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Fauna of Bryozoa from Kongsfjorden, West Spitsbergen

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ABSTRACT: Bryozoans were collected in Kongsfjorden (79°N and 12°E) in the summer seasons of 1997, 1998, and 1999. In the total of 44 grab, dredge, and SCUBA diving samples 143 taxa were determined: 123 species, 17 to the generic and 3 to the family level. In the investigated material were 24% Arctic species and 66% boreal-Arctic species. This suggests a rather Arctic nature of the fjord. A few boreal species indicate the influence of warm water masses (West Spitsbergen Current). The majority of species (76%) have an encrusting life form. There were 5 species with a frequency of occurrence higher than 20%. These are *Electra crustulenta* var. *arctica* (31.82%); *Cylindroporella tubulosa* (27.27%); *Tegella arctica* (22.73%); *Tegella armifera* (20.45%); and *Hippothoa divaricata* var. *arctica* (20.45%). Among all identified species 23 were recorded for the first time in the area of Svalbard archipelago. Most (79%) of newly noted species have Arctic distributions. The lower sampling effort of previous researchers most likely accounts for the present enrichment of the list of Bryozoa of Kongsfjorden.

Key words: Arctic, Spitsbergen, Kongsfjorden, Bryozoa.

Introduction

Bryozoa are benthic organisms, occurring mainly in marine ecosystems. The majority of species (ca. to 5000) live in the sea, but some are also found in freshwaters (Ryland 1970). In Arctic ecosystems these animals belongs to the most specious groups (Gulliksen *et al.* 1999). Initial investigations into Bryozoa in Svalbard waters took place at the end of the last century. These were mostly taxonomical works undertaken by Bidenkap (1897, 1900a, 1900b), Kluge (1906) and Nordgaard (1900, 1918). Recent papers by Różycki and Gruszczyński (1986), and Lippert (1998) were the first studies where ecology of bryozoans occurring in area

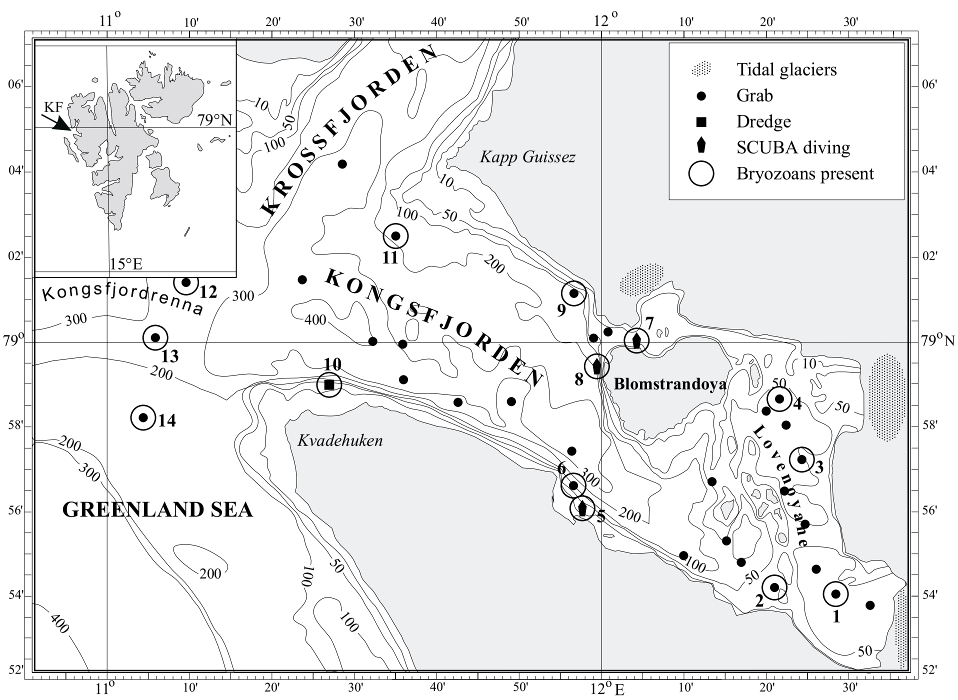

Fig. 1. Area of study and sampling station.

covered by the present research were published. This paper deals mainly with faunistics and is an attempt to prepare an updated list of the Bryozoa of Kongsfjorden (West Spitsbergen). The study presented is also part of the International Project BIODAF (Biodiversity and fluxes in Arctic glaciated fiords).

Area of study

Kongsfjorden is situated on the western coast of Spitsbergen at 79°N and 12°E (Fig. 1). The fjord is 26.1 km long and on average 8 km wide. The whole area of the fjord is 208.8 km^2. The maximum depth is 428 m while the average is 141 m. The length of coastline of the fjord is 89.6 km, with 15.9 km being covered by glaciers. The main environmental factors responsible for the conditions in the fjord are the depth, the distance from the open sea and from the glaciers, and climate. Kongsfjorden is devoid of sill at its entrance, which causes a strong influence of oceanic waters up on the hydrological regime (Węsławski *et al.* 1991, Ito and Kudoh 1997).

There are two main water masses which influence Kongsfjorden. The first is the West Spitsbergen Current, which is a branch of warm (4°C) and highly saline (35 PSU) Norwegian Current. This current flows along the western and northern parts of Spitsbergen (Loeng 1991). Transportation of these warm water masses causes a milder climate compared to other areas at the same latitude (Gammelsrod and Rudels 1983). The second water mass influencing this area is the East Spitsbergen Current. The cold, dense, and highly saline water of this current originates from the Arctic Ocean. It flows along the eastern coast of Spitsbergen down to the southern tip of the island, where it becames the Sorkapp Current. The Sorkapp Current brings waters, with temperatures from –1,5 to 1°C and salinity of 34–35 PSU to the western coast of Spitsbergen (Loeng 1991, Beszczyńska *et al*. 1997).

The amount of suspended matter close to glaciers can reach 300–500 mg/dm^3, decreasing in the central and outer parts of the fjord in the summer. In the inner basin the amount in the intermediate water layer may reach from 2–3 mg dm^{-3} to 20–25 mg dm^{-3} in the central part, whereas the relatively clear water in outer parts of the fjord contains only 0.5 mg dm^{-3} (Elverhoi *et al*. 1983, Zajączkowski 2000).

Materials and methods

Samples were taken during the 1997 and 1998 cruises of r/v *Oceania* and the 1999 cruise of r/v *Jan Mayen*. Three techniques were used to collect samples: Van Veen grab, dredge, and SCUBA diving. Among 44 samples, 13 were collected by SCUBA diving, 30 by grab and 1 by dredge (Table 1). Bryozoa were found on rocks, stones, shells, algae and soft sediment. The distribution of sampling stations is shown in Fig. 1. SCUBA diving was used to collect samples down to 25 m, while all the other samples were collected by grab and dredge. In the case of rocks, stones, and shells the collected material was dried. Algae, soft sediment samples, and bushy bryozoans were placed in 4% formaline. Some algae with encrusted Bryozoa were placed in the freezer. Material from the freezer was refrozen in the laboratory and, after being used, preserved in 4% formaline. Species determination was done using a stereomicroscope. The classification of the studied bryozoans and their geographical distribution were based on Kluge (1962) and Gontar and Danisienko (1989), with some updated corrections done by Hayward and Ryland (1979, 1985, 1996) and Hayward (1985, 1994). Most of the species not identified in this study were those which had been mechanically damaged.

Table 1

Sampling effort. First number denotes number of samples analysed; number of samples with Bryozoa given in brackets.

	Depth intervals (m)				
	0–5	6–25	26–50	51–200	>200
SCUBA	1 (1)	12 (12)	0	0	0
Grab	0	0	13 (4)	7 (4)	10 (2)
Dredge	0	0	1 (1)	0	0

Frequencies of occurrence were calculated using following equation:

$$F = n_i n^{-1}$$

F – frequency of given taxon [%]
n_i – number of samples where given taxon was present
n – number of all samples

Results

143 taxa have been recognized: 123 species, and 17 to the generic and 3 to the family level (Table 2). Identified taxa belong to three orders: Cyclostomata, Ctenostomata and Cheilostomata. In the collected material the most abundant taxa were from the order of Cheilostomata (79%). The lowest number of taxa were represented by the order Ctenostomata (5%). There were three species (*Electra crustulenta* var. *arctica*, *Callopora craticula*, *Porella minuta*) which occurred in the whole range of sampled depths. 38 species were present only in one depth interval. Based on the classification used by Gontar and Danisienko (1989) in the investigated material contained 24% species of Arctic, 66% species of boreal-Arctic, 3% species of amphiboreal, 2% species of high boreal, 2% species of boreal and 3% species of subtropical-boreal origin. The majority of the species (76 %) were of an encrusting life form. There were 5 species which had a frequency of occurrence higher than 20% (Table 2). These were: *Electra crustulenta* var. *arctica* (31.82%); *Cylindroporella tubulosa* (27.27%); *Tegella arctica* (22.73%); *Tegella armifera* (20.45%); and *Hippothoa divaricata* var. *arctica* (20.45%). Taking into account the data by Kluge (1975), Lippert (1998) and Gulliksen et al. (1999) there were 23 species (marked by + sign in Table 2) which were recorded for the first time in the investigated area. The relationship between the number of taxa and the number of samples is shown in Fig. 2.

Discussion

Large-scale patterns in many planktonic, nektonic, and benthic taxa distributions show a marked decline in species richness from the tropics to the pole (Stevens 1989, Ormond *et al*. 1997) There are, however, cases to which that rule does not apply, like for example soft bottom communities (Kendall and Aschan 1993). Bryozoa are very species rich in the Arctic. Kluge (1975) recorded 187 species in the Kara Sea (101 of them found in that study as well) and 277 species in the Barents Sea (117 of them found in Kongsfjorden). But still the number of species seems to be lower than those occurring in lower latitudes: for example in the Mediterranean Sea 370 species were found (Clarke and Lidgard 2000). Kluge (1975) found 149 species in the vicinity of Franz Joseph Land, (where conditions are

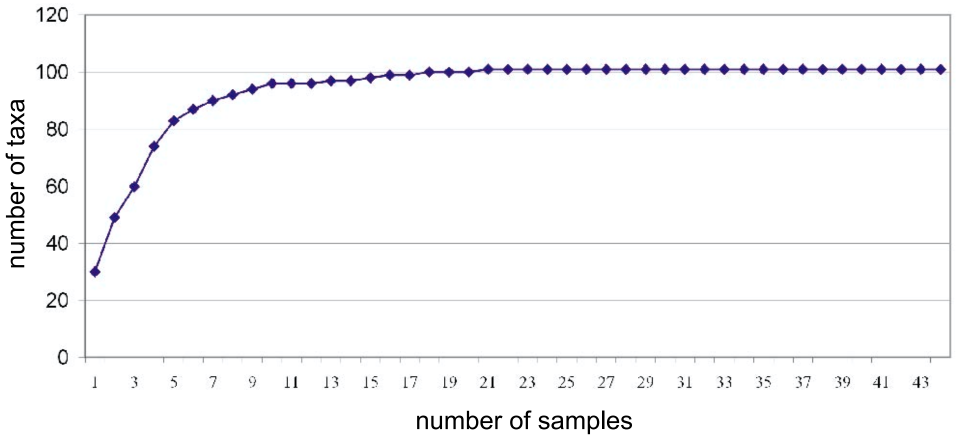

Fig. 2. Relationship between number of taxa and number of samples.

harsher than in Spitsbergen waters) (see Androsova 1977). Powell (1968) recognized 93 species in Arctic Canada from Belle Isle westward to Herschel Island, 65 of which were found in Kongsfjorden as well. It seems that the number and species' composition in the fjord does not differ much from other Arctic regions with similar conditions. In the presented list of taxa there are no species endemic to Spitsbergen waters (Kluge 1975). Most of the species newly noted in the area have an Arctic origin. That does not mean that conditions in the fiord are changing. According to Kluge (1975) most of the 23 bryozoan species that were not recorded by by former investigators of Svalbard, occur in the waters of Greenland, Barents, or Kara Seas. Seven of them: *Tubulipora ventricosa*, *Crisiella producta*, *Alcyonidium mamillatum* var. *erectum*, *Porella princeps*, *Schizoporella elmwoodiae*, *Schizoporella stylifera*, and *Rhamphostomella ovata* were found in the Barents Sea, in Kara Sea, and in the waters off Greenland. *Tubulipora soluta*, *Berenicea arctica*, *Tegella arctica* var. *retroversa*, *Smittina mucronata* were noted in the Barents Sea and in the Kara Sea. Another four species: *Callopora craticula* var. *sedovi*, *Escharella latodonta*, *Schizoporella hexagona* and *Stomachetosella producta* were found only in the Barents Sea. Other species newly noted in Svalbard waters were not yet found in the above mentioned seas but still four of them have been noted in the Arctic region: *Lichenopora sibirica* was found in the Laptev Sea, *Dendrobeania pseudolivenseni* – in the Chukchi Sea, *Porella tumida* – in the Bering Strait, *Schizoporella ortmani* – in Baffin Bay (Kluge 1975). The last three species new to the area have rather boreal distributions. *Proboscina major* and *Membranipora membranacea* are well known species of the Norwegian Sea occurring as far as the Mediterranean (Kluge 1975). *Palmiskenea faroensis* has been found previously only once, in the waters off the Faroe Islands (Hayward 1994). In general we can conclude that all the newly recorded species mentioned above were found owing to the higher sampling efforts in the present investigations than those of the previous studies. Other possible reasons (for instance climate changes) which might also be responsible for the observed pattern of taxa are not easy to prove.

One can recognize in Kongsfjorden three groups of Bryozoa of different depth preferences (Table 2) with regard to depth distribution. For example *Callopora aurita*, *Celleporella hyalina*, *Harmeria scutulata* occurred only in shallow depths (down to 25 m). The second group occurred over a wide range of depth – from shallow to deep places. Examples of such species are: *Electra crustulenta* var. *arctica*, *Porella minuta*, *Callopora craticula.* The most evident examples of species occurring only in the deepest parts of the fjord (>200 m) are: *Escharella latodonta, Lepralioides nordlandica, Schizoporella elmwoodiae*. Most of the species (altogether 90%) are of Arctic or boreal-Arctic origin, which well evidences the Arctic conditions in Kongsfjorden. The presence of amphiboreal, high boreal, boreal, and subtropical-boreal species (altogether 10%) indicates the probable influence of the warm water masses which are carried by the West Spitsbergen Current.

The number of species increases towards the mouth of the fjord (see Fig.1 and Table 2). The high sedimentation rate in the inner part of the fjord, making the bottom covered mostly by soft sediment and therefore causing a lack of suitable habitat for bryozoans, is most likely responsible for this observed pattern.

As shown in Fig. 2 species number becomes stable after the 21st sample collected. This indicates the representativeness of investigated material for Kongsfjorden. The study of Gulliksen *et al.* (1999) suggests that altogether we can expect up to 196 species of Bryozoa in all Svalbard waters.

Such high diversity of Bryozoa suggests that they play a major role in the sessile macrofauna in Svalbard waters. They are the second most specious group (first are annelids) in that area (Gulliksen *et al.* 1999). On the other hand our knowledge of the bryozoan ecology in Svalbard waters (structure of community, distribution in the fjords, influence of glacial sediment and preferences to particular substrates, as well as their potential as bioindicators) indicates the need for further research.

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Table 2

Bryozoans in Kongsfjorden, Spitsbergen. Abbreviations: +, species first time noticed in the area of Svalbard; *, precise data not available; sub.-b., subtropical-boreal; b., boreal; h.-b., high boreal; amph.b., amphiboreal; b.-A., boreal-Arctic; Arc., Arctic.

Taxa	Depth (m)					Geographical distribution	Morphological form	Frequency of occurrence	Stations at which given taxa were present (see Fig. 1)
	0–5	6–25	26–50	51–200	>200				
1	2	3	4	5	6	7	8	9	10
Oncousoeciidae									
Oncousoecia canadensis Osburn, 1933				×	×	Arc.	encrusting	6.82	11, 13, 14
Oncousoecia diastroporides (Norman, 1869)				×	×	b.-A.	encrusting	6.28	11, 13, 14
Oncousoecia sp.				×		–	–	2.27	14
Tubuliporidae									
+ *Tubulipora soluta** Kluge, 1946						Arc.	encrusting	–	–
*Tubulipora dilatans** (Johnston, 1847)						sub.-b.	encrusting	–	–
+ *Tubulipora ventricosa** Busk, 1855						b.-A.	encrusting	–	–
Tubulipora flabellaris (Fabricius, 1780)		×				b.-A.	encrusting	9.09	5, 8
Tubulipora sp.		×				–	–	2.27	8
Tubuliporidae indet.		×	×	×	×	–	–	20.45	5, 8, 9, 10, 11, 12, 13, 14
+ *Proboscina major** (Johnston, 1847)						sub.-b.	encrusting	–	–
Idmoneidae									
*Idmonea atlantica** Forbes, 1847						b.-A.	free-growing, branched	–	–
*Idmonea fenestrata** Busk, 1859						Arc.	free-growing, branched	–	–
Diastoporidae									
Diplosolen obelia var. *arctica* (Waters, 1904)			×			b.-A.	encrusting	2.27	10
+ *Berenicea arctica** Kluge, 1946						Arc.	encrusting	–	–
Crisiidae									
Crisiella producta (Smitt, 1865)		×				b.-A.	free-growing, branched	2.27	5
Crisia eburnea (Linnaeus, 1758)	×					b.-A.	free-growing, branched	2.27	8
*Crisia eburnea–denticulata** Smitt, 1867						Arc.	free-growing, branched	–	–
Crisia sp.		×				–	–	2.27	8
Crisidae indet.	×					–	–	6.82	8

Table 2 – continued.

1	2	3	4	5	6	7	8	9	10
Lichenoporidae									
*Lichenopora verrucaria** (Fabricius, 1780)						b.-A.	encrusting, round	–	–
*Lichenopora sibirica** Kluge, 1955						Arc.	encrusting, round	–	–
Disporella hispida (Fleming, 1828)		×	×	×		b.-A.	encrusting, round	4.55	8, 10, 14
Lichenopora sp.	×	×		×	×	–	–	31.82	5, 7, 8, 11, 12, 13, 14
Alcyonidiidae									
Alcyonidium mamillatum Alder, 1857		×				b.-A.	encrusting	2.27	8
+ *Alcyonidium mamillatum* var. *erectum* Andersson, 1902				×		Arc.	free-growing, branched	2.27	9
Alcyonidium mytili Dalyell, 1847	×	×				b.-A.	encrusting	9.09	5, 8
Alcyonidium disciforme Smitt, 1872			×	×		Arc.	free-growing, disclike	9.09	1, 2, 3, 4
*Alcyonidium gelatinosum** (Linnaeus, 1767)						b.-A.	free-growing	–	–
Alcyonidium sp.		×				–	–	–	5
Flustrellidae									
Flustrellidra corniculata (Smitt, 1872		×				Arc.	free-growing, branched initially encrusting	2.27	8
Eucrateidae									
Eucratea loricata (Linnaeus, 1758)	×	×		×		b.-A.	bushy	15.91	5, 8, 9
Membraniporidae									
+ *Membranipora membranacea* (Linnaeus, 1767)			×			amph.b.	encrusting	2.27	10
Electra crustulenta var. *arctica* Borg, 1931	×	×	×	×	×	b.-A.	encrusting	31.82	5, 7, 8, 9, 10, 11, 13, 14
Electra crustulenta var. *catenularia–similis* Kluge, 1962				×		h.-b.	encrusting	4.55	9, 14
Calloporidae									
Callopora aurita (Hincks, 1877)	×	×				sub.-b.	encrusting	6.82	5,8
Callopora craticula (Alder, 1857)	×	×	×	×	×	b.-A.	encrusting	25.0	5, 6, 7, 8, 9, 10, 13
+ *Callopora sedovi* Kluge, 1962	×	×				Arc.	encrusting	4.55	7,8
Callopora lata (Kluge, 1907)		×				Arc.	encrusting	2.27	8
Callopora sp.	×	×		×		–	–	20.45	5, 6, 7, 8, 9, 14
Cauloramphus intermedius Kluge, 1955	×	×	×			b.-A.	encrusting	11.36	7, 8, 10
*Amphiblestrum trifolium** (S. Wood, 1844)						b.-A.	encrusting	–	–
Amphiblestrum sp.				×		–	–	2.27	6

Table 2 – continued.

1	2	3	4	5	6	7	8	9	10
Tegella arctica (d'Orbigny, 1850–52)	×	×	×			b.-A.	encrusting	22.73	5, 7, 8, 10
+ *Tegella arctica* var. *retroversa* Kluge, 1952			×			b.-A.	encrusting	2.27	10
Tegella armifera (Hincks, 1880)	×	×	×			b.-A.	encrusting	20.45	5, 7, 8, 10
Tegella nigrans (Hincks, 1882)		×				b.-A.	encrusting	2.27	5
*Tegella spitsbergensis** (Bidenkap, 1897)						b.-A.	encrusting	–	–
Tegella sp.	×	×				–	–	9.09	5, 8
*Doryporella spathulifera** (Smitt, 1868)						b.-A.	encrusting	–	–
Scrupocellaridae									
Scrupocellaria arctica (Busk, 1855)		×				Arc.	free-growing, branched	2.27	8
Scrupocellaria scabra var. *paenulata** Norman, 1903						b.-A.	free-growing, branched	–	–
Tricelaria ternata (Ellis et Solander, 1786)	×	×				b.-A.	bushy	13.64	5, 8
*Tricelaria gracilis** (Van Beneden, 1848)						b.-A.	free-growing, branched	–	–
Scrupocellaridae indet.	×	×	×	×	×	–	–	18.18	5, 7, 8, 9, 10, 13
Microporidae									
Dendrobeania fruticosa (Packard, 1863)	×	×				b.-A.	bushy	11.36	8
Dendrobeania murrayana (Johnston, 1847)	×	×				b.-A.	bushy	9.09	7, 8
+ *Dendrobeania pseudolevinseni* Kluge, 1952			×			Arc.	bushy	2.27	10
Cribrilinidae									
Cribrilina annulata (Fabricius, 1780)	×	×				b.-A.	encrusting	11.36	5, 7, 8
Cribrilina spitsbergensis Norman, 1903			×	×		Arc.	encrusting	2.27	9,10
Cribrilina sp.		×				–	–	2.27	7
Hippothoidae									
Hippothoa divaricata var. *arctica* Kluge, 1906		×	×	×	×	b.-A.	encrusting	20.45	6, 8, 9, 10, 11, 12, 13, 14
Hippothoa expansa Dawson, 1859	×	×		×		b.-A.	encrusting	11.13	5, 7, 8, 11, 14
Celleporella hyalina (Linnaeus, 1767)	×	×				b.-A.	encrusting	25.0	5, 7, 8
Harmeria scutulata (Busk, 1855)	×	×				Arc.	encrusting	18.18	5, 7, 8
Escharellidae									
Escharella immersa (Fleming, 1828)			×			b.-A.	encrusting	2.27	10
Escharella microstomata (Norman, 1864)			×			b.-A.	encrusting	2.27	10
*Escharella ventricosa** (Hassal, 1842)						b.-A.	encrusting	–	–

Table 2 – continued.

1	2	3	4	5	6	7	8	9	10
Escharella klugei (Hayward, 1979)			×			Arc.	encrusting	2.27	10
Escharella abyssicola (Norman, 1869)				×		Arc.	encrusting	2.27	11
+ *Escharella latodonta* Kluge, 1962					×	h.-b.	encrusting	4.55	13
Escharella sp.				×		–	–	6.87	6, 9, 11
Escharelloides spinulifera (Hincks, 1889)				×	×	Arc.	encrusting	6.82	9, 11, 13, 14
*Escharelloides cancellatum** (Smitt, 1868)						Arc.	encrusting	–	–
*Hemicyclopora emucronata** (Smitt, 1872)						Arc.	encrusting	–	–
*Hemicyclopora polita** (Norman, 1864)						b.	encrusting	–	–
Lepralioides nordlandica (Nordgaard, 1905)					×	b.-A.	encrusting	2.27	13
Smittinidae									
Smittina majuscula (Smitt, 1868)		×	×	×		b.-A.	encrusting	4.55	6, 8, 10
Smittina minuscula (Smitt, 1868)		×	×	×		b.-A.	encrusting	13.64	6, 7, 8, 9, 10, 14
Smittina rigida Lorenz, 1886		×		×	×	b.-A.	encrusting	13.64	7, 9, 11, 12, 13, 14
+ *Smittina mucronata** (Smitt, 1868)						b.-A.	encrusting	–	–
*Smittina jeffreysi** Norman, 1903						b.-A.	encrusting	–	–
Smittina sp.				×		–	–	2.27	6
Parasmittina trispinosa (Johnston, 1838)			×	×		sub.-b.	encrusting	4.55	6, 9, 10
Porella concinna (Busk, 1854)					×	b.-A.	encrusting	2.27	12
Porella concinna var. *belli* (Dawson, 1829)					×	b.-A.	encrusting	2.27	13
Porella minuta (Norman, 1869)	×	×	×	×	×	b.-A.	encrusting	18.18	5, 6, 7, 8, 10, 13
+ *Porella princeps* Norman, 1903				×		b.-A.	encrusting	2.27	14
Porella proboscidea Hincks, 1888				×	×	Arc.	encrusting	6.82	11, 13, 14
+ *Porella tumida* Kluge, 1955				×		b.	encrusting	2.27	11
*Porella compressa** (Sowerby, 1806)						b.-A.	free-growing, branched	–	–
Porella sp.					×	–	–	2.27	13
Cystisella saccata (Busk, 1856)			×			b.-A.	free-growing, branched	2.27	10
*Porelloides laevis** (Fleming, 1828)						b.-A.	free-growing, branched	–	–
*Palmicellaria skenei** (Ellis et Solander, 1786)						b.-A.	free-growing, branched	–	–
Palmicellaria skenei var. *bicornis* (Busk, 1859)					×	b.-A.	encrusting	2.27	13
*Palmiskenea faroensis** Hayward, 1994						b.	–	–	–

Table 2 – continued.

1	2	3	4	5	6	7	8	9	10
Umbonulidae									
Umbonula arctica (Sars, 1851)				×		b.-A.	encrusting	4.55	9
Umbonula patens (Smitt, 1868)				×		b.-A.	encrusting	2.27	14
Schizoporellidae									
*Schizoporella bispinosa** Nordegaard, 1906						Arc.	encrusting	–	–
*Schizoporella porifera** (Smitt, 1868)						b.-A.	encrusting	–	–
Schizoporella pachystega Kluge, 1929			×	×	×	b.-A.	encrusting	11.36	6, 9, 10, 11, 13, 14
Schizoporella auriculata var. *lineata* (Nordgaard, 1896)		×				b.-A.	encrusting	2.27	8
Schizoporella biaperta (Michelin, 1841–42)			×	×		b.-A.	encrusting	2.27	10, 14
Schizoporella costata Kluge, 1962			×	×		b.-A.	encrusting	9.09.	6 ,9, 10, 11, 14
+ *Schizoporella elmwoodiae* Waters, 1900					×	Arc.	encrusting	2.27	13
+ *Schizoporella hexagona* Nordgaard, 1905				×		h.-b.	encrusting	4.55	9, 14
Schizoporella limbata Lorenz, 1886				×	×	b.-A.	encrusting	4.55	13, 14
Schizoporella magniporata Nordgaard, 1906					×	amph.b.	encrusting	2.27	13
+ *Schizoporella ortmanni* Kluge, 1955		×				Arc.	encrusting	2.27	8
+ *Schizoporella stylifera* (Levinsen, 1887)					×	b.-A.	encrusting	2.27	13
Schizoporella sp.		×				–	–	4.55	9, 14
Hippodiplosia obesa (Waters, 1900)				×	×	b.-A.	encrusting	13.64	6, 9, 11, 12, 13, 14
*Hippodiplosia propinqua** (Smitt, 1868)						b.-A.	encrusting	–	–
+ *Hippodiplosia murdochi** Kluge, 1962						Arc.	encrusting	–	–
*Hippodiplosia harmsworthi** (Waters, 1900)						Arc.	encrusting	–	–
Stomachetosellidae									
Stomachetosella cruenta (Busk, 1854)		×		×	×	b.-A.	encrusting	9.09	6, 7, 8, 13
+ *Stomachetosella producta* (Packard, 1863)			×	×	×	Arc.	encrusting	6.82	6, 10, 13, 14
*Stomachetosella sinuosa** (Busk, 1860)						b.-A.	encrusting	–	–
Ragionula rosacea (Busk, 1856)		×				b.-A.	free-growing stem	2.27	8
Myriozoidae									
*Myriapora subgracilis** (d'Orbigny, 1852)						b.-A.	free-growing, branched	–	–
Microporellidae									
Microporella ciliata (Pallas, 1766)		×				amph.b.	encrusting	2.27	8

Table 2 – continued.

1	2	3	4	5	6	7	8	9	10
Microporella arctica Norman, 1903			×		×	Arc.	encrusting	4.55	10, 12, 13
Microporella sp.	×					–	–	2.27	8
Tessaradomidae									
Cylindroporella tubulosa (Norman, 1868)	×	×		×		b.-A.	encrusting	27.27	5, 6, 7, 8, 9, 11, 14
Phidoloporidae									
Reteporella beaniana (King, 1846)			×			amph.b.	free-growing, branched	27.27	10
*Reteporella watersi** (Nordgaard, 1907)						Arc.	free-growing fussed branches	–	–
Cleidochasmatidae									
Hippoporella hippopus (Smitt, 1868)				×		b.-A.	encrusting	2.27	11
Hippoporella sp.				×		–	–	4.55	6, 9
*Lepraliella contigua** (Smitt, 1868)						b.-A.	encrusting	–	–
Rhamphostomellidae									
Rhamphostomella scabra (Fabricius, 1780)				×		b.-A.	encrusting	2.27	14
Rhamphostomella bilaminata (Hincks, 1877)		×				Arc.	encrusting	2.27	8
*Rhamphostomella hincksi** Nordgaard, 1906						b.-A.	encrusting	–	–
*Rhamphostomella plicata** (Smitt, 1868)						b.-A.	encrusting	–	–
*Rhamphostomella radiatula** (Hincks, 1877)						b.-A.	encrusting	–	–
*Rhamphostomella spinigera** Lorenz, 1886						Arc.	encrusting	–	–
+ *Rhamphostomella ovata* (Smitt, 1868)			×			b.-A.	encrusting	2.27	10
*Rhamphostomella costata** Lorenz, 1886						b.-A.	encrusting	–	–
Rhamphostomella sp.				×		–	–	2.27	14
*Escharopsis sarsi** (Smitt, 1868)						Arc.	free-growing lobe	–	–
Celleporidae									
*Cellepora surcularis** (Packard, 1863)						Arc.	free-growing lobe	–	–
Cellepora ventricosa Lorenz, 1886			×			b.-A.	free-growing lobe	2.27	10
Cellepora sp.				×	×	–	–	4.55	11, 13
Hippopodinidae									
Cheilopora sincerea (Smitt, 1868)		×		×	×	b.-A.	encrusting	6.82	7, 9, 13