

MEDDELELSER OM GRØNLAND

UDGIVNE AF

KOMMISSIONEN FOR VIDENSKABELIGE UNDERSØGELSER I GRØNLAND

Bd. 121 · Nr. 1

THE ZOOLOGY OF EAST GREENLAND

GEPHYREANS

BY

ELISE WESENBERG-LUND

WITH 7 FIGURES IN THE TEXT

KØBENHAVN

C. A. REITZELS FORLAG

BIANCO LUNOS BOGTRYKKERI A/S

1937

INTRODUCTION

The present paper comprises an account of the Gephyreans (*Priapulidæ*, *Sipunculidæ* and *Echiuridæ*) hitherto found at the coast of East Greenland. It is primarily based on the collections made by the Danish Expeditions of the last few years, but in addition the material of all previous expeditions have been included too, partly as they formerly have been discussed in the literature, and partly as they are represented in the collections of the Zoological Museum of Copenhagen.

In the material which has been at my disposal all species hitherto known have been represented. The material does not contain any species new to science but the two following species are new to East Greenland, viz. *Sipunculus norvegicus* KOR. & DAN. and *Echiurus echiurus* (PALL.). Both these species have been taken in one specimen only, and it holds good of both that a priori they could not be expected to occur at East Greenland. An investigation of the hydrographical and climatic conditions prevailing on the finding places however accounts for these interesting finds.

Altogether the following species is now known from East Greenland.

Priapulidæ:

Priapulus caudatus (LAM.)

Priapulus bicaudatus (KOR. & DAN.)

Halicryptus spinulosus v. SIEB.

Sipunculidæ:

Phascolosoma vulgare (DE BLAINV.)

Phascolosoma margaritaceum SARS

Phascolosoma eremita (SARS)

Phascolosoma minutum (KEFERST.)

Phascolion strombi (MONT.)

Sipunculus norvegicus (KOR. & DAN.)

Echiuridæ:

Echiurus echiurus (PALL.)

Hamingia arctica KOR. & DAN.

Synopsis of the Species.

Fam. *Priapulidæ*.

1. *Priapulus caudatus* (LAMARCK).

Priapulus caudatus WESENBERG-LUND, E. 1930, p. 7, pl. 1, fig. 1.

East Greenland records:

Priapulus caudatus THEEL 1906, p. 15.

Priapulus caudatus FISCHER, W. 1928, p. 475.

Priapulus caudatus WESENBERG-LUND, E. 1930, p. 8.

Priapulus caudatus WESENBERG-LUND, E. 1934, p. 5.

Occurrence at East Greenland: *North East Coast*: Danmarks Havn; off Sabine Ø. — *Franz Joseph Fjord*: Nordfjord; Moskusokse Fjord; Dusén Fjord; Antarctic Sund; Bjørne Ø; Blomsterbugt; off Cape Weber; off Jackson Ø; off Cape Franklin; off Knudshoved. — *Scoresby Sund*: Nordbugt; Røde Fjord; off Cape Hooker; off Cape Steven; off Cape Hope; off Cape Tobin; off Scoresby Sund; off Cape Dalton. — *Kangerdlugssuaq*: Mikis Fjord; Kangerdlugssuaq Fjord. — *South East Coast*: Angmagssalik; Sermilik; Lindenow's Fjord.

Priapulus caudatus is thus spread all over the coast of East Greenland. A common feature of all localities is that they are situated close to the coast, the depth thus everywhere being rather slight. The majority of the specimens has been dredged in shallow water — at a depth of less than 30 m. Of interest in this respect is only one of the stations in the Dusén Fjord (Ymer Ø) where the bathymetrical range of the species amounts to 370 m. — The main consistence of the bottom is everywhere clay, more or less tough; in some places mingled with mud and decaying vegetation f. i. *Desmarestia*, *Fusus* or *Fucus*; more seldom the clay is mixed up with sand, gravel or stones. From several localities it is stated that the clay is black or of a dark blue-grey tint; this may be due to a mixture of organic substances, corresponding to the putrid bottom in which we find *Priapulus caudatus* in Danish waters. — Although the species is spread all over the coast of East Greenland, the scarcity of it is however evident, since seldom more than one or two specimens occur in each sample.

Distribution: The species is bipolar. In the northern hemisphere it is circumpolar and has its main distribution in the arctic, boreo-arctic and boreal zone of the Atlantic.

Remarks: The East Greenland specimens are on an average rather small and slender; the cuticle cover is remarkably thin and the caudal appendage often very small. In one specimen, however, this was not the case; it amounted to no less than 2—3 times the length of the trunk. The

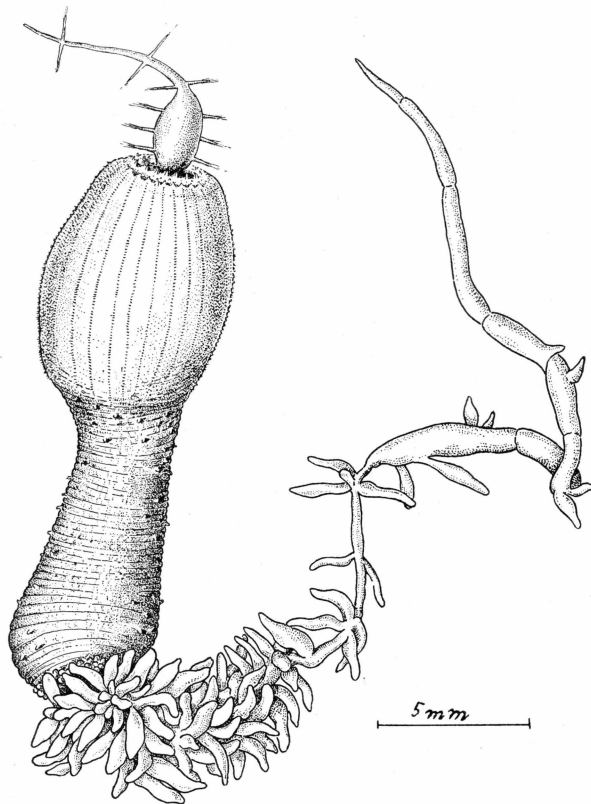


Fig. 1. *Priapulus caudatus* with a very elongated caudal appendage — feeding on a polychæte. — Poul H. Winther del.

distal filiform end of the appendage was entirely devoid of respiratory lobes, these latter especially being clustered round the proximal end of the appendage. One other specimen was noticeable; out of its gullet the remnants of a polychæte worm protruded. The triangular, serrated teeth of the Priapulid were deeply imbedded into the skin of the prey. *Priapulus caudatus* is, as a rule, stated to be a detritus feeder, but as shown by BLEGVAD and myself its stomach-contents often contain the chitinous cuticle with bristles of polychæte annelides as well as lots of spikes of spongiæ etc. In the Vidensk. Medd. 88, pl. 5 is figured a specimen which

has attacked a Synaptid, *Chiridota lævis*, and in the present material there is — as said above — another specimen, which has attacked a polychæte. This once more shows that BLEGVAD is right in transferring *Pr. caudatus* from the group of animals living on detritus to a group which he designates as detritus-and-animal feeders.

As the two specimens, viz. the one with the long caudal appendage and the one with the remnants of the worm protruding of the gullet, were found at the same station, Solitærbugten, Ellaø in Franz Josefsfjord, I have not considered it illicit to combine them in one drawing.

2. *Priapulus bicaudatus* (KOREN & DANIELSSEN)

Priapulus bicaudatus WESENBERG-LUND, E. 1930, p. 14, pl. 2, fig. 17.

East Greenland records:

Priapulus bicaudatus THEEL 1906, p. 19.

Priapulus bicaudatus FISCHER, W. 1928, p. 477.

Priapulus bicaudatus WESENBERG-LUND, E. 1930, p. 15.

Priapulus bicaudatus WESENBERG-LUND, E. 1934, p. 5.

Occurrence at East Greenland: *North East Coast*: Off Sabine Ø. — *Franz Joseph Fjord*: Off Eskimonæs; Clavering Ø; off Jackson Ø; Nordfjord; Mackenzie Bugt; off Cape Franklin; Dusén Fjord; Antarctic Sund; Rhedin Fjord; Gael Hamkes Bugt, 73°58' N. 18°23' W. and 74°05' N. 17°47' W. — *Scoresby Sund*: Hurry Fjord; off Cape Tobin; off Liverpool Land, Raffles Ø; off Danmarks Ø. *Kangerdlugssuaq*: Mikis Fjord; Kangerdlugssuaq.

The occurrence of this species is more restricted than that of *Pr. caudatus* and *Halicryptus spinulosus*. Its area of distribution ranges from abt. 75 N. Lat. to abt. 67 N. Lat. It is noticeable that several stations are situated outside the 200 m line, one even outside the 1000 m line. The southernmost locality at which it has been dredged is the Mikis Fjord and Kangerdlugssuaq. It seems to be just as scarce as *Priapulus caudatus*; everywhere only one or two specimens have been taken in each sample. It further seems to occur at greater depths than its congener, perhaps at a higher salinity too. The bottom where it occurs mainly consists of clay which is often fat and stiff, sometimes mixed up with sand, gravel or stones.

Distribution. *Pr. bicaudatus* is a more typical cold-water form than *P. caudatus*; corresponding with this its distribution is restricted to the northern parts of the Atlantic. The southernmost finding place hitherto known is off the coast of North Scotland. Its western boundary is at Smith Sound, West-Greenland and its eastern in the Kara Sea north of Eurasia (WESENBERG-LUND, E. 1933).

Remarks: It may be noticed that all specimens are rather small

some of them only a few mm; only one is of a considerable size abt. 60 mm even in a highly contracted condition; it was dredged off the mouth of Hurry Fjord at a depth of 140 m, the bottom consisting of brown clay and sand. — Furthermore it is conspicuous that in most of the specimens the caudal appendages are exceedingly small; in some individuals they are represented by two diminutive little protrudings only.

3. *Halicryptus spinulosus* v. SIEBOLD

Halicryptus spinulosus WESENBERG-LUND, E. 1930, p. 17, pl. 2, fig. 20.

East Greenland records:

Halicryptus spinulosus THEEL 1906, p. 19.

Halicryptus spinulosus FISCHER 1922, p. 244.

Halicryptus spinulosus FISCHER, W. 1928, p. 478.

Halicryptus spinulosus WESENBERG-LUND, E. 1930, p. 17.

Occurrence at East Greenland: *North East Coast*: Danmarks Havn; off Germania Land. — *Franz Joseph Fjord*: Mackenzie Bugt; *Scoresby Sund*: Nordbugt of Nordvestfjord. — *Kangerdlugssuaq*: Mikis Fjord and Kangerdlugssuaq. — *South East Coast*: Sermilik and Angmagssalik.

This species is the Priapulid most seldom met with, although its finding places are spread all over the East Coast of Greenland. They are in most cases situated in the inner parts of the fjords where the salinity is rather low. Further it is found in localities where the depth is slight, varying from 2 to 10 m. In all the dredging places the bottom consists of clay sometimes mixed up with sand or big stones and often containing decayed algæ. On an average only few specimens have been taken at each locality; a rare exception is the station in the Nordbugt in the Nordvestfjord (Scoresby Sund) where a single sample of 0.2 sq. m contained no less than 144 individuals even if most of them measured only few mm. Here the bottom consisted exclusively of clay, and the locality was situated just outside the outlet of a glacier torrent, the water thus presumably being brackish and of a low temperature (abt. 0° C.). An equally low salinity is found in the Hornafjörður at S. Iceland, from where *Hal. spinulosus* is recently reported (WESENBERG-LUND, E. 1937, p. 5).

Distribution: The species has a rather peculiar distribution. It is widely spread in arctic waters which may be considered the primary centre of its distribution; its western boundary is at West Greenland and the most easterly point from which it is known is the Taimyr Strait North of Byrranga. Besides this area it is found at several localities in the Baltic and the Kattegat for instance round Bornholm and in the outlet of the Götaelv. In this area it may be regarded as a survivor from the glacial period.

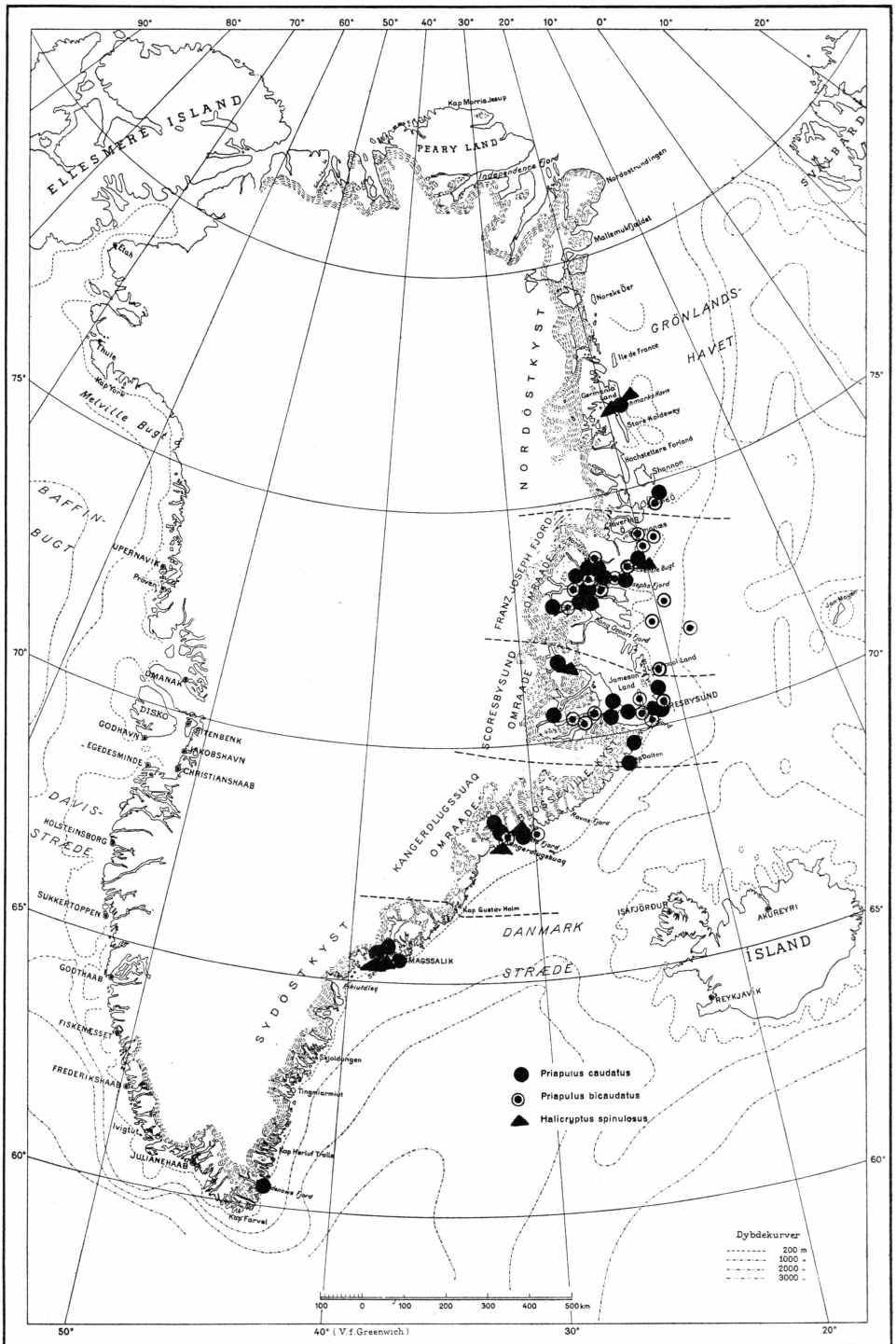


Fig. 2. Occurence of Priapulids at the coast of East Greenland.

Remarks: All the specimens from East Greenland are of a small size, on an average smaller than those we found in the Baltic. The specimens at hand all date from the months of July and August.

Fam. *Sipunculidæ*.

3. *Phascolosoma vulgare* (de BLAINVILLE)

Phascolosoma vulgare WESENBERG-LUND, E. 1930, p. 23, fig. 1.

East Greenland records:

Phascolosoma margaritaceum THÉEL 1905, p. 60.

Occurrence at East Greenland: *Franz Joseph Fjord*: Mackenzie Bugt. — *South East Coast*: Sermilik, 2nd Østfjord, 5 m stony sand.

Distribution: The European coast from Norway (Trondheim) to Gibraltar. Rather common in Danish waters and along the Swedish west coast; further in the lusitanian area and the Mediterranean. It is furthermore reported from the Indian Ocean; thus the species has a very wide distribution.

Ph. vulgare has formerly been reported from northern waters, among others the "Ingolf" Expedition has taken it at 64°24' N. 28°50' W. 1480 m (West of Iceland).

Remarks: It is of interest what THÉEL, undoubtedly the best connoisseur of arctic Sipunculids, writes about the occurrence of *Ph. vulgare* in East Greenland. From Mackenzie Bugt, N. of Franz Joseph Fjord, he has examined two small specimens which with some doubt he refers to *Phascolosoma vulgare*. He writes: "With regard to the small samples from Greenland the largest of which has a total length of 45 mm the strange locality makes one dubious about the correctness of the identification. However, as far as I have been able to make out the sample from East Greenland agrees with the typical forms in the arrangement and shape of the tentacles, in the presence of a girdle of hooks behind them (though they are small and of a light colour), in the posterior extremity of the trunk being rustcoloured and furthermore in the presence of two segmental organs and four retractor muscles as well as in the general shape of the intestinal spiral. The only difference to be noted concerns the papillæ of the skin which are of a rather minute size."— In my opinion THÉEL'S identification based upon this description is fully correct.

As to the specimens at hand dating from the Angmagssalik area the one of the two individuals measures 45 mm the other 37 mm; they are both fully extended, distinctly showing the tentacular crown and the girdle of irregularly scattered hooks. The papillæ are rather large especially at the base of the proboscis and the tip of the trunk; in the latter

place they form distinct, longitudinal rows pointing towards the tip. The colour is grey, only the base of the proboscis and the hindmost tip of the body is dark brown. As the skin is transparent the mudfilled intestinal coil is visible through it. As to the internal anatomy of the two specimens they fully agree with the typical forms. Both specimens are immature, the genital festoons being very indistinct and small.

The specimens at hand are as undoubtedly *Ph. vulgare* as the specimens examined by THÉEL; thus the occurrence of the species at the East Greenland coast now is a matter of fact, and we may expunge the point of interrogation which THÉEL has put in his comment on its occurrence at East Greenland. Yet we may suppose that the species is rare in this area and that the finding place in the Mackenzie Bugt without doubt indicates the northernmost boundary of its distribution in the Atlantic.

5. *Phascolosoma margaritaceum* (M. SARS)

Phascolosoma margaritaceum WESENBURG-LUND, E. 1930, p. 18, pl. 3, fig. 27.

East Greenland records:

Phascolosoma margaritaceum THÉEL 1905, p. 63.

Phascolosoma margaritaceum FISCHER, W. 1928, p. 457.

Occurrence at East Greenland: *Franz Joseph Fjord*: Off Clavering Ø; off Pendulum Ø; Solitærbugten; off Ella Ø; Dusén Fjord. — *Scoresby Sund*: Hurry Fjord, off Fame Ø; off Cape Hooker. — *South East Coast*: Napassorssuaq; Lindenow's Fjord.

It is remarkable that the species has not been found in the Kangerdlugssuaq area in spite of the numerous dredgings which have been made there. The reason may perhaps be that the species to a certain degree prefers the more protected fjords to the open coast, a fact which is supported by its occurrence in Danish, Swedish and Norwegian seas. — The localities mentioned above widen the hitherto known area of its distribution along the East coast of Greenland considerably, as until now it has only been reported from Angmagssalik and from a single station in the open sea outside the Franz Joseph Fjord area. As regards the material at hand the bathymetrical distribution of the species ranges from 15 m (Lindenow's Fjord) to 200 m (Sermilik).

The bottom mainly consists of clay or muddy sand, sometimes mingled with stones, gravel or algæ.

Distribution: On the northern hemisphere it is circumpolar with its main distribution in the boreo-arctic part of the Atlantic being f. i. rather abundant in the waters west of Greenland and round Iceland. It is furthermore known from Spitzbergen, the north coast of Asia, Finmarken, Norway and Denmark. Along the American east coast it is reported from New Foundland and the Gulf of St. Law-

rence. It ranges southwards to Morocco and the Azores always in shallow waters. In Danish waters it is especially common in the clay-areas of the Kattegat.

Remarks: Some of the specimens are very large, the maximum length being 224 mm with fully protruded proboscis. In some of the individuals the skin has the remarkably silky lustre which now and then is characteristic of the species; in others, f. i. in the three specimens from Ella Ø, Franz Joseph Fjord, the skin is tough and provided with great papillæ; the hindmost tip of the trunk is rusty red. The introverts of these latter are quite withdrawn; the greatest of them measures 44 mm, the smallest one only 16 mm. In a great number of the specimens the genital festoons were well developed and the body cavity full of mature eggs.

6. *Phascolosoma eremita* (M. Sars)

Phascolosoma eremita WESENBERG-LUND, E. 1930, p. 28, figs.

Phascolosoma eremita THÉEL 1905, pl. 1, fig. 6.

East Greenland records:

Phascolosoma eremita WESENBERG-LUND, E. 1930, p. 28.

Phascolosoma eremita WESENBERG-LUND, E. 1934, p. 6.

Occurrence at East Greenland: *Franz Joseph Fjord*: Off Ymer Ø, 72°25' N. 17°56' W. — *Kangerdlugssuaq*: The mouth of Kangerdlugssuaq Fjord. — *Angmagssalik*: Tasiussârssik; Tasiusaq.

The species has been dredged in very shallow waters, at a depth not exceeding 30 m. Only the finding place off the Franz Joseph Fjord area is close to the 1000 m line. From Kangerdlugssuaq the bottom is reported to consist of muddy clay whereas it may be of interest that at both localities in the area of Angmagssalik the bottom is *Lithothamnion* crusts. Here each sample contained 10 and 15 specimens respectively, at Kangerdlugssuaq only one.

Distribution: In the northern hemisphere it is almost exclusively arctic. In the west it reaches as far as Canada, in the east as far as Novaya Zemlya and the Kara Sea, thus not being circumpolar. It is worth mentioning that this pronounced arctic species which does not occur in Danish waters extends its distribution southwards along the eastern coast of America in shallow waters as far as to the Bay of Massachusetts presumably on account of the cold influence of the Labrador Stream, and in deeper waters until abt. 40° Lat. N. It usually occurs at depths less than 200 m but in the northern part of the Baffin Bay and south of Cape Cod the depths at the finding places amount to 1200 and 2000 m respectively.

Remarks: The length of the East Greenland specimens at hand ranges between 10 and 20 mm. They are all of a dark brown colour;

proboscis and the hindmost tip of the trunk is on an average lighter than the central part of the body. None of the specimens showed the light brown colour which THÉEL (1905, p. 73) considers characteristic of the Greenland "variety", a fact which coincides with my statement in the "Ingolf" Report on the Gephyreans in which material both the dark brown and the light brown iridescent specimens were found, a further proof that the two geographical varieties, based on the difference in colour do not exist.

7. *Phascolosoma minutum* (KEFERSTEIN)

Phascolosoma minutum WESEBERG-LUND, E. 1930, p. 30, pl. 3, fig. 30.

East Greenland records:

Phascolosoma anceps THÉEL 1905, p. 84.

Occurrence at East Greenland: *North East Coast*: S. of Shannon Ø, 74°52' N. 17°16' W. — *Franz Joseph Fjord*: Solitærbugten, Ella Ø, off

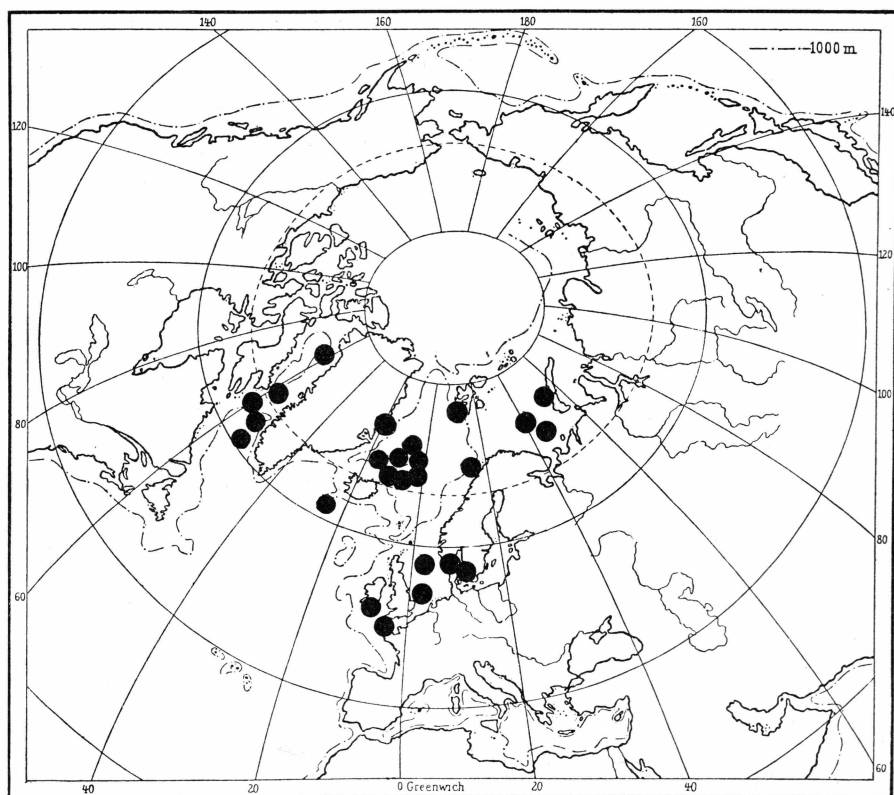


Fig. 3. Distribution of *Phascolosoma minutum* (Keferst.) in the northern part of the Atlantic.

the delta. — *Scoresbysund*: The outlet of Hurry Fjord; between Cape Stevenson and Cape Leslie.

The bottom is everywhere consisting of mud, clay sometimes mixed with sand, gravel or some few stones. The depth is 45 m at Ella Ø; at the 5 stations between the two capes: 106, 143, 162, 513 and 521 m respectively.

Distribution: In the northern hemisphere it is especially abundant in the northern part of the Atlantic area (fig. 3). It enters the lusitanian area too, as it is reported from a number of stations off the coasts of Ireland and Normandy. Furthermore it is found off the coast of Eurasia viz. Novaya Zemlya, the Barents Sea etc. and is known from Lofoten (West coast of Norway). It is generally reported from shallow waters (so f. i. in the Danish and Swedish seas) but at some localities in the Norwegian Sea and along the East coast of North-America, where it reaches as far southwards as to 39°41' Lat. N. it enters the deep sea (2250 m). — The species is said to occur either among the haptera of *Laminaria* or the tubes of annelids. In the deeper parts of the sea it inhabits the shells of small gastropodes. (THÉEL 1905, p. 81, and FAUVEL 1922, p. 10). According to THÉEL (l. c.) *Phascolosoma minutum* KEF. (= *Ph. sabellarix* THÉEL) is found abundantly in the epifauna formed by *Sabellaria spinulosa* LEUCK. as a thick layer the tubes of this polychæte envelop the shells of extinct *Cyprina islandica* which cover the sandy bottom in some places in the firth of Gullmarn at the west coast of Sweden. —

Among the rather great number of specimens which during the years have been at my disposal I have, however, never found a single one which inhabited shells or worm tubes; they have all been free-living and almost every one of them has been recorded from clay-bottom. Evidently the species is not much particular in its relation to bottom material.

Remarks: The greatest specimen of this slender and elegantly shaped little Sipunculid measures 40 mm in fully protruded condition; the proboscis alone measures abt. 15 mm. In all the specimens a distinct girdle of hooks was found; the hooks themselves and their arrangement fully agree with the description given in the "Ingolf" Report. The greater part of the specimens have an Endoproct fixed to the skin especially at the hind tip of the trunk but otherwise scattered all over the body. The skin is smooth and translucent and the intestinal coil as well as the long ventral retractor muscles which issue close to the nerve cord in the middle third of the trunk are distinctly discernable through the skin. In the fully extended specimens the small glandular bodies of the skin are difficult to recognize whereas each of them in the contracted specimens shows a little globular protrusion. The genital organs were well developed and the liquid of the body cavity contained mature sexual products. No trace of hermaphroditism was found.

8. *Phascolion strombi* (MONTAGU)

Phascolion Strombi THÉEL 1905, p. 6, figs. 82 and 87.

East Greenland records:

Phascolion Strombi THÉEL 1905, p. 87.

Phascolion Strombi FISCHER, W. 1922, p. 241.

Phascolion Strombi FISCHER, W. 1928, p. 469.

Phascolion Strombi WESENBURG-LUND, E. 1930, p. 34.

Phascolion Strombi WESENBURG-LUND, E. 1934, p. 6.

Occurrence at East Greenland: *North East Coast*: S. of Shannon Ø, 74°52' N. 17°16' W. — *Franz Joseph Fjord*: Dusén Fjord; Solitærbugten, Ella Ø; off Cape Hedlund; Rhedin Fjord; off Bjørne Øen; Sophia Sund; between Cape Weber and Ymer Ø; S.W. of Cape Franklin; off Zoologdalen, Ymer Ø; Mackenzie Bugt; Kong Oscars Fjord. — *Scoresby Sund*: Off Raffles Ø, Liverpool Land; Hurry Fjord; off Cape Hope; off Cape Hooker; off Bjørne Øerne; Hekla Havn. — *Kangerdlugssuaq*: Mikis Fjord; Kangerdlugssuaq. — *South East Coast*: Angmagssalik; Tasiussaq, Íkátoq; Lindenow's Fjord.

According to the present material and the literature this is by far the most common Gephyrean at the east coast of Greenland. The Danish "Treaarsekspedition 1931—34" has brought home more than 100 specimens and almost every one of the former expeditions also found it in great numbers. It has its hitherto northernmost finding place at Shannon Ø, and it ranges southwards almost to Cape Farvel. Along this enormous coast line its finding places especially group round the two wide fjord areas of the Franz Joseph Fjord and Scoresby Sund, furthermore at Kangerdlugssuaq, Angmagssalik and the Lindenow's Fjord, probably because the investigations have been especially numerous here. It is remarkable that it has never been found along the Nordøstkyst (Danmarks Havn) where thorough investigations have been carried out too. — The bathymetrical boundaries vary rather much: from abt. 10 m to abt. 600 m. The greatest depths are all situated in the fjords round Ymer Ø (Franz Joseph Fjord). It is a well known fact that *Ph. strombi* prefers a bottom consisting of clay; and on examining the list of stations from the "Treaarsekspedition 1931—34" we will find in correspondance with this that the statements as regards the bottom are as follows: clay, stiff clay, clay with single large stones, clay mixed with sand or gravel, clay with *Rhodophyceæ* or *Laminaria* and very often only: *Desmarestia*, an alga which always is an indicator of the presence of clay bottom. In some few cases as f. i. from some stations at Ella Ø and Cape Hedlund (Franz Joseph Fjord) the clay contains great numbers of shells. — The apparatus used for collecting the samples has everywhere been the bottom sampler or the dredge; only at the station south of the Bontekoe Island (off the mouth of Franz Joseph Fjord) the Sigsbeetrawl has been used, and in

the great lumps of stiff clay mixed with single stones, which the apparatus has brought up the species here dealt with has been buried.

Distribution: The species is recorded from both hemispheres. In the northern one it has a wide circumpolar distribution in the arctic, boreo-arctic, boreal, and lusitanian regions, especially abundant and widely distributed in the northern part of the Atlantic. At the east coast of North America it goes as far southwards as to the thirty fifth parallel, and along the European west coast it is known from the British and French waters. It is sporadically found in the Mediterranean. It is mainly a littoral species but it may be found at greater depths (at the Azores 1482 m, and off Virginia 1931 m).

Remarks: Inside the different areas of distribution along the East Greenland coast *Phascolion strombi* has been found in by far the greatest numbers in the ramifications of Franz Joseph Fjord. At Cape Hedlund in Kempes Fjord, opposit to the mouth of Rhedin Fjord it has for instance been dredged at no less than 22 stations of which the depths vary between 10 and 85 m; round Ella Ø (Solitærbugten, Cape Elizabeth, depths 22—320 m) at 10 stations, and round Ymer Ø (Dusén Fjord, Sophia Sund) at 6 stations. Besides at these and several other localities inside the wide fjord area the species has been dredged outside the coast too, e. g. in the Mackenzie Bugt; at the mouth of Kong Oscars Fjord; off Liverpool Land near Cape Greg etc. — In the Scoresby Sund area the species was by far not so often met with in the years 1931—33, although similar thorough investigations have been carried out here. So for instance in the Nordbugt in the Nordvest Fjord a great many samples were taken and not a single *Phascolion strombi* was found although the conditions as to the depths and the bottom material were almost the same as in the waters round Ymer Ø and Ella Ø.

This different occurrence may perhaps be due to accidental variations of single years, perhaps to the fact that the Franz Joseph Fjord area is a more closed water than the Scoresby Sund area. — It is indeed interesting to find a parallel to this occurrence in a polychæte annelid, viz. *Pectinaria granulata*. It is entirely absent in the Scoresby Sund whereas it is a typical animal in shallow waters in the *Macoma calcaria* community on clay bottom in the Franz Joseph Fjord.

Finally it may be mentioned that during a whole year 70 plankton samples were taken per month at Ella Ø in Franz Joseph Fjord and not a single larva which could be referred to *Phascolion strombi* (or any other Sipunculid) was ever found; in all likelihood the Gephyrean in question has a direct development in these regions. — As only a minority of specimens were found inside the 20 m line we may suppose that the species nearly always occurs at negative temperatures all the year round and that it also spawns at these low centigrades.

One of the specimens dating from Kong Oscars Fjord, S.E. of Archer Øerne, 280 m where the bottom consisted of tough clay was of special interest. It measured only 9 mm and was first determined as *Ph. tuberculosum* THÉEL because the skin bears a great resemblance to the characteristic verruciform skin of this species. A closer examination however revealed that minute, very little conspicuous horseshoe-shaped holdfasts were present on the top of some small protrusions; therefore the hooks of the proboscis were subjected to a closer examination too, and as they were found to resemble those of *Ph. strombi* very much, I had to alter my identification and refer the specimen to this much more common congener. This account is only reported to show how exceedingly plastic the species *Ph. strombi* is.

The species was found in abundance in tubes of *Pectinaria*; a few ones in Serpulid tubes. Furthermore in shells of the following gastropods: *Trichotropis borealis*, *Natica groenlandica*, *Natica affinis*, *Margarita groenlandica*, *Admete viridula*, *Buccinum hydrophanum*, *Sipho islandicus*, *Sipho curtus*, *Sipho varigatus*, *Sipho lachesis*, *Bela pyramidalis*, *Siphonodentalium vitreum*, and *Cylichna* sp. — In shallow waters (20—30 m) by far the greatest number of specimens inhabited shells of *Trichotropis*, *Natica groenlandica*, *Buccinum hydrophanum* and *Siphonodentalium vitreum*. — In greater depths (more than 100 m) the species especially inhabited *Natica affinis*, *Sipho curtus*, *Buccinum hydrophanum*, *Cylichna* sp. and *Siphonodentalium vitreum*.

9. *Sipunculus norvegicus* KOREN & DANIELSEN

Sipunculus norvegicus WESENBERG-LUND, E. 1930, p. 18, pl. 3, fig. 27.

Occurrence at East Greenland: *Franz Joseph Fjord*: Is Fjord.

Only a single specimen at hand. It dates from Is Fjord which west of Ymer Ø separates Fraenkel Peninsula from Andræ Land. The station from which the specimen originates is situated between the two glaciers in the head of the fjord. The bottom consists of clay with big stones. The depth is 350 m; the apparatus which was used was the Sigsbeetrawl.

Distribution: The distribution of *Sipunculus norvegicus* is very wide. It is originally described from the west coast of Norway where it is found at Lofoten, at Bergen, and Hardangerfjord. Furthermore it has been taken in the Bay of Biscay, at the Azores and the Cape Verde Islands, and off Monaco. FISCHER (1922) mentions it in the "Valdivia"-Report from the Indian Ocean. It is generally found in shallow waters in the northern seas; in deep waters in the warm seas.

Remarks: It was a great surprise to find *Sipunculus norvegicus* in the East-Greenland material. According to the above mentioned distribution the conclusion is justified that the distribution of the species is

related to a positive bottom temperature, all the findings in the northern Atlantic being made at stations with such a temperature. The hydrographical conditions in the Is Fjord are however rather different from those of the localities from where the species has hitherto been reported. The Isfjord is a typical threshold fjord separated from the outer basin of Franz Joseph Fjord by three thresholds, the last in a depth of abt. 360 m.

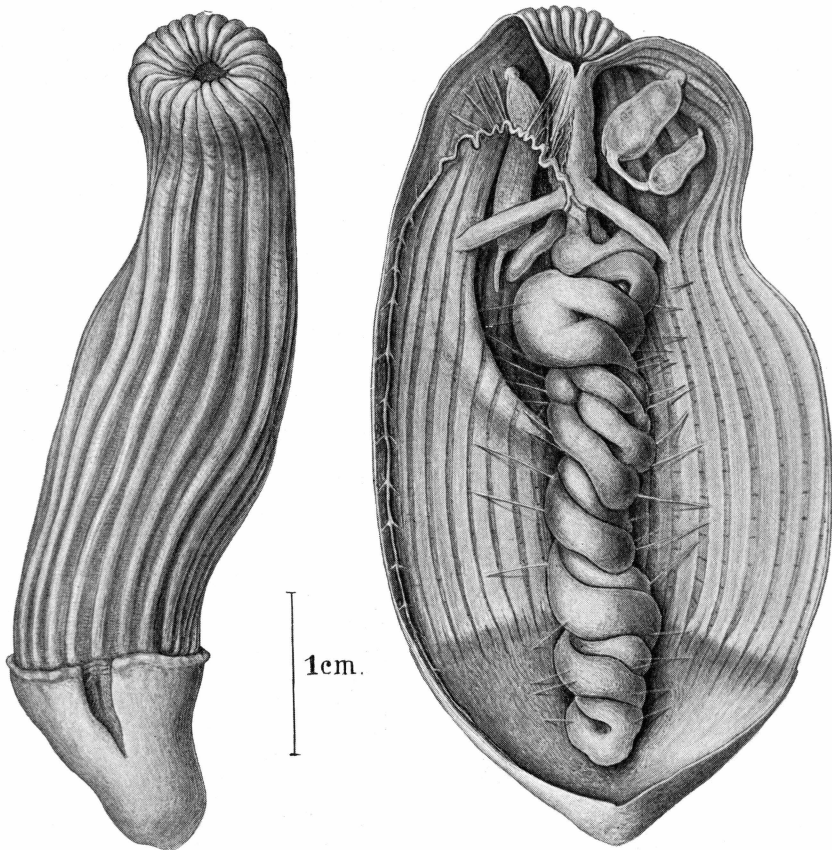


Fig. 4. *Sipunculus norvegicus* Kor. & Dan. — Poul H. Winther del.

The cold surface water from the Polar current here covers a layer of water consisting of a mixture of water from the inner basins and the Polar current. The bottom water has come into existence by a mixture of the Polar current water and the subjacent warmer water layers of the open sea (SPÄRCK 1933, p. 23). At the depth where *Sipunculus norvegicus* has been dredged (350 m) this bottom water has a temperature of abt. $\div 0.2^{\circ}$ C. and a salinity of abt. 34.60 per mille. The occurrence of *Sipunculus norvegicus* in the Isfjord may only be explained by the theory that it is to be regarded as a survivor from a remote time when the warmer

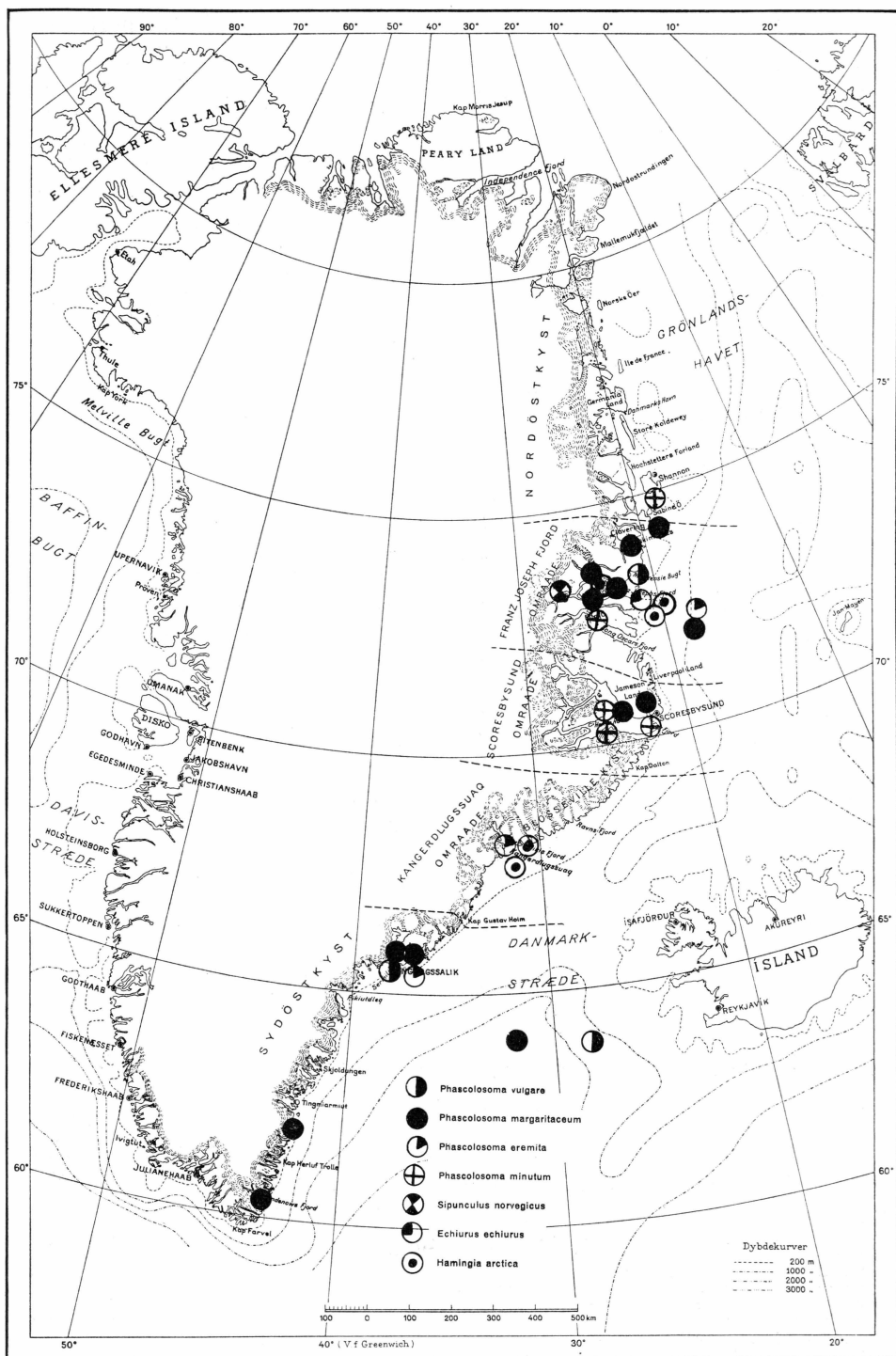


Fig. 5. Occurrence of *Sipunculids* and *Echiurids* at the coast of East Greenland with the exception of *Phascolion strombi*.

bottom water outside the thresholds reached abt. 100 m higher than now; the consequence of this would be that the warm water could pass over the thresholds and remain in the inner basin, creating such hydrographical conditions that the findings of *Sipunculus norvegicus* would be no surprise.

In order to ascertain the correctness of the identification of this species the specimen was subjected to a closer eidonomic and anatomical investigation. The trunk measures 51 mm; the proboscis is withdrawn and the tentacular crown was not fit for any study. The 22 longitudinal muscle bands were distinct; one of the dorsal ones was bifurcate at the proximal end, the drawing therefore shows 23 muscle bands round the aperture of the invaginated introvert. The skin is tough and not transparent; the colour is bluish-grey, the glans a little lighter than the trunk. At the transition between glans and trunk a very distinct annular ridge is seen, crenulated at the upper margin. Ventrally this ridge bends backwards some few mm, forming a longitudinal furrow on the surface of the glans, towards the tip of which it tapers considerably. — As regards the internal anatomy I have practically nothing to add to the description given in the "Ingolf" Report (p. 19). The specimen was opened alongside the ventral nerve cord; rectum and anus, the contractile vessel and the diverticle are therefore not visible on the figure. The two segmental organs were quite empty and of different shape being differently contracted during the preservation. The genital festoons were not developed. Finally I shall refer to a comparison between the accompanying two figures and the corresponding figures in the "Ingolf" Report (pl. 3, fig. 27 and pl. 6, fig. 63).

Fam. *Echiuridæ*.

9. *Echiurus echiurus* (PALLAS)

Echiurus pallasii THÉEL 1906, p. 22, pl. 1, fig. 7—8.

East Greenland records:

Echiurus echiurus FISCHER, W. 1928, p. 479.

Occurrence at East Greenland: *Franz Joseph Fjord*: 5 miles S. of the Bontekoe Ø, 245 m; tough clay mixed with some gravel and stone. Only one specimen at hand.

Distribution: The species is widely distributed in the northern part of the North Atlantic and in the North Sea. It is common in Danish waters and in the Channel both at the English, French and Belgian coasts. Furthermore it is reported from the West coast of Norway, from the Finmark, the Murman Coast, off Eurasia and the North Pacific; at the West coast of Greenland it is rather common. At the East coast of North America it goes as far southwards as to the coast of Maine. — The species

is generally found in very shallow waters and in localities where the bottom mainly consists either of rich black mud or of clay.— At the Bontekoe Ø it has been dredged at a considerable depth; yet the bottom temperature is positive at the finding place (SPÄRCK 1933, the map).

Remarks: The specimen at hand measures 45 mm; it is of a reddish colour the skin is well preserved, but the entrails are quite decayed.

11. *Hamingia arctica* KOREN & DANIELSEN

Hamingia arctica WESEBERG-LUND, E. 1934, p. 7, figs. 1—4.

East Greenland records:

Hamingia arctica WESEBERG-LUND, E. 1934, p. 7.

Occurrence at East Greenland: *Franz Joseph Fjord*: 5 miles S. of and 2 miles S.W. of the Bontekoe Ø, 245 and 240 m respectively; tough clay with some gravel and stones; *Dusén Fjord*, 370 m, tough, greybrown clay mixed with sand. — *Kangerdlugssuaq*: *Mikis Fjord* and *Kangerdlugssuaq* 65 and 130 m, muddy clay and mud resp. From the *Franz Joseph Fjord* area 3 very badly preserved specimens are at hand. From the *Kangerdlugssuaq* area 4 specimens, which formerly have been subjected to discussion (WESEBERG-LUND, E. 1934, p. 7).

Distribution: Besides the two above mentioned finding places at East Greenland the species is only recorded from the waters round Spitzbergen and the Murman Sea, a few stations in the Norwegian Sea and the West coast of Norway (f. i. *Hardanger Fjord*). The distribution of the species is thus rather considerable in the northern seas, although it is a rare form, the findings being scarce, and generally the samples only contain a single or two specimens. An exception is the statements of

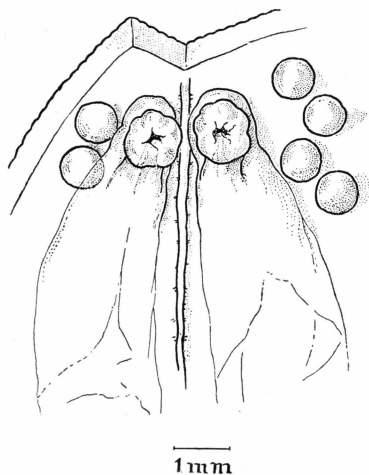


Fig. 6. *Hamingia arctica*; the two molested segmental organs with nephrostomes and some eggs.

SKORIKOW (1912) who found it in numbers in the Murman Sea, and one of the expeditions of the Prince of Monaco (SLUITER 1912, p. 25) in the Barents Sea obtained 6 specimens in one sample. — LEVINSEN (1883) reports it from Iceland without mentioning any further locality. On the map (fig. 7) the finding place is marked at the north coast of Iceland as this seems to be in best agreement with the further distribution of the species. The map shows that *Hamingia arctica* typically belongs to the

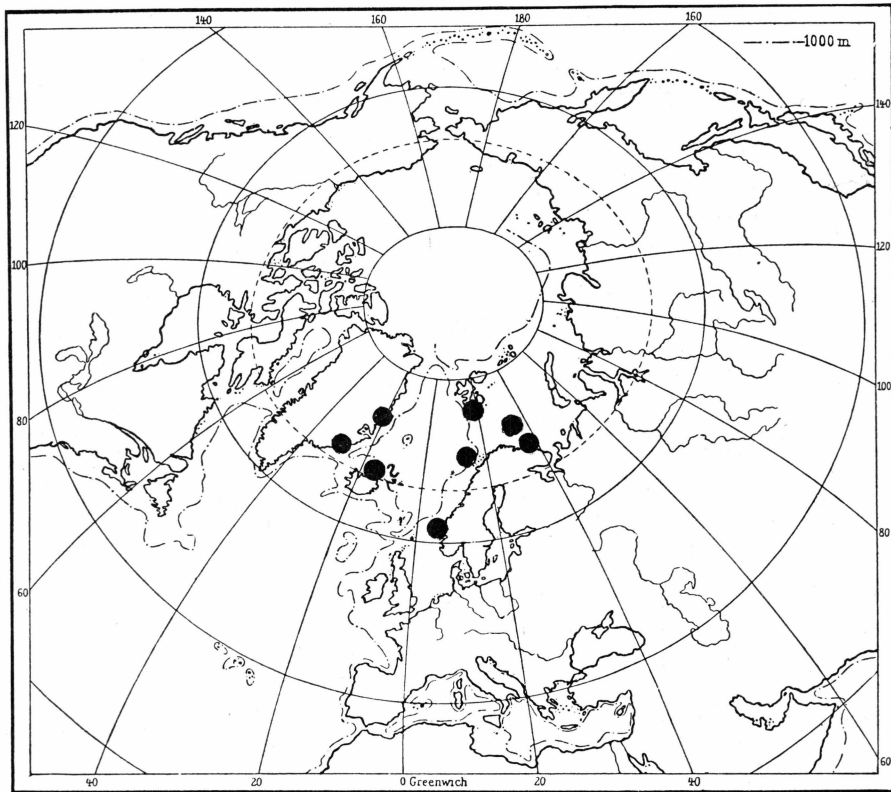


Fig. 7. Distribution of *Hamingia arctica* Kor. & Dan.

littoral and low abyssal area surrounding the cold deep sea basin of the Norwegian Sea.

Remarks: As the condition of preservation was so exceedingly bad it was impossible to make any anatomical studies. I therefore have nothing to add to the account given in my previous paper (WESENBERG-LUND, E. 1934, p. 7). The entrails of the specimens at hand were molested and decayed. Only one thing was found worth stating; the body cavity of all three specimens contained a great number of eggs; they were of a considerable size, abt. $\frac{3}{4}$ mm in diameter; the accompanying figure shows the remnants of the segmental organs, fixed on each side close to the

ventral nervecord; the nephrostome is ending in a curved collar and placed on a little tube close to the proximal end of the organ. As both segmental organs were injured no eggs were found in them, but outside them a number was floating. The genital festoon along the central nervecord contained eggs of different sizes. — The colour of the specimens was reported to be a vivid green, although they were quite discoloured under influence of the alcohol when I received them for examination. The proboscises were lacking in all specimens. The “anal trees” were relatively uninjured and resembled those figures l. c. fig. 3, p. 11.

Table I. Synopsis of the Distribution of the Gephyreans occurring at East Greenland.

Species	West-Greenland	Iceland	Spitzbergen	Finnmarken	North-Russia	Further distribution
<i>Priapulus caudatus</i> (LAM.)	×	×	×	×	×	bipolar; in the northern hemisphere circumpolar, boreal, subarctic, lusitanian; mainly littoral.
<i>Priapulus bicaudatus</i> (DAN.)	×	×	×	×	×	mainly arctic; low abyssal.
<i>Halieryptus spinulosus</i> v. Sieb.	×	×	×	×	×	arctic, subarctic, boreal; littoral.
<i>Phascolosoma vulgare</i> (BLAIN.)	×	subarctic, boreal, lusitanian; mainly littoral.
<i>Ph. margaritaceum</i> (SARS)	×	×	×	×	×	arctic, boreal, subarctic; littoral and abyssal.
<i>Ph. eremita</i> (SARS)	×	×	×	×	×	circumpolar; arctic, subarctic, boreal, lusitanian; littoral low abyssal.
<i>Ph. minutum</i> (KEF.)	×	×	×	×	×	arctic, subarctic, boreal; mainly low abyssal.
<i>Phascolion strombi</i> (MONT.)	×	×	×	×	×	circumpolar; arctic, subarctic, boreal, lusitanian; littoral, abyssal.
<i>Sipunculus norvegicus</i> (DAN.)	×	boreal, lusitanian; littoral, low abyssal, abyssal.
<i>Echiurus echiurus</i> (PALL.)	×	×	..	×	×	arctic, subarctic, boreal, lusitanian; littoral, low abyssal.
<i>Hamingia arctica</i> KOR. & DAN.	×	..	×	×	arctic, boreal, subarctic; littoral, low abyssal.

Table II. The Gephyrean fauna of the northern Atlantic.

Species	East- Greenland	West- Greenland	Iceland	Spitzbergen
<i>Priapulus caudatus</i> (LAM.)	×	×	×	×
<i>Priapulus bicaudatus</i> (DAN.)	×	×	×	×
<i>Halieryptus spinulosus</i> v. SIEB.	×	×	..	×
<i>Phascolosoma vulgare</i> (BLAINV.)	×	×
<i>Ph. margaritaceum</i> (SARS)	×	×	×	×
<i>Phascolosoma elongatum</i> (KEF.)	×
<i>Phascolosoma eremita</i> (SARS)	×	×	×	×
<i>Phascolosoma abyssorum</i> KOR. & DAN.	×
<i>Phascolosoma Liljeborgi</i> DAN. & KOR.	×
<i>Phascolosoma minutum</i> (KEF.)	×	×	..	×
<i>Phascolosoma improvisum</i> THÉEL.	×
<i>Phascolion strombi</i> (MONT)	×	×	×	×
<i>Phascolion alberti</i> SLUITER.	×
<i>Onchnesoma squamatum</i> (KOR. & DAN.)	×	..
<i>Sipunculus norvegicus</i> (DAN.)	×	..	×	×
<i>Echiurus echiurus</i> (PALL.)	×	×	×	..
<i>Hamingia arctica</i> KOR. & DAN.	×	..	×	..

General Remarks.

The comparatively great number of marine investigations which have been carried out in the northern part of the Atlantic especially on the part of Russia, Scandinavia and France make a comparison between the fauna of East Greenland and that of Spitzbergen and Eurasia possible.

The hydrographical and climatic conditions of the sea round the southern part of Spitzbergen, the Barents Sea and the White Sea bear a great resemblance to those of Northeast Greenland, although the north-

ern branch of the Gulf Stream which extends into the southern parts of these waters accounts for the fact, that the fauna of Spitzbergen the White Sea and the S.W. of the Barents Sea includes a number of southern species.

As to the Gephyreans 8 of the 11 East Greenland species are re-found at Spitzbergen. The three missing ones are *Hamingia arctica*, *Echiurus echiurus* and *Phascolosoma vulgare*. It seems to be accidental that the two Echiurids have not hitherto been found at Spitzbergen, they are both known from adjacent waters. Things are somewhat different as regards *Ph. vulgare* which generally occurs on more southern latitudes; the supposition that this species was to be found at Spitzbergen and not in Northeast Greenland might therefore seem to be justified.

On the other hand the following 4 Sipunculids have been found at Spitzbergen and not at East Greenland: *Phascolion alberti* SLUIT. *Phascolosoma elongatum* (KEF.) *Ph. abyssorum* KOR. & DAN. and *Ph. liljeborgi* (DAN. & KOR.) The two last mentioned species are arctic forms which might be expected to occur at East Greenland, whereas the two first mentioned species no doubt belong to the southern forms which owing to the influence of the Gulf Stream can subsist in the waters round Spitzbergen.

If we compare the conditions prevailing at the coast of East and West Greenland it will generally be found that the fauna of Northwest Greenland comprises a greater number of southern species than the same latitudes of Northeast Greenland. Unfortunately this fact is not borne out by the Gephyrean material which always will play a quantitatively inferior part. Leaving the two indeterminable *Thalassema* and *Sipunculus* species mentioned in the paper on West Greenland Gephyreans collected by the "Godthaab" Expedition (WESENBURG-LUND, E. 1932) out of consideration, it is only *Phascolosoma glaciale* DAN. & KOR. which has not been re-found at East Greenland. This is without doubt due to the fact that *Ph. glaciale* is an abyssal species, which at West Greenland has been taken in great depths in the Baffin Bay. — It is a matter of fact that at Angmagssalik two different zoogeographical regions meet; north of this line we find a region dominated by arctic species whereas south of it a number of boreal elements occurs — f. i. this is clearly borne out by the distribution of molluscs. As regards the Gephyreans it is characteristic in this respect that the pronouncedly arctic *Priapulus bicaudatus* occurs only north of the above mentioned boundary.

LIST OF LITTERATURE

- BLEGVAD, H., 1914. Undersøgelser over Næring og Ernæringsforhold hos Havbundens invertebrate Dyresamfund i danske Farvande. (Beretn. fra den danske biol. Stat. **22** p. 37).
- FISCHER, W., 1922. Gephyreen der Arktischen Meere. (Wiss. Meeresunters. Kiel **13** p. 230).
- 1922. Gephyreen. (Wissensch. Ergebn. d. Deutsch. Tiefsee-Exped. **22**).
- 1928. Die Sipunculiden, Priapuliden u. Echiuriden der Arktis. (Fauna Arctica **5** p. 455).
- LEVINSEN, G. M. R., 1883. Systematisk-geografisk Oversigt over de nordiske Annullata, Gephyrea etc. (Vid. Medd. fra Dansk Naturh. Foren.).
- SKORIKOW, A. Über die Gattung Hamingia Kor. & Dan. (Zool. Anz, **24** p. 158).
- SLUITER, G.-P., 1912. Gephyriens (Sipunculides et Echiurides) provenant des campagnes de la »Princesse-Alice«. (Rés. des Camp. scient. de Monaco Fasc. **36**).
- SPÄRCK, R., 1933. Contributions to the animal ecology of the Franz Joseph Fjord and adjacent East Greenland waters. (Medd. om Grønland **100** No. 1).
- THEEL, H., 1905. Northern and arctic Invertebrates in the collection of the Swedish State Museum. I Sipunculids. (Kungl. Svenska Vetensk.-Akad. Handl. **39** No. 1).
- 1906. *ibid.* II Priapulids and Echiurids. (Kungl. Svenska Vetensk. Akad. Handl. **40** No. 4).
- THORSON, G., 1936. The larval development, growth, and metabolism of arctic marine bottom invertebrates. (Medd. om Grønland **100**).
- WESENBERG-LUND, E., 1929. Some Remarks on the Biology and Anatomy of the Genus Priapulidæ etc. (Vid. Medd. fra Dansk Naturh. Foren. **88** p. 165).
- 1930. Priapulidæ and Sipunculidæ. (The Danish Ingolf-Expedition **4** No. 7).
- 1932. Gephyrea. The Godthaab Expedition 1928. (Medd. om Grønland **79** No. 3).
- 1933. The collections of Gephyreans in the Royal Museum of Natural History of Belgium. (Bull. du Mus. Roy. d'Hist. nat. de Belg. **9** No. 6).
- 1934. Gephyreans and Annelids. The Scoresby-Sound Committees 2nd East Greenland Expedition in 1932. (Medd. om Grønland **104** No. 14).
- 1937. Gephyrea. (The Zool. of Iceland **2** No. 23).
-