

Marine Worms of the Phylum Sipuncula in Faroese waters

Sipunkula-ormar í føroyskum sjóøki

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Úrtak

Í samband við BIOFAR verkætlanirnar, sum høvdu til endamáls at kanna botndýralívið í føroyskum sjóøki, vóru seks nýggj sløg av sipunkulida ornum funnin. Sostatt eru higartil funnin 10 ymisk sløg av sipunkulidum í føroyskum sjóøki. Dýrini eru sett upp í lista við gjølligum upplýsingum um hvørt slagi sær, og eisini er kort av hvar hvørt slagið er funnið. Í greinini er eisini lykil til at greina sundur familjur, ættir og sløg.

Abstract

The BIOFAR programme (investigations of the marine benthic fauna within the Faroese fishing territory) added six new species of sipunculans to the four previously known Sipuncula species from the region. This paper presents a comprehensive list of all the found species and maps showing the distribution. A key to families, genera and species is also given.

Introduction

Investigations on the marine benthic fauna within the Faroese fishing territory started in 1987 as a Nordic programme called BIOFAR with sampling efforts concentrated on waters deeper than 100 m. After the BIOFAR sampling was concluded in 1993, a new programme called BIOFAR 2 started in 1995 to sample marine benthic fauna from the intertidal zone to a 100 m depth.

The BIOFAR material was collected with various benthic sampling equipment (Nørrevang *et al.*, 1994). Five thousand one hundred and forty specimens of sipunculans were recovered from 253 stations. In all, 99 samples were taken by detritus sledge (43%), 56 samples (24.3%) by a heavy triangular dredge, 25 samples (about 11%) by epibenthic sampler, and 20 samples (about 9%) by a medium triangular dredge. The last 32 samples (14%) were taken using other benthic sampling equipment. It should be noted that the richest samples (80-100 individuals or more) were taken by detritus sledge. Most often the

*Phascolion strombus.*

samples contained 2-3 or more different species of sipunculans.

Analysis of these very rich samples showed that six of the ten species of sipunculans found were recorded for the first time from this area. The dominant species were *Nephasoma minutum* (119 stations), *Phascolion strombus* (104 stations) and *N. lilljeborgi* (44 stations).

The following information is provided for each of the species in the systematic list below: valid species name with author and publication year; synonyms (when relevant); reference to a good description including page number and figures; previous Faroese records; enumeration of the BIOFAR and BIOFAR 2 stations where the species was found; depth range; measured temperature and salinity range; bathymetrical and geographical distribution in the North Atlantic and in the world oceans. A key to all families, genera and species is also given.

At the end of this article there is a list of

references to important works and a short conclusion.

Order ASPIDOPHORMES

Family ASPIDOSIPHONIDAE

Genus *Aspidosiphon* Diesing, 1851

Aspidosiphon (A.) *muelleri* Diesing, 1851

Synonyms: numerous, see Stephen and Edmonds (1972: 231); Murina (1977: 134).

Good description: Stephen and Edmonds (1972: 231, figs. 26 A-D).

Previous records: None.

BIOFAR stations: 295, 319, 505, 506, 596, 605, 691, 736, 742 (9 stations and 11 specimens in total), fig. 1.

Temperature: 2.1–8.6 °C. Salinity: 34.9–35.25‰.

Depth range: 100–1157 m.

Bottom type: silt, sand, coastal terrigenous ooze, often occurring in gastropod and scaphopod shells.

General distribution: Boreal-tropical eurybathic species (depth range 0–1262 m).

Suez Bay, Red Sea, Aden Gulf, East Africa, Mauritius Isles, Durban, Malay Archipelago, east coast of Japan, South and East Australia, West India, Chile;

Atlantic distribution: Common in the north-eastern Atlantic, from Norway through the British Isles, Biscay Bay, Azores, Canary Isles, West Africa, Gulf of Guinea, off Congo; Mediterranean: Adriatic and Aegean Seas.

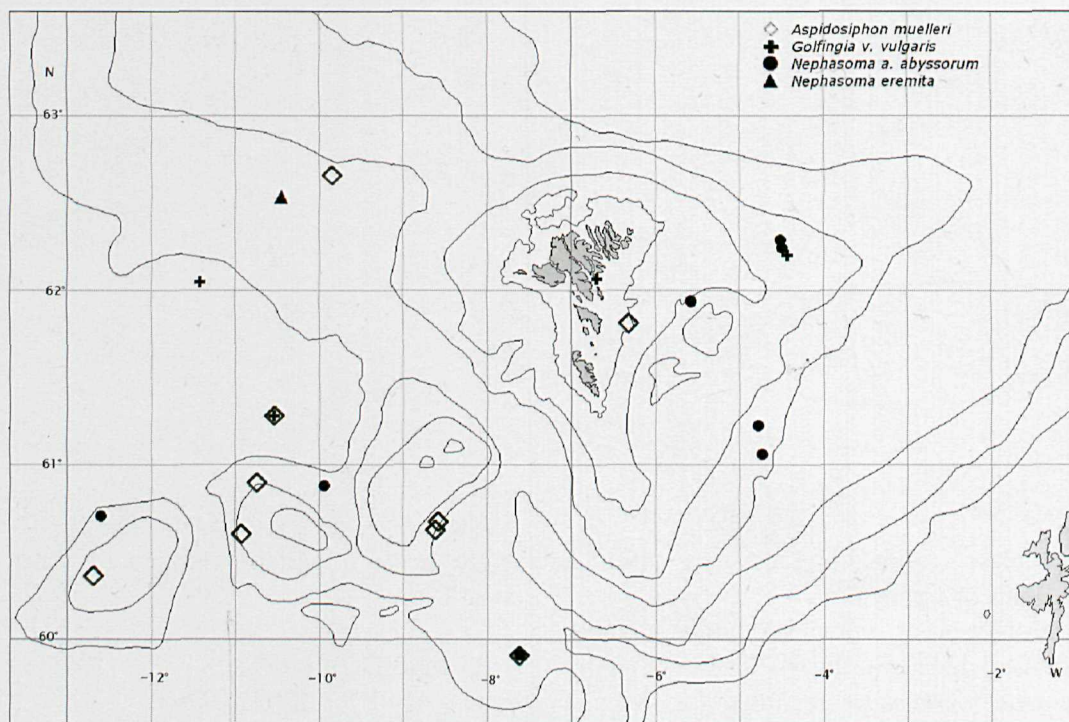


Fig. 1. Records of *Aspidosiphon muelleri*, *Golfingia v. vulgaris*, *Nephasoma a. abyssorum* and *Nephasoma eremita*.

Order GOLFINGIIFORMES

Family GOLFINGIIDAE

Genus *Golfingia* Lankester, 1885

Golfingia vulgaris vulgaris (de Blainville, 1827)

Synonyms numerous: see Murina (1977: 217); Cutler (1994: 75-76).

Good description: Stephen and Edmonds (1972: 231, figs. 26 A-D).

Previous records: None.

BIOFAR stations: 19, 736, 745, 1390 (4 stations and 4 specimens in total), fig. 1.

Temperature: 6.5-7.8 °C. Salinity 35.2‰.

Depth range: 15-1112 m.

Bottom type: sandy detritic bottom mixed with ooze, sandy mud with gravel, red clay.

General distribution: Cosmopolite in the northern hemisphere. Eurybathic species (0-5853 m). In Arctic

waters: Barents Sea, White Sea, Laptev Sea, Chuckchee Sea. Indian Ocean: Zanzibar, Malay Archipelago; Chile, Kerguelen Isles; Pacific Ocean: from Bering Strait to the southern coast of Japan, and from Alaska to San Francisco;

Atlantic distribution: Spitzbergen, Greenland, Davis Strait, Iceland, Scandinavia, Norwegian coast, British Isles, along the European coast from Kattegat, Skagerrak to the south coast of Spain, West Africa, Gulf of Guinea; Mediterranean: along the south coast of France, Alboran, Balearic Isles, Ligurian coast, Corsica, Adriatic Sea, Tyrrhenian and Aegean Seas, Levantine.

Genus *Nephasoma* Pergament, 1940

Nephasoma (*N.*) *abyssorum abyssorum* (Koren & Danielssen, 1875)

Synonyms numerous: see Murina (1977: 187); Cutler (1994: 89).

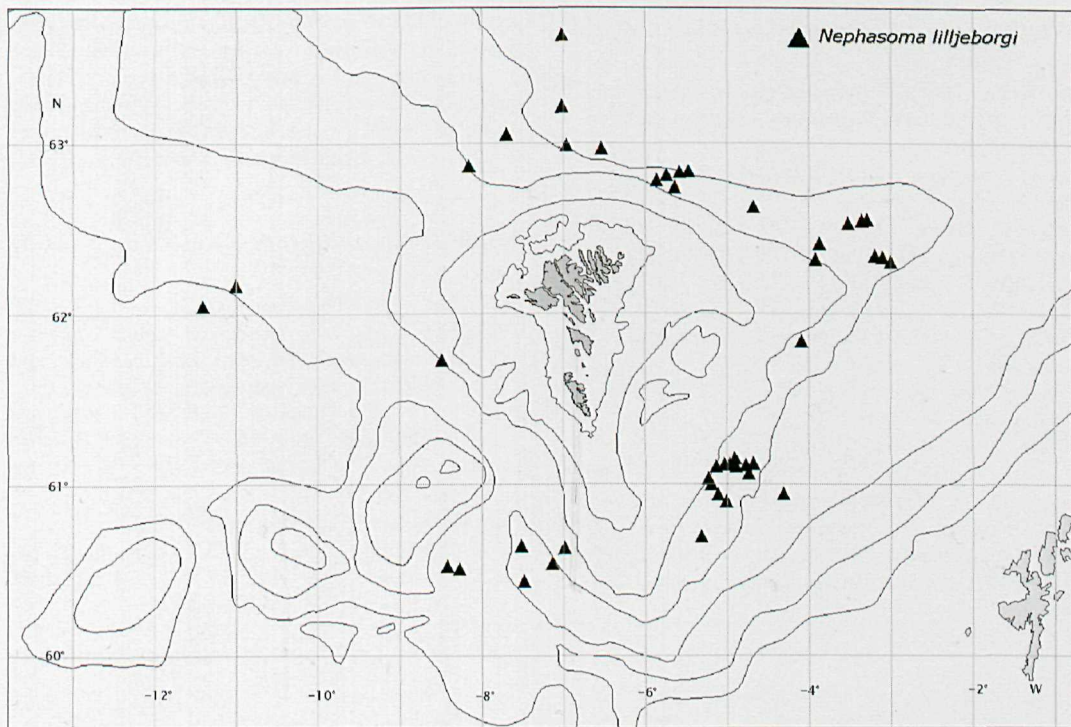


Fig. 2. Records of *Nephasoma lilljeborgi* (Danielssen & Koren, 1880)

Good description: Théel (1905: 78, pl. 5, figs. 71-75; pl. 6, figs. 76-81; pl. 14, fig. 206); Murina (1977: 188, fig. 124).

Previous records: None.

BIOFAR stations: 41, 295, 478, 492, 523, 762, 763, 778, 779 (9 stations and 10 specimens in total), fig. 1.

Temperature: $-0.60 - 8.5^{\circ}\text{C}$. Salinity: $35.15-35.30\text{‰}$.

Depth range: 259-973 m.

Bottom type: sandy silt, muddy sand.

General distribution: Arctico-boreal eurybathic species (depth range 95-5300 m).

Common in the north-eastern Atlantic and Arctic, Alaska;

Atlantic distribution: widely distributed in the northern hemisphere, Spitzbergen, Barents sea, Kola Gulf, Laptiv Sea, Kara Sea, Chuckchee Sea, Bergenfjord, Ireland, Helgoland Bight, English Channel, Biscay Gulf, northern coast of France; Mediterranean: Alboran Sea, Libyan coast, off Corsica, Ligurian and Aegean seas, off Morocco.

Nephasoma eremita (Sars, 1851)

Synonyms: *Phascolosoma eremita* Selenka *et al.* (1883: 35), *Golfingia (Nephasoma) eremita* Murina (1977: 195); *Nephasoma eremita* Cutler (1994: 94).

Good description: Wesenberg-Lund (1930: 28, pl. 5, figs. 53-54); Murina (1977: 195, fig. 132); Cutler (1994: 94-95, fig. 19A).

Previous records: None.

BIOFAR stations: 421 (1 specimen), fig. 1.

Temperature: 3.1°C . Salinity: 35.10‰ .

Depth range: 597 m.

Bottom type: sandy silt, muddy sand.

General distribution: Widespread and probably bipolar (depth range 0-3867 m). Circumpolar in Arctic, Antarctica, Commonwealth Bay, Eastern Pacific, Capetown, Falklands Islands; Atlantic distribution: Spitzbergen, western and eastern Greenland (records of "Ingolf Expedition), North Atlantic, Novaya Zemlya, Kola Peninsula, Finmark, Iceland, near Canada, west coast of USA, in shallow waters as far as Massachusetts Bay, Cape Cod.

***Nephasoma lilljeborgi* (Danielssen & Koren, 1880).**

Synonyms: *Golfingia* (*Nephasoma*) *glacialis* Murina (1977:184); see also *Nephasoma lilljeborgi* Cutler (1994: 96).

Good description: Murina (1964:184), fig. 121.

Previous records: None.

BIOFAR stations: 15, 82, 95, 170, 172, 188, 230, 271, 275, 294, 361, 397, 459, 477, 478, 479, 480, 481, 482, 501, 705, 718, 719, 720, 721, 722, 723, 728, 730, 744, 745, 748, 750, 751, 752, 768, 769, 770, 772, 773, 774, 9008, 9009, 9018 (44 stations and 2479 specimens in total), fig. 2.

Temperature: -0.05 - 6.7 °C; Salinity: 34.90-35.2‰.

Depth range: 496-1533 m.

Bottom type: silt, muddy sand, clay.

General distribution: Arctico-boreal, cold - water eurybathic species (depth range 65-2734 m). Widely distributed in the northern hemisphere: from Baffin Bay through the Kara Sea, high Arctic waters to 82° N, Laptiv Sea, East Siberian Sea, Chuckchee Sea (Deep sea

records of R/S Vitjaz in the Pacific Ocean probably were mistaken for *Nephasoma capilleforme*, which resembles *N. lilljeborgi* by outward appearance.); Atlantic distribution: Greenland, Spitzbergen, Norwegian coast, off Ireland, near Gibraltar, Biscay Gulf, Ibero-Moroccan Bay, Gasconge; Mediterranean: Adriatic, Aegean seas.

***Nephasoma minutum* (Keferstein, 1863) sensu latum**

Synonyms: *Phascolosoma diaphanes* (Gerould, 1913:395); *Golfingia* (*Nephasoma*) *minuta* Murina, 1977:186; *Nephasoma diaphanes diaphanes* Cutler and Cutler (1986:557); Saiz and Villafranca (1990:1156); Cutler (1994:93); Murina (1997:66); Pancucci-Papadopoulou *et al.* (1999: 50).

Good description: Théel (1905:84-85; pl. 5, figs. 60-70; pl. 14, figs. 200-205).

Previous records: Wesenberg-Lund (1928).

BIOFAR stations: 7, 19, 27, 32, 33, 41, 51, 56, 65, 68, 70, 124, 149, 158, 168, 169, 188, 192, 193, 203, 230,

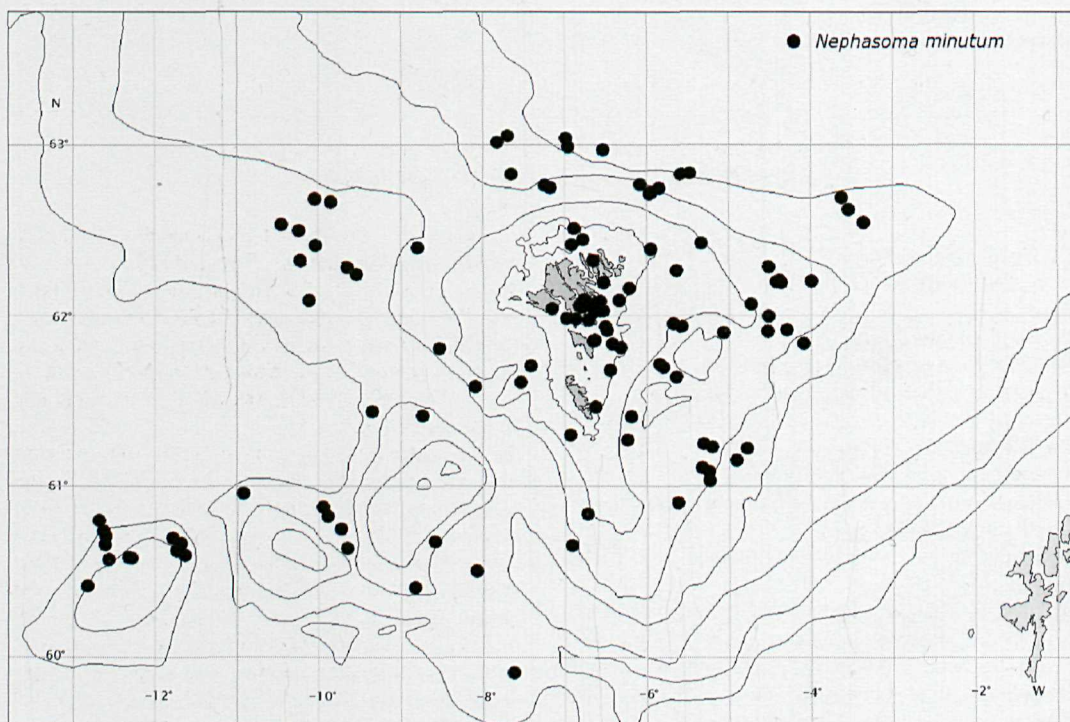


Fig. 3. Records of *Nephasoma minutum* (Kefersten, 1863)

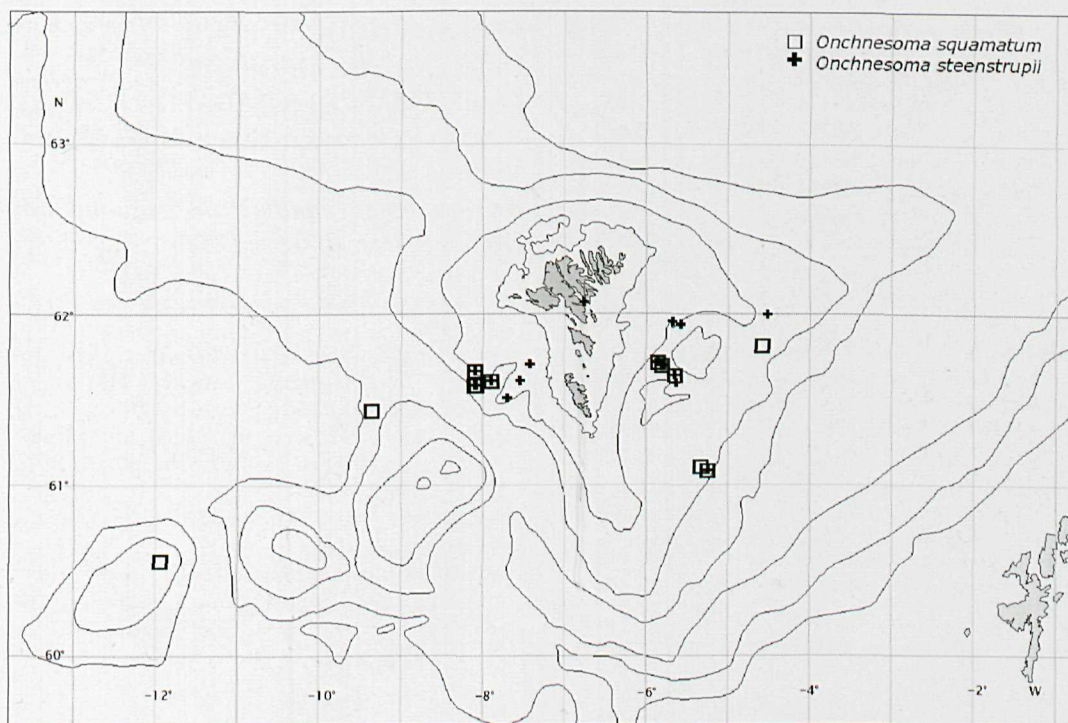


Fig. 4. Records of *Onchnesoma s. squamatum* (Kor. & Dan., 1875) and *Onchnesoma s. steenstrupii* Kor. & Dan., 1875.

233, 234, 263, 274, 275, 285, 295, 343, 356, 357, 360, 361, 381, 382, 400, 411, 421, 423, 447, 452, 453, 459, 467, 482, 483, 492-495, 497, 502, 506, 514-517, 520, 522-525, 542, 543, 546, 549, 597, 605, 608, 609, 610, 689, 690, 692, 695, 716, 724, 726, 738, 739, 742, 743, 747, 751, 752, 755, 756, 760, 762, 765, 766, 772, 777, 779, 781, 1132, 1135, 1143, 1160, 1217, 1484, 1485, 1517, 1562, 1600, 1614, 1705, 1744, 1746, 1791, 1794, 1795, 1799, 1801, 1805, 1810, 1834, 9012 (19 stations and 912 specimens in total), fig. 3.

Temperature: -0.86 – 8.7 °C. Salinity: 34.88-35.30‰.

Depth range: 15-1099 m.

Bottom type: sand, gravel, clay, shells, algae, sandy clay.

General distribution: Cold-water cosmopolitan (depth range 0-6170 m). In northern hemisphere: Kara, Laptev, Chuckchee Seas, from 82° N to equator; Indian Ocean: Arabian Sea, Bering Sea, Okhotsk seas, Tasmania, New Zealand, Kjørt trench, Pacific Ocean with many deep-sea records, Chile, near New Guinea, Australia, Antarctic

coast; Atlantic distribution: Spitzbergen, Greenland, Novaya Zembyla, Barents Sea, Lofoten, North Sea, Skagerrak, Kattegat, Gulmarfjord, coast of Ireland, Bay of Biscay, Mauritius, Cape Verde and Canary Isles, Guinea Gulf, near Monrovia and Congo, along the Atlantic coast of USA to about 45° N; Mediterranean: Adriatic and Aegean seas, Sea of Marmara (only one record).

Remark: Regarding the name of this species, we have an opinion that differs from E. Cutler (1994). We are sure that it is not correct to use the name *Nephasoma diaphanes* (Gerould, 1913) for the common name *Nephasoma minutum* used by many authors since Keferstein's description in 1863. We suggest that the species *N. minutum* is widely distributed in the world's oceans and that this designation should not be limited to the hermaphroditic population that inhabits the north-eastern Atlantic (Gibbs, 1975).

To support our opinion, we offer the following arguments: Firstly, it is inappropriate to limit the

common cosmopolitan name (*N. minutum*) only on the basis of hermaphroditic specimens found in the population that inhabits the north-eastern Atlantic. Secondly, cases of hermaphroditism were noted among other species of sipunculids (Harms, 1921) and also nereid polychaetes (Smith, 1958). Thirdly, there are no significant morphological differences between the hermaphroditic populations of *N. minutum*, described by Keferstein (1862) and *N. diaphanes* described by Gerould (1913). It is incorrect to regard the differing vertical distribution of these two species of the genus *Nephasoma* used by Cutler (1994) as an important criterion for the identification of these species.

As a result, *N. diaphanes* was considered as a junior synonym of *N. minutum*. It is appropriate to quote Peter Gibbs' (1975) opinion: "The morphologically similar specimens now regarded as a single species have two distinct forms, a dioecious form found chiefly in deep water, and a hermaphroditic form found on the shore and in shallow water around Europe and Scandinavia".

Class SIPUNCULIFORMES

Order GOLFINGIIFORMES

Family PHASCOLIONIDAE

Genus *Onchnesoma* Koren & Danielssen, 1875.

Onchnesoma squamatum squamatum (Koren & Danielssen, 1875)

Synonyms: *Phascolosoma squamatum* Koren & Danielssen (1875:129); *Phascolion squamatum* Théel (1905:96).

Good description: Théel (1905: 96-98, pl. 11, figs. 153-156; pl. 13, figs. 183-184, pl. 15, fig. 214-215).

Previous records: Bruntse and Tendal (2001).

BIOFAR stations: 32, 33, 61, 63, 64, 65, 68, 158, 483, 518, 716, 767 (12 stations and 105 specimens in total), fig. 4.

Temperature: 2.0-8.60 °C; Salinity: 35.00-35.20‰.

Depth range: 292-405 m.

Bottom type: silty sand, clayed sand.

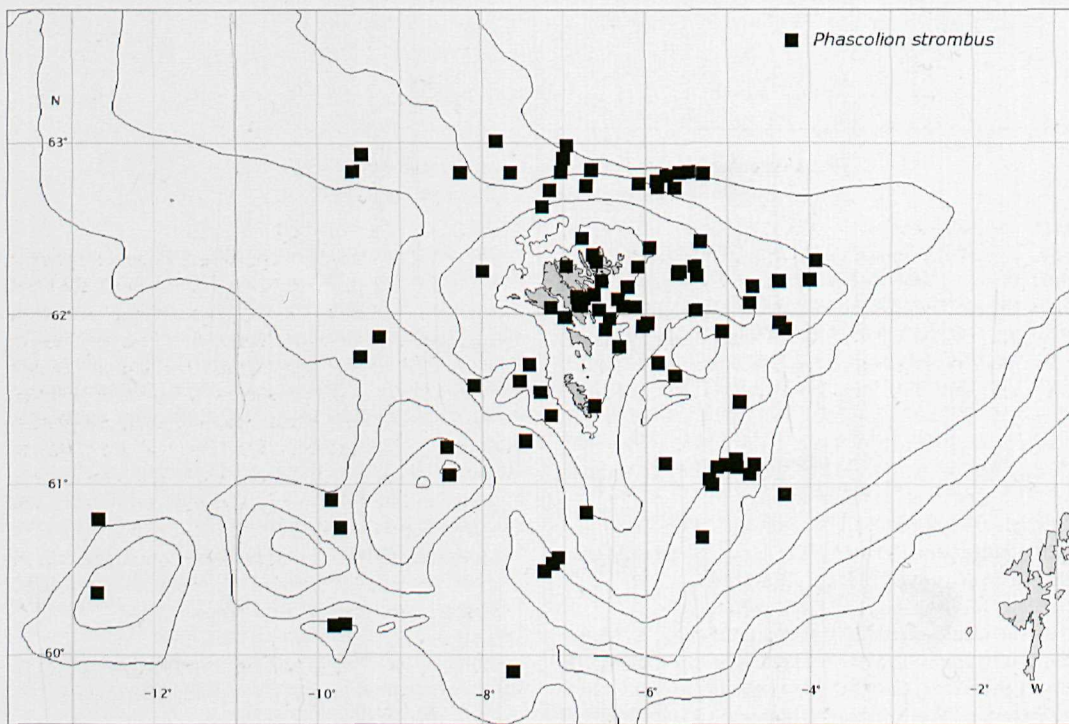


Fig. 5. Records of *Phascolion strombus* (Montagu, 1804)

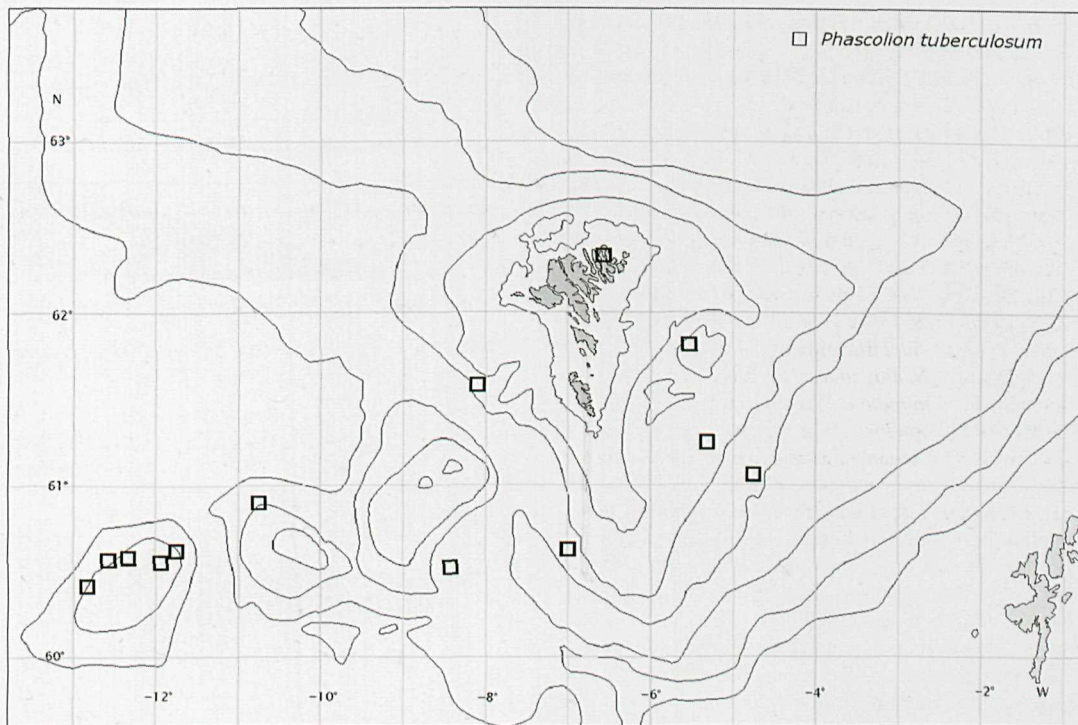


Fig. 6. Records of *Phascolion tuberculosum* Theel, 1875.

General distribution: Boreal-tropical eurybathic species (depth range: 10-2380 m). Atlantic distribution: From Iceland to Cape Verde Isles, coast of Norway, Bergenfjord, Lofoten, west coast of Ireland, coast of the British Isles, North Sea, Gulf of Biscay, Atlantic coast of USA from Florida to Cape Hatteras (24-34°N); Mediterranean: Ligurian Sea, coast of Israel; Pacific Ocean; Indian Ocean.

***Onchnesoma steenstrupii steenstrupii* Koren & Danielssen, 1875**

Good description: Théel (1905:93-96, pl. 10, figs.151-152; pl.11, figs. 157-172; pl. 13, fig. 185).

Previous records: Bruntse and Tendal (2001).

BIOFAR stations: 32, 33, 60, 61, 63, 64, 65, 132, 158, 223, 483, 542, 543, 765, 777, 778, 779 (17 stations and 410 specimens in total), fig. 4.

Temperature: 0.60 - 8.10 °C. Salinity: 34.95-35.20‰.

Depth range: 68-405 m.

Bottom type: mainly coarse sediments, also silt, sand,

sabulous clay, gravel, shell.

General distribution: Tropical-temperate eurybathic species (depth range 0-3362m). Bay of Suez, Red and Arabian seas, Indian Ocean, South Africa, Chatham Rise, West Australia, New Guinea, New Zealand Plateau, Cook Strait, Tasman Sea; Atlantic distribution: Iceland (?), Norwegian coast, Trondheimfjord, north of Lofoten, Great British Isles, North Sea, Kattegat, Skagerrak, northern coast of France, off the Portugal coast, Bay of Biscay, Spanish waters, Canary Isles, Mauritania coast, Guinea Gulf, off the Ivory Coast, near Angola and Congo, eastern coast of USA from 30 to 40° N.

Mediterranean: Alboran Sea; Spanish, French, Italian coasts; Tyrrhenian, Ligurian, Adriatic, Aegean Seas. Often found in rather large numbers.

***Phascolion (Phascolion) strombus strombus* (Montagu, 1804)**

Synonyms: numerous, see Murina (1977: 262); Cutler (1994: 130-131).

Good description: Théel (1905: 86-89, pl. 6, figs. 85-95;

pl. 7, figs. 109-110; pl. 15, figs. 207-208); Cutler (1994: figs. 27A, 28A-C, 30A).

Previous record: Nørrevang (1990) and Wesenberg-Lund (1928, 1930: 35).

BIOFAR stations: 3, 6, 8, 27, 44, 56, 65, 75, 76, 95, 103, 158, 172, 189, 190, 203, 230, 274, 295, 304, 305, 350, 356, 357, 359, 360, 363, 364, 366, 367, 381, 382, 390, 424, 425, 447, 455-459, 467, 478, 482, 491, 494, 514, 525, 542-545, 596, 597, 600, 603, 609, 646, 91, 698, 699, 718, 719, 721, 723, 724, 729, 730, 731, 748-752, 753, 755, 764, 776, 780, 781, 1123, 1133, 1160, 1260, 1217, 1219, 1447, 1484, 1600, 1614, 1615, 1789, 1791, 1814, 1821, 1834, 9018 (104 stations and 1158 specimens in total), fig. 5.

Temperature: -0.1-9.1 °C. Salinity: 34.9-35.3‰.

Depth range: 15-1078 m.

Bottom type: various substrates from sand, gravel, and shells to mud and clay. Usually inhabits shells of gastropods and scaphopods; polychaet tubes, Foraminifera, and commensal with Syllidae and some Gastropoda.

General distribution: Cosmopolitan, sublittoral-bathyal (depth range 1-4030 m). Red Sea, Gulf of Aden, Madagascar, near Durban, Australia Gulf, near Tasmania, New-Zealand, circumpolar in Arctic; Pacific Ocean: from Bering Strait to Japan Isles (about 40° N); Chile, Argentina, Comoran and Kerguelen Isles. Two Antarctic records were recently found. Atlantic distribution: Greenland-western and eastern coast to 85° N, Davis Strait, Spitzbergen, Norwegian coast, Iceland, Ireland, Great Britain Isles, Kattegat, Skagerrak, Bay of Biscay, Verde and Canary Isles, Guinea Gulf, South Africa, Atlantic coast of Canada and USA to Florida; Mediterranean: Algerian, Spanish and French coasts; Ligurian Sea, Messina Strait, Lipari Isles, Adriatic and Aegean Seas, Sea of Marmara.

Phascolion (Isomya) tuberosum Théel, 1875

Synonyms: *Phascolion pallidum* Koren et Danielssen, 1877: 132; Stephen & Edmonds, 1972:184; *Phascolion hironellei* Sluiter, 1900: 7; Stephen and Edmonds, 1972:178. *Phascolion temporariae* Edmonds, 1976: 217.

Good description: Cutler, 1994: 120-121, figs. 29 A, B; 30 F; 32.

Previous records: None.

BIOFAR stations: 65, 82, 234, 478, 514, 518, 520,

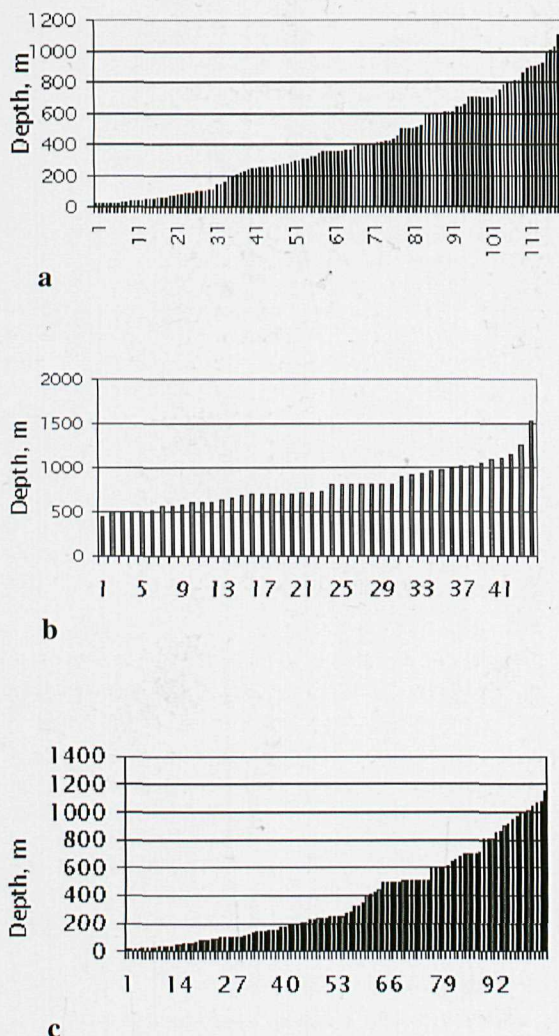


Fig. 7. Vertical distribution plots (a) *Nephasoma minutum*, (b) *Nephasoma lilljeborgi*, (c) *Phascolion strombus*. X-axis shows all the stations where the species is found and the y-axis shows the corresponding depth in meters.

Identification keys to Families, Genera and Species of Sipuncula

Key to Families of Class Sipunculidea

- | | |
|--------------------------------|----------------|
| 1. A single nephridium present | Phascolionidae |
| - Two nephridia present | Golfingiidae |

Key to Golfingiidae Genera

- | | |
|-------------------------------------|---------------------------|
| 1. Four introvert retractor muscles | <i>Golfingia vulgaris</i> |
| - Two introvert retractor muscles | <i>Nephasoma</i> |

Key to *Nephasoma* Species

- | | |
|---|-----------------------|
| 1. Hooks absent, trunk rugose with transverse grooves in the thick body wall | <i>N. eremita</i> |
| - Hooks present, trunk smooth without transverse grooves | |
| 2. Hooks are large and arranged spirally; digitiform tentacles fully developed | <i>N. abyssorum</i> |
| - Hooks small and not spirally arranged, tentacles weakly developed, reduced to small lobes. | |
| 3. Trunk is cylindrical, flask shaped, opaque, with short introvert, trunk width usually more than 1/10 the length | <i>N. minutum</i> |
| - Trunk long and very slender, transparent and threadlike with long introvert, trunk width usually less than 1/10 the length of trunk | <i>N. lilljeborgi</i> |

Key to *Onchnesoma* species:

- | | |
|--|-------------------------|
| 1. Trunk covered with prominent backward directed protrusions, eight tentacles | <i>On. squamatum</i> |
| - Trunk flat without spherical protrusions or scales; tentacles absent | <i>On. steenstrupii</i> |

Key to *Phascolion* species

- | | |
|--|-------------------------|
| 1. Dorsal and ventral retractors have equal width; holdfast spherical and lacks hardened borders; hooks broad, strongly recurved | <i>Ph. tuberculosum</i> |
| - Ventral retractor much thinner than the dorsal retractor, holdfast usually V-shaped with dark hardened border, hooks sharp and claw like, not recurved | <i>Ph. strombus</i> |

596, 689, 692, 728, 780, 1506 (total 13 stations, 22 specimens), fig. 6.

Temperature: from -0.1 - 8.6 °C. Salinity: 34.92-35.20‰.

Depth range: 351-732 m.

Bottom type: silty sand and gravel.

General distribution: Atlantic-boreal eurybathic species.

Depth range: 25-2700m.

Atlantic distribution: from Iceland to Azores Isles, coast of Norway, Trondheim, Bergenfjord, Swedish coast, Kattegat, Skagerrak, Mid-Atlantic Ridge, Bay of Biscay, Azores Isles; Mediterranean: Alboran Sea, Spanish waters, Adriatic Sea.

Conclusion

In early investigations in the defined area by Wesenberg-Lund (1928, 1930), only two species of sipunculans (*Ph. Strombus* and *N. minutum*) were found. Recent investigations (Bruntse and Tendal, 2001; Nørrevang, 1990) added two more to the list (*On. steenstrupii* and *On. squamatum*). In the present work, we collected more than 5,000 specimens from more than 254 representative stations.

Analysis of the material showed six species of Sipuncula recorded for the first time from this area. The dominant species were *Nephasoma minutum* (119 stations), *Phas-*

colion strombus (104 stations) and *N. lilljeborgi* (44 stations).

The vertical distribution of these species clearly varied (fig. 7). It was shown that *N. lilljeborgi* mainly inhabits deepwater sites. All samples were taken at depths of more than 400 m. Two species, *N. minutum* and *Ph. strombus*, are more eurybathic; 58 % of the samples were taken at depths less than 400 m.

The cryptobiotic habitat choice of the more common species, *Ph. strombus*, was discussed. The preferred habitat is hard bottom inside empty shells of gastropods and scaphopods. *N. lilljeborgi* lives free on the bottom in finer, soft sediments. Some samples of this species contain more 200-300 specimens. Distribution of *N. minutum* has intermediate characteristics: some of them inhabit scaphopod shells, others live free without shells. Zoogeographical distribution of these species in the world's oceans follows: Three species: *G. vulgaris*, *N. minutum* and *Ph. strombus* are cosmopolitan. Three species: *N. abyssorum*, *N. lilljeborgi*, *Ph. tuberculosum* are mainly arctic-boreal. Three species: *A. muelleri*, *On. steenstrupii* and *On. squamatum* are boreal-tropical. One species: *N. eremita* is bipolar.

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References

- Bruntse, G. and Tendal O.S. 2001. Marine biological investigations and assemblages of benthic invertebrates from the Faroe Islands. 80 p.
- Cutler, N.J. and Cutler E.B., 1986. A revision of the genus *Nephasoma* (Sipunculida, Golfingiidae). *Proceeding of the Biological Society of Washington*. 99(4): 547-573.
- Cutler, E. B.1994. The Sipuncula. Their Systematics, Biology, and Evolution. *Omstock Publishing Associates a division by Cornell University Press*, Ithaca and London: 1- 453.
- Edmonds, S. J. 1976. Three sipunculan species (two new) from New Zealand. *New Zealand Journal of Marine and Freshwater Research* 10: 217-224.
- Gerould, J.H. 1913. The sipunculids of the eastern coast of North America. *Proceeding of the U.S. National Museum*. 44:373-437.
- Gibbs, P.E. 1975. Gametogenesis and spawning in a hermaphroditic population of *Golfingia minuta* (Sipuncula). *Journal of the Marine Biological Association of the United Kingdom* 55:69-82.
- Harms, W. 1921. Morphologische und kausal-analytische Untersuchungen über das Internephridialorgan von *Physcosoma lanzarotae*. *Archiv für Entwicklungsmechanik der Organismen* 47:307-374.
- Keferstein, W. 1863. Beiträge zur Kenntnis der Gattung *Phascolosoma* F.S. Leuck. Untersuchungen über niedere Seethiere. *Z. wiss. Zool.* 12: 35-51, pls 3 and 4.
- Koren, J. and Danielssen, D. S. 1877. Contribution to the natural history of the Norwegian Gephyree.-In: *Sars M. Fauna littoralis Norwegiae.*, 3:11-152.
- Murina, G.-V.1977. Marine worms of arctic and boreal waters of Europe. *Works on the fauna of USSR*. Leningrad: Akademii Nauk USSR. Vol. 111: 1-283.
- Nørrevang, A. 1990. Botndjórálívið á føroyskum gáttarfirðum. *Fiskirannsóknir* 6:259-287.
- Nørrevang, A., Brattegaard, T., Josefson, A.B., Sneli, J.A., and Tendal, O.S. 1994. List of BIOFAR stations. *Sarsia* 79:165-180.
- Pancucci- Papadopoulou, M. A., Murina, G. V. V. and Zenetos, 1999. The Phylum Sipuncula in the Mediterranean Sea. Monographs on marine sciences. Athens: 1-109.
- Saiz-Salinas, I. J and L. Villafranca Urchegui. 1990. The Sipuncula from the Alboran Sea and Ibero-Moroccan Bay. *Journal of Natural History*. 24:1143-1177.
- Selenka, E., Man, J.G. de and Bülow, C. 1883. Die Sipunculiden. Reisen im Archipel Phillippinen von

- Dr. C. Semper. Leipzig and Wiesbaden, pt. 2, 4(1): 1-133, 14 pls.
- Smith, R.I., 1958. On reproductive pattern as specific characteristic among nereid polychaetes. *Systematic Zoology*, 7, 60-73.
- Stephen, A. C. and Edmonds, S. J. 1972. The Phyla Sipuncula and Echiura. *Brit. Museum Natural History*, London:1-588.
- Théel, H. 1905. Northern and Arctic invertebrates in the collection of the Swedish State Museum (Riksmuseum). I. Sipunculids. *Kungl. Svenska Vet.-Acad. Handlingar*, . 39,1, 1-130.
- Wesenberg-Lund, E. 1928. Gephyrea and Sternaspidae. *The Zoology of The Faroes*. Vol I, part 1: 1-5.
- Wesenberg-Lund, E. 1930. Priapulidae and Sipunculidae. *The Dan. Ingolf Expedition*, 4(7): 1-44.