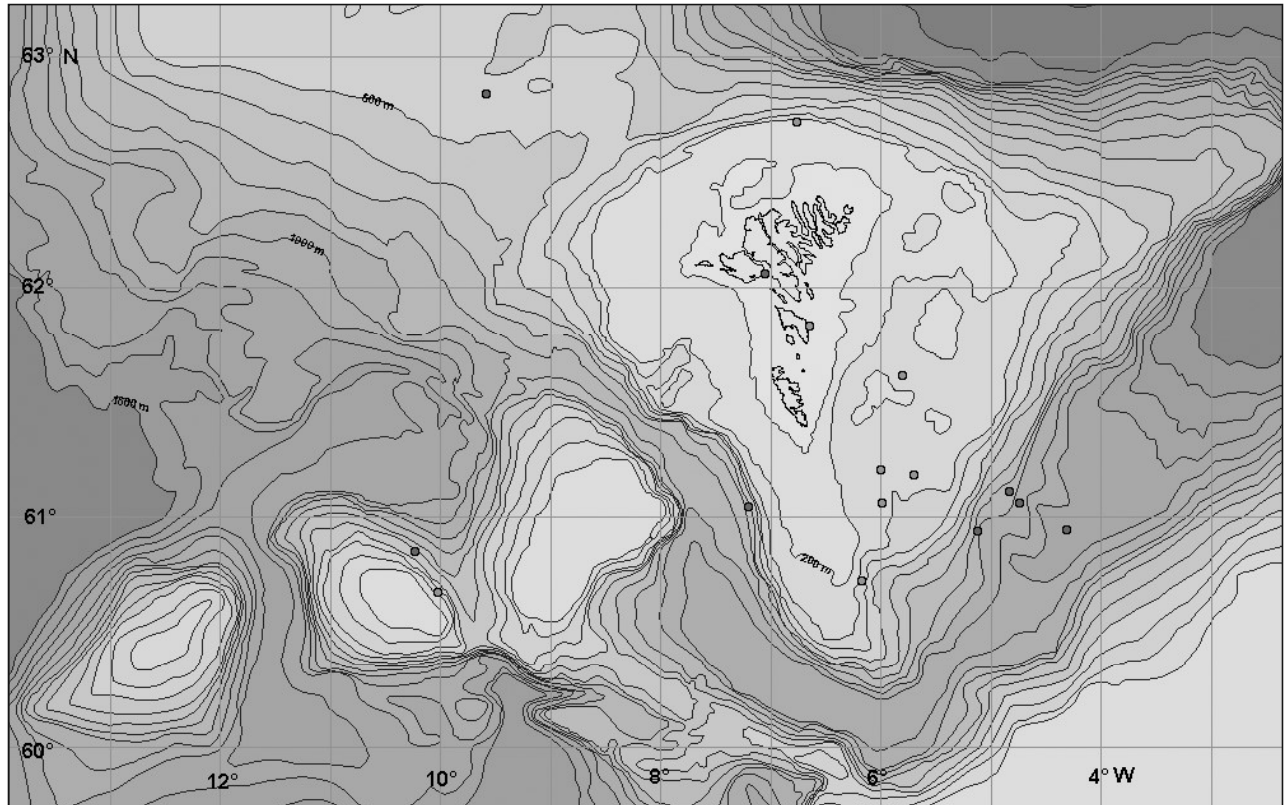


Figure 38. BIOFAR records of *Microcosmus glacialis* ● and *Pyura tessellata* ○.

Genus: *Pyura* Molina, 1782

Pyura tessellata (Forbes, 1848)

Good description: Hartmeyer, 1923: 174-175; Millar, 1966: 96, fig. 66.

Previous records: East of Suðuroy Bank, 283 m (61°39'N;04°45'W); east of Suðuroy Bank, 283 m (61°39'N;04°45'W); south east of Nólsoy Bank, 158 m (61°04'N;05°50'W); east of Sandoy Bank, 229 m (61°46'N;05°05'W) (Thompson, 1930).

BIOFAR stations (number of individuals in parentheses): 43(2); 156(7); 191(1); 282(1); 286(1); 486(4); 589(4); 1664(1).

BIOFAR area: One coastal record; five records on the plateau south east of the islands; one on the eastern slope of Bill Bailey Bank; and one record on the northern slope of the plateau (Fig. 38).

BIOFAR depth range: 15-272 m.

BIOFAR temperature: Unknown.

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Southern part of the Norwegian coast; western coast of Sweden; Belt;

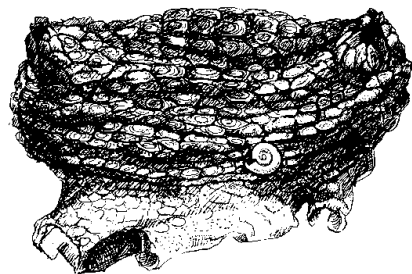


Figure 39. *Pyura tessellata* (from Lützen, 1967).

Kattegat; northern coast of France; southern and western part of Great Britain; Ireland; Shetland; Faroes (Millar, 1966).

General distribution: *P. tessellata* is recorded in the southern part of the boreal eastern Atlantic, in the Lusitanian region, and in the Mediterranean Sea. In the Mediterranean it is only recorded from the southern coast of France.

General depth range: From the lower part of the shore down to about 300 m (Millar, 1966).

Remarks: *P. tessellata*, *P. squamulosa* (Alder, 1863) and *P. microcosmus* (Savigny, 1816) (= *P. savignyi*) are related members of *Pyura* with similar distribution. The three species are distinguished primarily by different number of gonads and folds in the branchial sac.

Family: MOLGULIDAE

Genus: *Molgula* Forbes, 1848

Before the BIOFAR project the number of *Molgula* species recorded in the Faroese EEZ was relatively low, a fact that had been noticed by other authors (Ärnäck-Christie-Linde, 1952; Hartmeyer, 1923; Thompson, 1930). A doubling of the species recorded by the BIOFAR project (from three to six species) was therefore anticipated. The new EEZ molgulids are *M. herdmani* Bjerkan, 1905, *M. mira* (Ärnäck, 1931), and *M. occulta* Kuppfer, 1875.

Molgula citrina Alder and Hancock, 1848

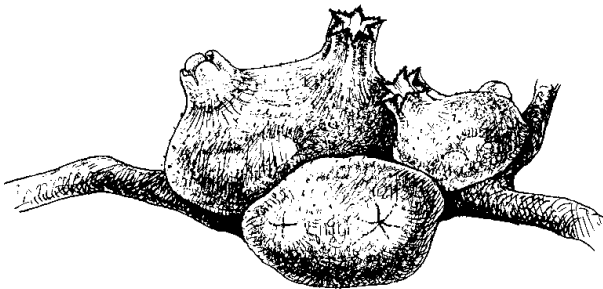


Figure 40. *Molgula citrina* (from Lützen, 1967).

Good description: Hartmeyer, 1923: 97-105; Van Name, 1945; Millar, 1966: 108, fig. 76.

Previous records: East of Nólsoy, 75 m (62°02'30 N; 06°29'W) (Thompson, 1930).

BIOFAR stations (number of individuals in parentheses): 1628(3); 1638(1); 1665(2); 1670(3).

BIOFAR area: Four coastal records (Fig. 41).

BIOFAR depth range: 5-10 m.

BIOFAR temperature: Unknown.

BIOFAR water mass: AW.

North Atlantic/Nordic Seas distribution: Svalbard; Norwegian coast; western coast of Sweden; Denmark; North Sea; Channel coast of France; coasts of Great Britain; Ireland; Shetland; Faroes; Iceland; northern North America (Millar, 1966).

General distribution: *M. citrina* is recorded on both sides of the boreal Atlantic and in Arctic areas bordering the boreal Atlantic; Western Greenland; Svalbard; and White Sea.

General depth range: From shallow water to about 60 m, occasionally below 200 m (Millar, 1966).

Remarks: The phylogenetic analyses made by Huber *et al.* (2000) place *M. citrina* in the so called Roscovitae clade together with *M. echinosiphonica* Lacaze-Duthiers, 1877; *M. oculata* Forbes, 1848; *M. occulta*; and *M. bleizi* (Lacaze-Duthiers, 1877) (all endemic to Europe), and *M. pacifica* (Huntsman, 1912) (endemic to boreal eastern Pacific).

Molgula complanata (Alder and Hancock, 1870)

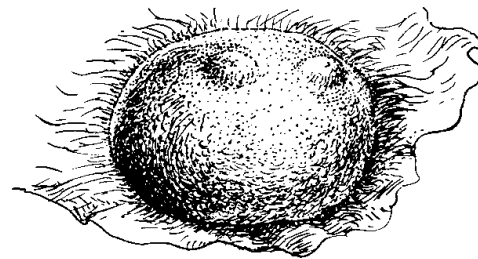


Figure 42. *Molgula complanata* (from Lützen, 1967).

Good description: Hartmeyer, 1923: 76-83; Van Name, 1945; Millar, 1966: 104, fig. 72.

Previous records: Rowingboat sample by Japetus Steenstrup 1844?: Sandavágur 9-18 m. identified by Steenstrup 1858 (Hartmeyer, 1923). "Thor" 1899: Between Stong and Eystnes 180 m. Identified by Th. Mortensen (Hartmeyer, 1912). "Beskytteren" 1926: Vestmannasund 45 m (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 1017(4); 1019(1); 1022(1); 1130(1); 1592(2); 1602(2); 1612(8); 1638(1); 1663(1); 1664(1); 1665(6); 1706(1); 1750(2); 1801(14) (in addition to these records, 1 individual of *M. complanata* is identified, that cannot be located to station).

BIOFAR area: Mainly coastal records. A few records east off Stong and Eystnes (Fig. 43).

BIOFAR depth range: 5-65 m.

BIOFAR temperature: Unknown.

BIOFAR water mass: AW.

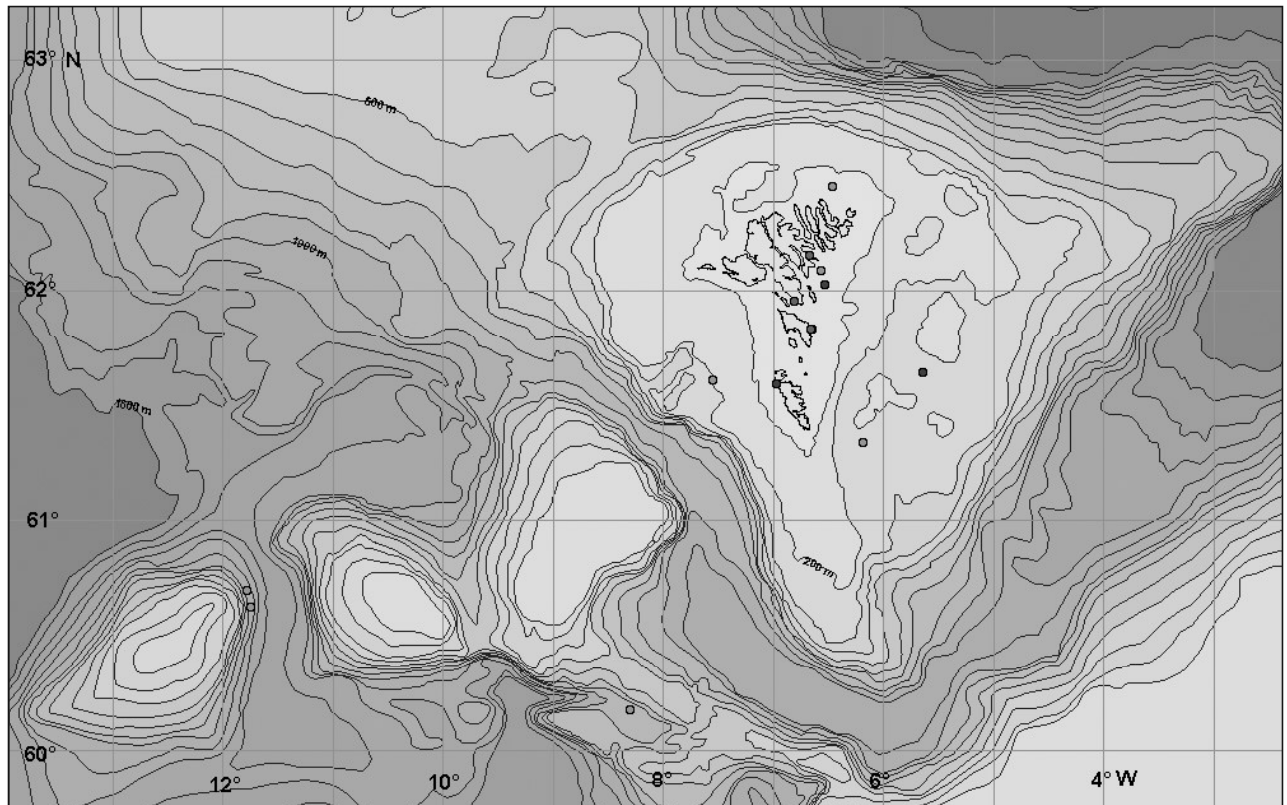


Figure 41. BIOFAR records of *M. occulta* ●, *M. siphonalis* ●, and *M. citrina* ●.

North Atlantic/Nordic Seas distribution: Svalbard; Norwegian coast; Skagerak; North Sea; English Channel; eastern coast of Great Britain; Shetland; Faroes; western coast of Greenland; northern North America (Millar, 1966).

General distribution: *M. complanata* is recorded on both sides of the boreal Atlantic and in the Arctic area in the vicinity of the boreal Atlantic (Svalbard; Murman Coast; White Sea; Barents Sea; Franz Josef Land; Siberian Sea).

General depth range: From lower part of the shore to depths greater than 500 m (Millar, 1966).

Remarks: The phylogenetic analyses made by Huber *et al.* (2000) suggest that two species: the tailed *M. complanata*, with Arctic and amphi-boreal Atlantic distribution, and the anural *M. tectiformis*, known, e.g., from the coast of Japan are closely related. *M. tectiformis* resembles, according to Nishikawa (1991), the three European molgulids *M. appendiculata* Heller, 1877; *M. simplex* Alder and Hancock, 1870; and *M. socialis* Alder, 1848, and also the Antarctic *M. hodgsoni*, Herdman, 1910.

***Molgula herdmani* Bjerkan, 1905**

Good description: Bjerkan, 1905: 5-7; pl. 1, figs. 1-6; Hartmeyer, 1923: 84-86; pl. 1, fig. 1; Millar, 1966: 104, fig. 73; Monniot and Monniot, 1979: 569, figs 3, A and 4, D.

Previous records: None.

BIOFAR station and individual: 491(1) (60°55'N;09°50'W, 986 m).

BIOFAR area: Northern entrance of the channel between Bill Bailey Bank and Faroe Bank (Fig. 45).

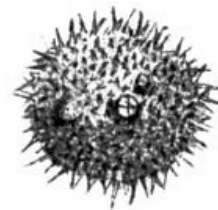


Figure 44. *Molgula herdmani* (from Bjerkan, 1905).

BIOFAR depth range: 986 m.

BIOFAR temperature: Estimated 6.9 °C.

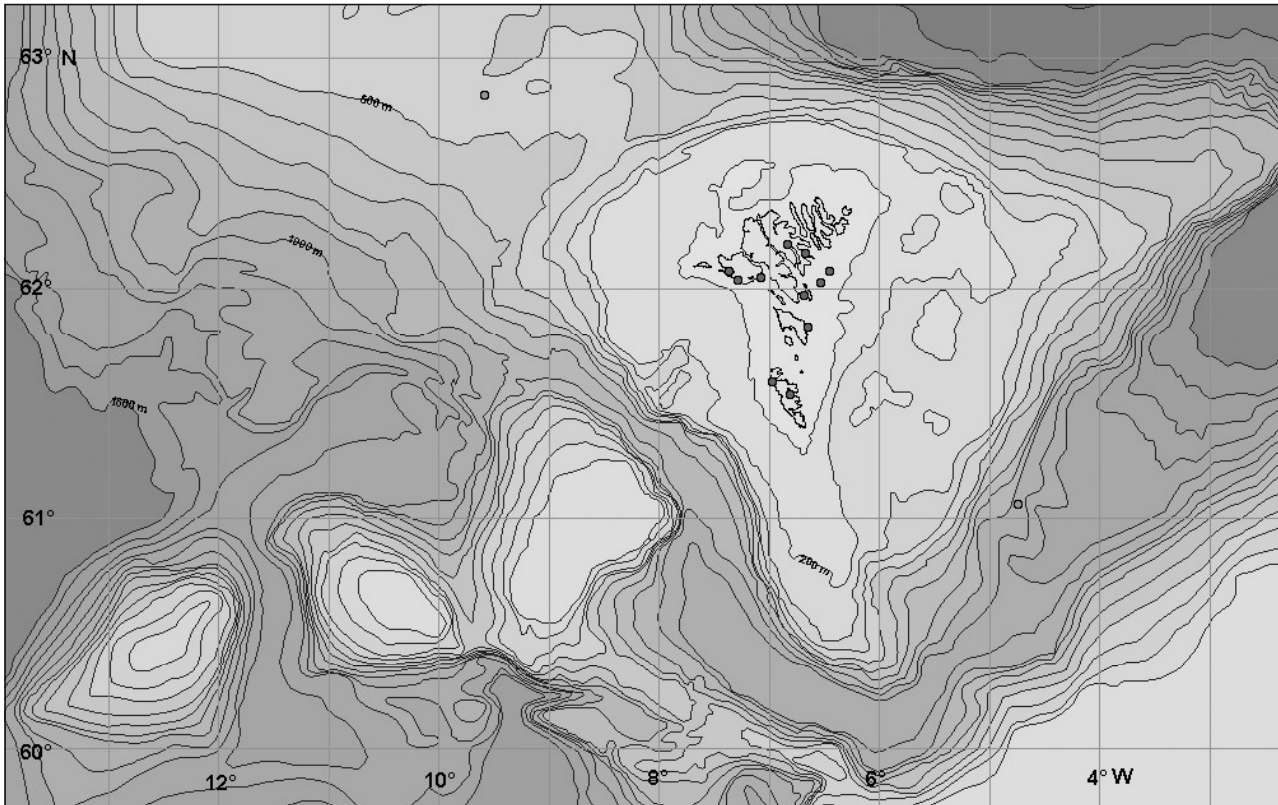


Figure 43. BIOFAR records of *M. complanata* ● and *E. islandica* ●.

BIOFAR water mass: AW/AI.

North Atlantic/Nordic Seas distribution: Lofoten and North Cape in Norway (Monniot and Monniot, 1979); north western coast of Norway; west of Wyville-Thomson Ridge (type locality) (Millar, 1966); south-west of the Faroes; possibly Svalbard (Ärnback-Christie-Linde, 1928).

General distribution: As above.

General depth range: In deep water to 1260 m (Millar, 1966); possible record from 18 m (Ärnback-Christie-Linde, 1928).

Remarks: The tentacles of this species are characteristic: The 24 tentacles are 12 double feather-formed and very large, and the intermediate piece between them forms a nice curve. The finest branches of the tentacles constitute small finger-formed series. See Bjerkan (1905) for good description and illustration. The closest relatives of *M. herdmani* are probably *M. romeri* Hartmeyer, 1903 and *M. kiaeri* Hartmeyer, 1901, having different shapes of the dorsal laminas as the most important distinguishing character, apart from the tentacles. I find *M. herdmani* a potential member of the Roscovita clade.

The species is viviparous, but it is not known whether the larvae are anural or urodele.

The identification of the single specimen is confirmed by Francoise Monniot.

***Molgula mira* (Ärnback, 1931)**

Good descriptions: Monniot and Klitgaard, 1994; Ärnback-Christie-Linde, 1931.

Previous records: None.

BIOFAR stations (number of individuals in parentheses): 474(1); 901(4).

BIOFAR area: South east of the Faroes (south off Munkagrinninum, and the Faroe-Shetland Channel) (Fig. 45).

BIOFAR depth range: 241-246 m.

BIOFAR temperatures: Estimated 7.1 °C (stn.474).

BIOFAR water mass: NW/AW.

North Atlantic/Nordic Seas distribution: Trondhjem Fjord and southeast of the Faroes (Monniot and Klitgaard, 1994).

General distribution: *M. mira* is only recorded southeast of the Faroes (south of Munkagrinninum and in the Faroe Shetland Channel) and in the Trondhjem Fjord

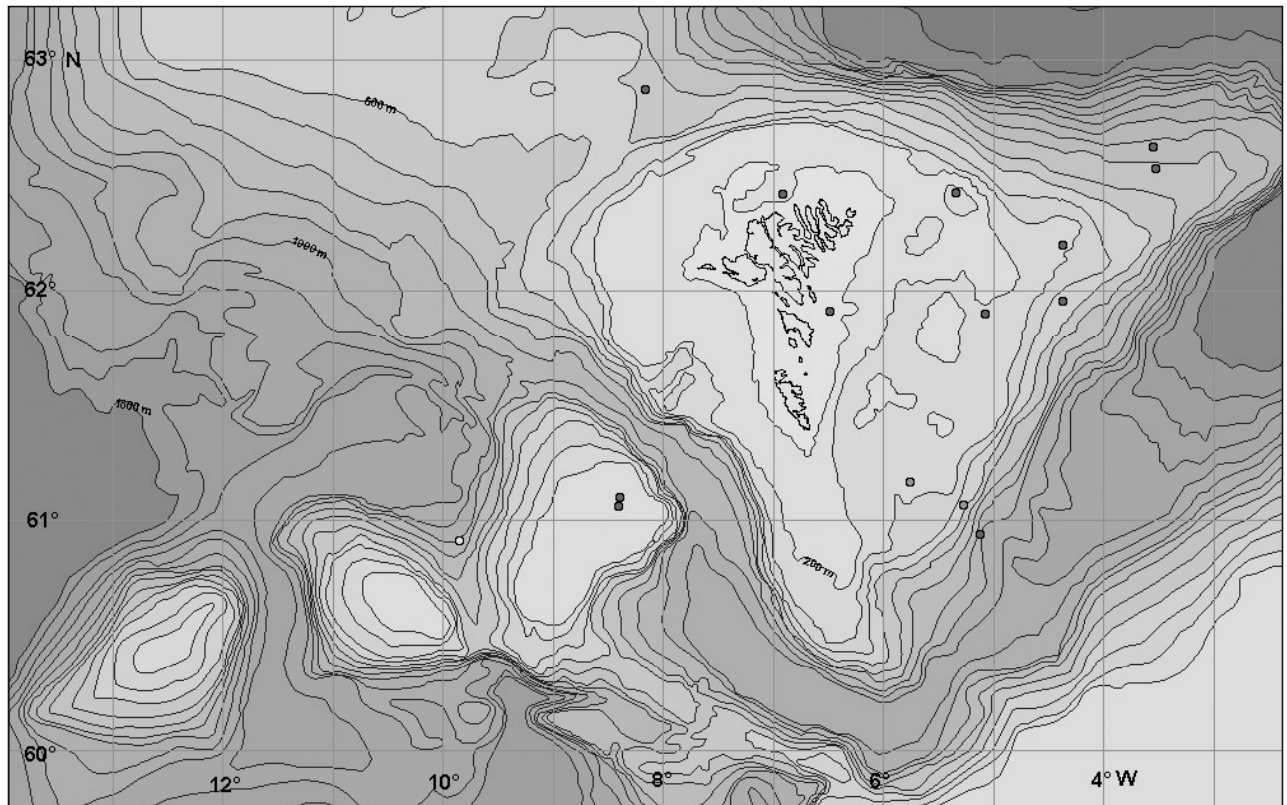


Figure 45. BIOFAR records of *Molgula herdmani* ○, *M. mira* ◐, and *Eugyra arenosa* ●.

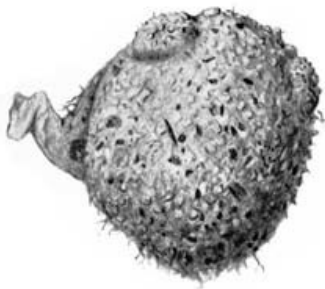


Figure 46. *Molgula mira* (from Ärnäck-Christie-Linde, 1931).

in south western Norway.

General depth range: From 246 to 400 m (Monniot and Klitgaard, 1994).

Remarks: *Molgula mira* is like *M. herdmani* a rare species apparently with a somewhat similar distribution area. The bathymetric range (246–400 m) indicates that this is a slope species.

It is notable, that all records of *M. mira* are associ-

ated with sponge records.

The phylogeny of this species is of interest, as it like *Eugyra arenosa*, has only one gonad, but like all other *Molgula* species the branchial sac has folds. *M. mira* is urodele and the branchial sac has, like several other molgulids, six folds on each side.

***Molgula occulta* Kuppfer, 1875**

Good description: Ärnäck-Christie-Linde, 1928: 30-34; pl. 1, figs. 23-26; Berrill, 1950: 254-256, figs. 90 and 91, D-G; Millar, 1966: 110, fig. 77; Monniot, 1969c: 213-219, fig. 19-22.

Previous records: None.

BIOFAR stations (number of individuals in parentheses): 299(1); 514(7); 515(25); 542(4); 886(2); 887(1); 888(1+2); 1663(1); 1664(1); 1801(1); 1811(1); 1837(1).

BIOFAR area: Coastal records (Skálavík, Sandoy 5 m; Skálavík, Sandoy 15 m; east of Nólsoy 55 and 60 m; Høgnaboði, east of Eystnes 37-50 m; north of Kalsoy 102 m); on the plateau west of Suðuroy (Skeivi Banki 200 m); Wyville-Thomson Ridge (923 m); north east-



Figure 47. *Molgula occulta* (from Lützen, 1967).

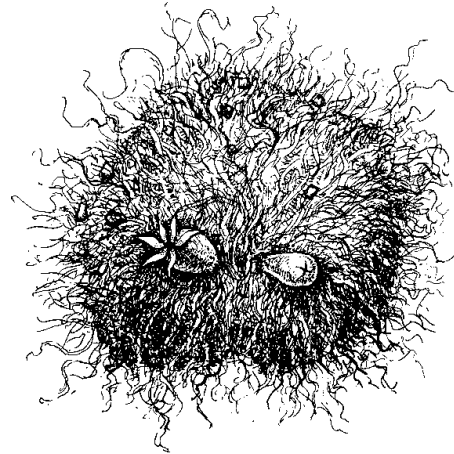


Figure 48. *Molgula siphonalis* (from Lützen, 1967).

ern slope of Lousy Bank (496 and 700 m) (Fig. 41).

BIOFAR depth range: 5-923 m.

BIOFAR temperature: Unknown.

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: Cost of Norway; western coast of Sweden; Kattegat; Skagerak; North Sea; English Channel; western coast of Great Britain; Ireland (Millar, 1966).

General distribution: *M. occulta* is found in the boreal eastern Atlantic-, Lusitanian-, and Mediterranean regions. In addition to this it is found in the Mauritanian and the Senegalian regions (Monniot, 1969c).

General depth range: From shallow water down to about 100 m (Millar, 1966); 5-923 m (present study).

Remarks: Based on morphological comparisons the closest relatives to *M. occulta* are *M. bleizi*, *M. oculata*, and *M. siphonalis* (see Monniot, 1969c) and this is also in agreement with the phylogenetic results (Huber *et al.*, 2000), except for *M. siphonalis* which not yet has been examined by molecular analyses.

One specimen deviates by having a ventrally oriented oviduct and a highly reduced dorsal fold of the branchial sac. Dr. Francoise Monniot has confirmed the identity of this specimen.

Information on records from stations 886, 887, and 888 are from Dinesen and Ockelmann (2005).

***Molgula siphonalis* Kiær, 1896**

Good description: Hartmeyer, 1923: 105-114; Van Name, 1945: 377-379; pl. 1, fig. 2 and pl. 6, fig. 3; Millar, 1966: 112, fig. 79.

Previous records: “Thor” 1899: Between Stong and

Eystnes 180 m. Identified by Th. Mortensen (Hartmeyer, 1912). “Beskytteren” 1926: Vágur, 43 m (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 158(1); 1019(2); 1664(6); 1801(15).

BIOFAR area: Two coastal records (Hvalbiareiði, Suðuroy 2-3 m; Skálavík, Sandoy 15 m); two records on the plateau of the islands (east of Nólsoy 55-60 m; between Suðuroy Bank and Sandoy Bank 322 m) (Fig. 41).

BIOFAR depth range: 2-322 m.

BIOFAR temperature: Estimated 6.6 °C (based on stn. 158).

BIOFAR water mass: Mainly AW.

North Atlantic/Nordic Seas distribution: Svalbard; Bear Island; Norwegian coast; western coast of Sweden; Faroes; Iceland; coasts of Greenland; northern North America (Millar, 1966).

General distribution: *M. siphonalis* has the largest occurrence in the Arctic where it is found from the Kara Sea in the east to Disko Fjord in western Greenland, and one record is from the Bering Sea. *M. siphonalis* is found on both sides of the boreal Atlantic and these records are chiefly confined to the northern parts, although southern records occur on both sides, *i.e.*, Gullmarfjorden, Sweden (Ärnäck-Christie-Linde, 1928) and 41°49' N; 65°49' 30'' W off the American east coast (Van Name, 1945).

General depth range: From shallow water about 300 m (Millar, 1966).

Remarks: *M. siphonalis* is probably indigenous to the Arctic (Hartmeyer, 1923; Ärnäck-Christie-Linde, 1928; Thompson, 1930; Monniot, 1969c) and as men-

tioned above, the closest relatives are probably *M. oculata*, *M. occulta*, and *M. bleizi*, and together with *M. citrina* and *M. echinosiphonica* all these species probably belong in the Roscovita clade.

Genus: *Eugyra* Alder and Hancock, 1870

Eugyra arenosa Alder and Hancock, 1848

Good description: Hartmeyer, 1923: 30-39; Millar, 1966: 118, figs. 83b and 84.

Previous records: "Thor" 1899: East off Bispinum 126 m; south of Mykines 126 m. Identified by Th. Mortensen (Hartmeyer, 1923). "Diana" 1901: Vestmanna; Funningsfjørður 21-36 m. Identified by Hörning 1901 (Hartmeyer, 1923). "Dana" 1927: Funningsfjørður 75 m (62°18'N; 06°53'W) (Ärnäck-Christie-Linde, 1952).

BIOFAR stations (number of individuals in parentheses): 27(3); 56(5); 76(14); 77(3); 169(1); 170(5); 193(2); 271(1); 356(1); 359(1); 382(1); 480(1).

BIOFAR area: Mainly off shore records on the plateau east of the islands; two records from the ridge between the Norwegian Sea and the Faroe-Shetland Channel; one in the Faroe-Shetland Channel; two on Faroe Bank; and two records north of the islands (Norðhavið and Faroe-Iceland Ridge) (Fig. 45).

BIOFAR depth range: 99-808 m.

BIOFAR temperatures: Estimated range -0.6 to 9.1 °C.

BIOFAR water mass: NW/AW/AI.

North Atlantic/Nordic Seas distribution: Norwegian coast; Swedish coast; Skagerak; North Sea; English Channel; coasts of Great Britain; Shetland; Faroes (Millar, 1966).

General depth range: From shallow water (Hartmeyer, 1923; Millar, 1966) to 1152 m (Herdman, 1883).

General distribution: *E. arenosa* is confined to the three zoogeographic regions of Europe, the boreal, Lusitanian, and Mediterranean.

Remarks: Apart from Herdman's (1883) record from deeper waters *E. arenosa* is found only from shallow water to 150 m (Hartmeyer, 1923; Millar, 1966). The BIOFAR records suggest that the species is more common in deeper water than previously assumed.

Eugyra islandica Millar, 1974

Good description: Millar, 1974: 150, figs. 1-6.

Previous records: None.

BIOFAR stations (number of individuals in parentheses): 424(51); 478(1).

BIOFAR area: Faroe-Shetland Channel and the Faroe-Iceland Ridge (Fig. 43).

BIOFAR depth range: 509 and 973 m.

BIOFAR temperatures: Estimated range -0.80 and 1.5 °C.

BIOFAR water mass: NW and AI.

North Atlantic/Nordic Seas distribution: Faroes (present study) and Iceland (Millar, 1974).

General depth range: The records from Iceland are from 10-15 m (Millar, 1974).

General distribution: As above.

Remarks: *E. islandica* seem to be an intermediate form of *E. glutinans* and the Arctic endemic *E. pedunculata* Traustedt, 1886 differing from the former by the number of gonads, and the latter by their structure (Millar, 1974).

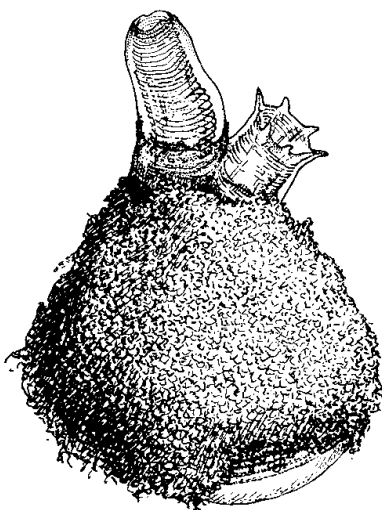


Figure 49. *Eugyra arenosa* (from Lützen, 1967).

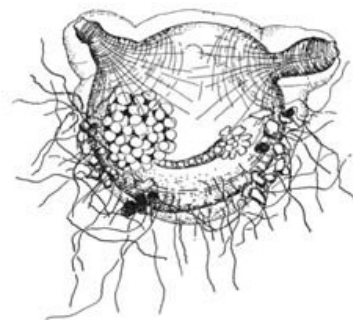


Figure 50. *Eugyra islandica* (from Millar, 1974).

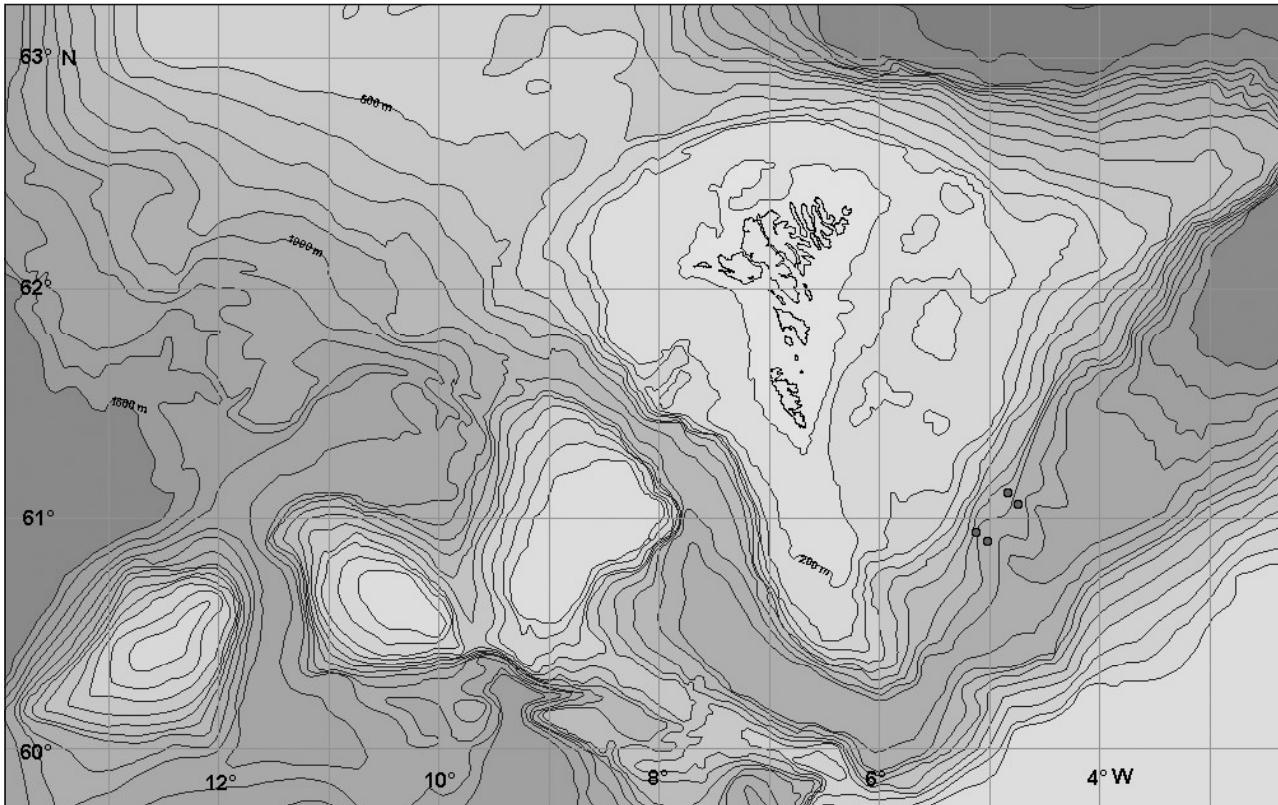


Figure 51. BIOFAR records of *A. arcticus*.

Class **SORBERACEA**

Family **HEXACROBYLIDAE**

Genus: *Asajirus* Kott, 1989

(syn. *Hexadactylus* Monniot, 1990)

Asajirus arcticus (Hartmeyer, 1923)

Common synonyms: *Hexadactylus arcticus* (Hartmeyer, 1923); *Hexacrobylus arcticus* Hartmeyer, 1923.

Good description: Hartmeyer, 1923: 133-137, pl. 1, fig. 5-6; Monniot and Monniot, 1990: 261-263, fig. 11.

Previous records: None.

BIOFAR stations (number of individuals in parentheses): 228(11); 478(17); 479(37); 480(6).

BIOFAR area: Faroe-Shetland Channel (Fig. 51).

BIOFAR depth range: 806-973 m.

BIOFAR temperature: Estimated -0.6 °C.

BIOFAR water mass: Mainly NW.

North Atlantic/Nordic Seas: Norwegian Sea; eastern slope of the Faroe-Iceland Ridge; Iceland Sea; and the Greenland Sea (Monniot and Monniot, 1990).

General distribution: As above.

General depth range: In deep waters from 806 (present

study) to 2538 m (Monniot and Monniot, 1990).

Remarks: The records from BIOFAR in the Faroe-Shetland Channel are the southernmost (60°54'N; 05°00'W, st. 479) and the ones from the most shallow waters (806 m, st. 480) until now.

Due to the small size of the specimens and since *A. arcticus* and *A. ledanoisi* are very much alike, distinguished mainly on the length of the sperm duct (longer in *A. ledanoisi*), Dr. Francoise Monniot has re-examined the specimens and confirms that all are very young and small specimens of *A. arcticus*.

Kott (1992) synonymized *A. arcticus* and a number of other related species with *Asajirus indicus*. I do not consider myself experienced enough to comment on the disagreement regarding the taxonomy of this difficult group, but I will, however, refer to these specimens as *A. arcticus*.

On to that, the validity of this class is questioned by some taxonomists. According to Kott (1989) all members of the family Hexacrobylidae belong to the class Ascidiacea, and she placed this family (the single family within Sorberacea) in the class Ascidiacea, Order Stolidobranchia. Kott's view is supported by Sanamyan (Karen Sanamyan, pers. comm.).

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