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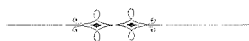
SYNOPSIS

OF

THE NORWEGIAN MARINE THALAMOPHORA

BY

HANS KLÆR



KRISTIANIA

OSCAR ANDERSENS BOGTRYKKERI

1900

During the preparation of the Thalamophora of the Norwegian North Atlantic Expedition, I had the opportunity of examining the late Professor M. Sars' valuable collection of Norwegian Thalamophora, which had been arranged by the Professor himself.

There was, however, no list appertaining to this collection, at least not of the species obtained from the Christiania Fiord, which were found partly at Bygdø (11—56 m.), and in the Bunde Fiord (18—112 m.), partly at Drøbak (about 100 m.).

Having been granted a stipend for the purpose, from the Rathke legacy in the summer of 1897, I studied the occurrence of the Thalamophora in the Christiania Fiord, especially at Drøbak (0—200 m.) and also in the outer part of the fiord, at Hankø—Rauø—Misingerne (5—345 m.).

Independent of this, I had, during the summer of 1899, the opportunity of making a two days' cruise to the Drammen Fiord with a steam-launch, kindly placed at my disposal by Dr. Hjort, during which time I obtained soundings of the sea bottom at 10 different places between Rødtangen and Drammen. I have also been enabled to examine samples taken from the bottom of the Bunde-Fiord, Brevik Fiord and Frier Fiord.

A by no means insignificant amount of classified material, is now presented of the Thalamophora of the Christiania Fiord, and the adjacent fiords, and it seems, therefore, desirable to issue a statement concerning the occurrence of the Thalamophora within certain parts of these fiords.

I did not find it expedient, however, only to deal with the Thalamophora of the eastern fiords, but decided on giving an account of the occurrence of Thalamophora along our coast, though dealing, chiefly, with the Christiania Fiord.

As various soundings have been taken at many spots along our coast, I submit a summary of the papers that have issued concerning the Norwegian Thalamophora:

1857. Parker, W. R., and Jones, J. R., Description of some Foraminifera from the Coast of Norway. *Ann. and Mag. Nat. Hist.* ser. 2, vol. XIX, p. 273, pls X, XI.

1864. Sars, M. Bemærkninger om det dyriske livs udbredning i havets dybder. *Kristiania Vidensk. Selsk. Forhandling*, 1864, pag. 34 og 55.

1865. Sars, M. Om de i Norge forekommende fossile dyrelevninger fra Quartærperioden. *Universitetsprogram*, 1ste halvaar 1864.

1868. Sars, M. Fortsatte bemærkninger over det dyriske livs udbredning i havets dybder. *Vidensk. Selsk. Forhandling* 1868, pag. 246. Kristiania.

1868. Crosskey, Rev. H. W., and Robertson, D. Notes on the Post-tertiary Geology of Norway. *Proc. Phil. Soc. Glasgow* vol. VI, p. 346.

1871. Sars, G. O. Undersøgelser over Hardangerfjordens fauna. I. Crustacea (etc.). *Vidensk. Selsk. Forhandling* 1871, p. 246. Kristiania.

1874. Schultze, F. E. *Zoologische Ergebnisse der Nordseefahrt*. II. *Jahresb. d. Komm. zur Untersuch. d. deutsch. Meere in Kiel*, p. 99, pl. II. Berlin.

1886. Terquem, M. O., et M. E. Foraminifères et Ostracodes de L'Islande et du Sud de la Norvege. *Bull. Soc. Zool. de France*, XI, p. 328. Paris.

1892. Goes, A. Arctic and Scand. Foraminifera. *K. Svenska Vetensk. Akad. Handlingar*. Bd. 25. No. 9. Stockholm.

1894. Rhumbler, L. Beiträge zur Kenntnis d. Rizopoden. *Zeitschr. f. wiss. Zoologie*, 1894, p. 587. Leipzig.

1894—95. Schaudinn, F. Verzeichniss der während des Sommers 1894 aus dem Pudde-, By- und Hjeltefjord bei Bergen gesammelten Foraminiferen. *Bergens Museums Aarbog*. Bergen 1896.

1899. Kiær, Hans. Thalamophora. *Den Norske Nordhavs-Expedition* 1876—78.

Professor M. Sars' Thalamophora were, chiefly, collected in the Lofoten [Odvær, Svolvær, at a depth of about 200 metres; Skraaven, 4 metres, and about 500 metres; Guldbrandsøerne, about 200 metres; Raftsund, Digermulen, Buknæsforden, about 100 metres; Brettesnæs, about

100 metres] and also at Grøtø [Bodø], Øxfjord, in West Finmarken, and at Vadsø.

Professor G. O. Sars has also kindly furnished me with portions of fine shell, and sand, for examination, which contained a multitude of Thalamophora. This material was procured from Moldøen at Stadt, about 500 metres, and Selsøvig, Lofoten, 100 metres, and 500 metres.

In the following account of the Thalamophora, e — indicates a single, or one or two specimens; n — a few; m — numerous; sm — a great numbers. A * before the name of its habitat, indicates that, the bottom sample has been treated according to Dr. Madsen's method*).

Bygdø, near Christiania, 10—60 metres.

Biloculina simplex	Webbina clavata
Miliolina agglutinans	Nodulina scorpiura
Polystomella striatopunctata	Miliolina seminulum
Nodosaria communis	Uvigerina pygmaea
Vaginulina linearis	Operculina ammonoides
Valvulina conica	Truncatulina lobatula
Polymorphina lactea	Nonionina scapha
Miliolina bucculenta	Trochammina robertsoni
Bigenerina digitata	Cassidulina laevigata
Ammodiscus incertus	Bulimina pyrula
Verneuilina polystropha	Polymorphina rotundata
Saccammina sphaerica	Rotalia orbicularis
Haplophragmium latidorsatum	Rhabdammina abyssorum
„ canariense	Cornuspira foliacea
„ glomeratum	Rotalia beccari

The Bunde Fiord, 18—110 metres.

Biloculina simplex	Nodulina scorpiura
„ sphaera	Uvigerina pygmaea
Triloculina oblonga	Operculina ammonoides
Miliolina agglutinans	Truncatulina lobatula
„ bucculenta	Nonionina scapha
„ seminulum	Polymorphina rotundata
„ subrotunda	Verneuilina polystropha
Lagena striata	Ammodiscus patelliformis
Cornuspira foliacea	Trochammina robertsoni
Bigenerina digitata	Cassidulina laevigata
Glandulina laevigata	Rotalia orbicularis
Haplophragmium canariense	Bulimina marginata
„ latidorsatum	„ pyrula
„ glomeratum	

*) V. Madsen. Istidens Foraminiferer i Danmark og Holsten. Copenhagen 1895.

Sandpollen, and Sætrepollen, near Drøbak, 11—15 metres, soft, grey mud.

Verneuilina polystropha (m)	Rotalia beccari (m)
Polystomella striato punctata (e)	„ orbicularis (e)
Bulimina marginata (e)	Nonionina umbilicatula (n)
Cassidulina laevigata (n)	

Bergholmerne, near Drøbak, 18—23 metres. Stony bottom.

Biloculina elongata (e)	Uvigerina angulosa (n)
Miliolina seminulum (e)	Cassidulina laevigata (n)
Truncatulina lobatula (m)	Polymorphina compressa (e)
„ refulgens (m)	„ rotundata (e)
„ coronata (e)	„ rot. fistulosa (e)
Rotalia beccari (n)	Nonionina scapha (e)

»Drøbaksgrunden« (Drøbak), 18—23 metres. Rocky bottom with corals.

Truncatulina lobatula	Biloculina simplex
Nonionina umbilicatula	Cristellaria rotulata

Storskjær, near Drøbak, 0.5—2 metres. Sand, with large and small stones.

Truncatulina lobatula (n)

A little south of Drøbak, 10—20 metres. Rocky bottom.

The following species were found attached to sea-weed and mussels:

Planorbulina lobatula (n)	Miliolina subrotunda (n)
„ refulgens (e)	Verneuilina polystropha (n)
Operculina ammonoides (e)	

Drøbak, about 100 metres. (Sars).

Biloculina simplex	Valvulina conica
„ elongata	Rotalia beccari
„ depressa	Cristellaria rotulata
Spiroloculina limbata	Bulimina marginata
„ complanata	„ normanni
Cornuspira foliacea	„ pyrula
Miliolina trigonula	„ elipsoides
„ aglutinans	Trochammina robertsoni
„ seminulum	Truncatulina ungeriana
„ oblonga	Glandulina laevigata
„ valvularis	Vaginulina linearis
Polystomella striatopunctata	Nodulina scorpiura
Lagena striata	Polymorphina rotundata
„ laevis	Anomalina coronata
Nodosaria pyrula	Pulvinulina punctulata
„ communis	Nonionina umbilicatula

Nonionina scapha	Truncatulina lobatula
Uvigerina pygmaea	Haplophragonium glomeratum
" angulosa	Valvulina fusca
Hyperammuna elongata	Placopsilina bulla
Operculina ammonoides	Ammodiscus tennis
Cassidulina laevigata	

Skiphellebugten, south of Drøbak, about 60 metres. Grey, partly liquid mud.

Nonionina stelligera (e)	Miliolina subrotunda (e)
" scapha (n)	Biloculina elongata (e)
Bulimina marginata (e)	Trochammina robertsoni (e)
Cassidulina laevigata (n)	Uvigerina angulosa (n)
" crassa (n)	Valvulina conica (e)
Operculina ammonoides (n)	Haplophragonium nanum (e)
Rotalia beccari (n)	Truncatulina lobatula (e)
Verneuilina polystropha (e)	

Drøbaksund about midway, south of Storskjær, about 200 metres. Soft clay of different compositions, from solid blue clay, to a greyish green mud.

Cristellaria rotulata	Spiroloculina limbata
Cassidulina laevigata	Polymorphina augusta
" crassa	Bolivina dilatata
Lagena gracillima	Lagena striata
" globosa	" distoma
" sulcata	" marginata
Nonionina depressula	" hexagona
" umbilicatulata	" williamsoni
" scapha	Nodosaria scalaris
Bulimina elipsoides	Sacammuna sphaerica
" marginata	Psammospaera fusca
Operculina ammonoides	Rhabdammina abyssorum
Polystomella striatopunctata	Hyperammuna elongata
Uvigerina pygmaea	Nodulina scorpiura
" angulosa	Bigenerina digitata
Cornuspira carinata	Haplophragmium latidorsatum
Rotalia beccari	" canariense
Miliolina agglutinans	Valvulina conica
" trigonula	Webbina clavata
" seminulum	Batysiphon filiformis
" valvularis	Truncatulina lobatula
Biloculina elongata	Nodosaria laevigata
" simplex	

The depression between Haadøen and Graadøen, Drøbak, about 100 metres. Light grey mud.

Hyperammuna elongata (m)	Haplophragonium canariense (e)
Bigenerina digitata (m)	Webbina clavata (e)

Truncatulina akneriana (e)	Nonionina stelligera (e)
" ungeriana (e)	Bulimina pyrula (n)
" refulgens (e)	" marginata (n)
" coronata (e)	Miliolina seminulum (n)
" lobatula (n)	Biloculina elongata (e)
Textularia agglutinans (e)	Operculina ammonoides (m)
Nodosaria laevigata (e)	Trochammina nitida (n)
Nodolina nodolosa (e)	" robertsoni (n)
Lagena distoma (e)	Haplophragmium globigeriniforme (e)
" striata (e)	Uvigerina angulosa (n)
" squamosa (e)	Cassidulina laevigata (n)
" marginata (n)	Gordiammina patelliformis (e)
Nonionina umbilicatula (m)	Virgulina schreibersiana (e)
" scapha (m)	Lagena williamsoni (e)

Western side of Drøbaksund, 4—10 metres. Fucus and Laminaria, gravel and small stones, with adherent specimens of Planorbulina lobatula.

Hvidsten, midway, about 200 metres, very soft mud of a dark-drab colour mixed with occasional tints of greyish blue and greyish green. The mud differs from the genuine Biloculina mud, in having a darker tinge of greyish green.

Batysiphon filiformis (m)	Pullenia quinqueloba (e)
Nodulina scorpiura (e)	Operculina ammonoides (n)
Bigenerina digitata (n)	Bulimina elipsoides (m)
Haplophragmium latidorsatum (e)	" marginata (e)
" globigeriniforme (e)	Miliolina seminulum (e)
" glomeratum (e)	Nonionina scapha (e)
Verneuilina polystropha (e)	" umbilicatula (e)
Ammodiscus incertus (e)	Planorbulina lobatula (e)
Hyperammia elongata (e)	Bolivina dilatata (n)
Valvulina conica (e)	Cassidulina laeviga (e)
Pullenia sphaeroides (e)	

Rødtangen, 125 metres. Grey mud.

Rhabdammina abyssorum (e)	Nonionina scapha (n)
Batysiphon filiformis (n)	" umbilicatula (n)
Bigenerina digitata (n)	Nodosaria aequalis (e)
Haplophragmium latidorsatum (n)	Bulimina pyrula (n)
" glomeratum (n)	" elipsoides (n)
Valvulina conica (e)	" marginata (n)
Gordiammina patelliformis (e)	Bolivina dilatata (m)
Biloculina simplex (n)	Cassidulina laevigata (n)
Miliolina seminulum (e)	Operculina ammonoides (n)
Planorbulina lobatula (n)	

Drammen Fiord, a little to the north of Svelvik, 125 metres. Dark grey mud, mixed with tinges of black.

Spiroplecta biformis (m)	Haplophragmium glomeratum (n)
Nodulina gracilis (n)	Lagena gracilis (e)

Nonionina scapha (n)	Bulimina elipsoides (e)
" depressula (n)	" marginata (e)
Polystomella striatopunctata (e)	Pullenia sphaeroides (e)
" var. incerta (e)	Nonionina stelligera (e)
Virgulina schreibersiana (n)	Rhabdammina abyssorum (e)

Drammen Fiord, a little to the north of Svelvik, 94 metres. Greyish-black mud.

Spiroplecta biformis (n)	Cassidulina laevigata (e)
Nonionina scapha (e)	Virgulina schreibersiana (e)

Drammen Fiord, a little north of Svelvik, 75 metres. The mud was of a light grey colour, with a tinge of brown.

Nodulina scorpiura (m)	Trochammina robertsoni (m)
Haplophragmium glomeratum (m)	Nonionina scapha (e)
Spiroplecta biformis (sm)	" stelligera (e)

Drammen Fiord, midway, 125 metres. Dark grey mud, with tinges of black.

Spiroplecta biformis (m)	Nonionina scapha (e)
Nodulina gracilis (e)	Miliolina agglutinans (e)
Haplophragmium glomeratum (e)	Virgulina schreibersiana (e)

Drammen Fiord, midway), 120 metres. Plain grey mud.*

Spiroplecta biformis (n)	Nonionina umbilicatula (e)
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Drammen Fiord, midway), 120 metres. Plain grey mud.*

Spiroplecta biformis (n)	Haplophragmium glomeratum (n)
Trochammina robertsoni (e)	Miliolina agglutinans (e)

Drammen Fiord, midway), about 40 metres. Grey mud.*

Nodulina scorpiura (e)	Haplophragmium glomeratum (m)
Nonionina stelligera (n)	Trochammina robertsoni (m)
Spiroplecta biformis (m)	

Drammen Fiord, upper part, 100 metres. Dark-grey mud.

Spiroplecta biformis (n)	Haplophragmium glomeratum (n)
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Drammen Fiord, opposite Tangen, 56 metres. Grey mud.

Spiroplecta biformis (m)	Miliolina agglutinans (e)
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*) Indicates the central part of the fiord, between Svelvik and Drammen.

Outer part of the Christiania Fiord.

Between Engelsvigen, and Rauø, to the north of Hankø, 112 metres. Soft grey clay.

Rhabdammina abyssorum (e)	Uvigerina pygmaea (e)
Tholysina bulla (e)	Rotalia beccari (n)
Biginerina digitata (e)	Cassidulina laevigata (n)
Bulimina elipsoides (e)	Biloculina elongata (e)
„ marginata (e)	Virgulina squamosa (e)
Nonionina umbilicatula n)	Bolivina dilatata (e)
„ scapha (n)	Biloculina simplex (e)

North West of Misingerne, about 345 metres. Very soft mud, of a dark-drab colour.

Batysiphon filiformis (n)	Miliolina seminulum (n)
Rhabdammina abyssorum (n)	Biloculina sphaera (e)
Biginerina digitata (n)	„ depressa (e)
Hyperammia elongata (n)	Planorbulina akneriana (e)
Valvulina conica (n)	Nonionina umbilicatula (n)
Nodulina scorpiura (n)	„ scapha (n)
Haplophragmium latidorsatum (n)	Bulimina elipsoides (n)
„ glomeratum (e)	Bolivina dilatata (n)
„ globigeriniforme (e)	Operculina ammonoides (n)
„ canariense (e)	Pullenia sphaeroides (n)
Trochanmina robertsoni (n)	Cassidulina laevigata (n)
Cornuspira foliacea (e)	Virgulina squamosa (e)
Lagena marginata (e)	

Hankø sund, southern entrance, about 26 metres. Soft bluish grey clay, with quantities of sand.

Planorbulina lobatula (m)	Cassidulina laevigata (e)
Rotalia beccari (m)	Nonionina umbilicatula (e)
Bulimina marginata (e)	„ scapha (e)
Textularia agglutinans (e)	

Locality as above, a little inside the entrance, 6 metres. Soft bottom of bluish grey clay and sand.

Rotalia beccari	Polystomella striatopunctata
Planorbulina lobatula	Verneuilina polystropha
Nonionina umbilicatula	

Engelsviken, 56 metres. Soft grey mud, greatly mixed with sand.

Rhabdammina abyssorum (e)	Miliolina seminulum (e)
Nodulina scorpiura (e)	„ valvularis (e)
Anmodiscus tenuis (n)	Lagena sulcata (e)
Haplophragmium pseudospirale (e)	

Brevik Fiord, 80—90 metres. Pure grey mud.

Nodosaria laevigata (e)	Trochammina vesicularis (e)
" pauperata (e)	Nonionina scapha (n)
" scalaris (e)	" turgida (e)
Miliolina agglutinans (n)	" stelligera (n)
" seminulum (e)	" umbilicatula (m)
Bulimina elipsoides (m)	" depressula (n)
" marginata (n)	Virgulina squamosa (n)
Operculina ammonoides (m)	" subsquamosa (e)
Biloculina simplex (e)	" schreibersiana (e)
" sphaera (e)	Truncatulina lobatula (n)
Uvigerina pygmaea (n)	" akneriana (e)
Bulimina pyrula (n)	" ungeriana (e)
Cassidulina laevigata (n)	Polystomella crispa (e)
Bulimina normanni (e)	Cornuspira foliacea (e)
Haplophragmium canariense (n)	Uvigerina angulosa (e)
" latidorsatum (e)	Pullenia sphaeroides (e)
" nanum (e)	Verneuilina polystropha (e)
" glomeratum (e)	Discorbina berthelothi (e)
Valvulina conica (n)	Lagena laevis (e)
Saccamina sphaerica (n)	" striata (e)
Bigenerina nodosaria (e)	" squamosa (e)
Nodulina scorpiura (n)	" marginata (e)
Reophax difflugiformis (n)	" distoma (e)
Trochammina robertsoni (n)	

The Frier Fiord, about 86 metres. Drab coloured mud.

Bigenerina digitata (n)	Bulimina marginata (n)
Verneuilina polystropha (n)	Nonionina umbilicatula (e)
Ammodiscus incertus (e)	" scapha (n)
Gordiammina patelliformis (e)	Cassidulina laevigata (n)
" gordialis (e)	Biloculina elongata (e)
Nodulina nodulosa (n)	Virgulina schreibersiana (s. m.)
Reophax difflugiformis (e)	Operculina ammonoides (n)
Haplophragmium glomeratum (n)	Miliolina subrotunda (n)
Trochammina robertsoni (n)	Spiroloculina biformis (n)
" squamata (n)	Uvigerina pygmaea (e)
" vesicularis (e)	

Thalamophora.

I. Fam. Rhabdamminidae.

I. Subfam. Myxothecinae.

1. *Biomyxa vagans* Leidy.

According to Schaudinn, this species was frequently found in the aquariums of the Biological Station, Bergen.

2. *Gromia oviformis* Dui.

Frequent at Bergen, from 2—80 metres (Schaudinn).

3. *Craterina mollis* Gruber.

Single specimens, found at Bergen at the same depth as the preceding species (Schaudinn).

4. *Rhynchogromia variabilis* Rhumbler.

5. *Dendrotuba nodulosa* Rhumbler.

6. *Dactylosaccus vermiformis* Rhumbler.

7. *Rhynchosaccus immigrans* Rhumbler.

8. *Ophiotuba gelatinosa* Rhumbler.

The 5 latter species were found by Rhumbler at Christianssand, and by Schaudinn at Bergen in Saccammina shells. I have not succeeded in finding any of these species in the Saccammina shells from the Christiania Fiord. The lot, derived from the soundings, which I have examined from the eastern fiords, did not yield great numbers of Saccammina sphaerica. A Saccammina shell from the Brevik Fiord, contained a probably defective specimen of Rhynchosaccus immigrans.

9. *Shepherdella taeniformis* Sidall.

Rather common at depths of 80—520 metres at Bergen (Schaudinn).

10. *Myxotheca arenilega* Schaudinn.

Schaudinn found single specimens of this species at Bergen, 80—300 metres.

II. Subfam. *Astrorhizinae*.

11. *Astrorhiza limicola* Sandahl.

Single specimens of this species have been found in several localities along the west coast of Norway, near Bergen, at a depth of 8—520 metres (Goës, Schaudinn).

Distribution: The coasts of Northern Europe, and North Eastern America, 20—140 metres.

12. *Astrorhiza arenaria* Norman.

Seems to be a genuine deep water form, thus it is not found at a less depth than 100 metres from the surface, while sometimes it is obtained from the profound depths of the North Atlantic.

The species occurs along the entire west coast of Norway, from the Kors Fiord to Hammerfest.

A. limicola is recorded by M. Sars as having been found at a depth of 850 metres on the coast of Norway. He probably means *A. arenaria*, as that species is not mentioned in his list. Again *A. limicola* is not so common along our coast as the *arenaria*.

Distribution: Spitsbergen 4200 metres; the Rhabdammina Clay; the North Sea; Faeroe Channel, and the Cape of Good Hope.

13. *Astrorhiza crassatina*, Brady.

Like the former, a well defined deep water form, and even more so than the other. *A. crassatina* is not found on the Norwegian coast (The Norwegian North Atlantic Expedition) in water of lesser depth than 911 metres.

Distribution: Spitsbergen 204—4630 metres; the Rhabdammina Clay, 191—333 metres; the Faeroe Channel, 1200 metres; the Northern Ocean, 911—2030 metres.

III. Subfam. *Saccammininae*.

14. *Saccammina sphaerica* M. Sars.

Exists along the entire coast of Norway, at times in great quantities, at depths varying from 2—1200 metres.

It is found in the Christiania Fiord at Bygdø, at a depth of 11—95 metres, and at Drøbak (Storemedet) 100—200 metres. Also in the Brevik Fiord 80—100 metres; Frier Fiord, about 86 metres (single specimens only); Christiansand, 40—80 metres; Hardanger Fiord, 900 metres; Sogne

Fiord, 1200 metres; at Bergen, 100—520 metres; in the Lofoten, at Brettesnæs, 225 metres, and Selsøvig about 400 metres, and on the Rhabdammina Clay, E. of Vardø 238 metres (Station 266).

Distribution: Cosmopolitic, 2—4000 metres.

Psammosphaera fusca Schulze.

Though this form is known to represent a less developed stage of the preceding species, I have still found it requisite to make a special note of its distribution.

In the Christiania Fiord it is only found at Drøbak (Storemedet), at depths of 100—200 metres.

On the west coast of Norway it is less frequent than *S. sphaerica*, but lives at the same depth.

Distribution: Like the preceding species.

15. *Storthosphaera albida Schulze.*

Exists in some parts of the western fiords, thus in the Bukken Fiord, at a depth of about 650 metres; Kors Fiord, 340 metres; at Bergen, 150—520 metres, very common, and in the Sogne Fiord, about 1200 metres (some specimens).

Distribution: The warm area of the Faeroe channel, about 1000 metres, a single specimen (Murray), the Bay of Biscay (Norman); South Atlantic, 3700 metres, rare.

16. *Thurammia papillata Brady.*

A single specimen met with in the material obtained by the Norwegian North Atlantic Expedition, from Station 192, a little North of Lofoten, on the Vesteraalseggen, taken from a depth of 1187 metres.

Distribution: west coast of Scotland—Antarctic Ocean, 90—5000 metres. As a fossil it is found in the Jurassic formation in Austria, and Switzerland.

17. *Pelosina variabilis, H. B. Brady.*

According to Brady, found by Norman on the coast of Norway.

Distribution: Franz Joseph Land—New-Zealand, 100—4000 metres.

18. *Sorosphaera confusa, Brady.*

Carpenter found this species at Drøbak, since when the species has never been found on the coasts of Norway.

Distribution: The Faeroe Channel—the Azores, 1000—1700 metres; North Pacific, 5—6000 metres.

19. *Reophax difflugiiformis*, Brady.

Single specimens in the Brevik Fiord, about 90 metres; at Bergen, 100—520 metres; in the Sogne Fiord, about 1200 metres; Lofoten, 200—600 metres; Ram Fiord, at Tromsø, and on the N. E. coast, near the Rhabdammina Clay.

Distribution: Franz Joseph Land—The Antarctic Ocean, 100—7000 metres.

Post tertiary deposits of England.

20. *Tholosina bulla*, Brady.

This species is found in the Christiania Fiord, at Drøbak (about 100 metres, M. Sars), and by the author in Engelsviken, at a depth of 110 metres.

Of other localities may be mentioned: Bergen, 100—520 metres; the Sogne Fiord, 1200 metres; Selsøvig and Guldbrandsøerne in the Lofotens, about 100 metres — single specimens throughout.

Distribution: Beeren-Eiland—east coast of South America, 100—4000 metres.

IV. Subfam. Rhizammininae.

21. *Rhizammina algaeformis*, Brady.

Found, chiefly, at Bergen, at a depth of 80—520 metres.

Distribution: Cosmopolitic, though not in the North beyond the British Isles.

V. Subfam. Rhabdammininae.

22. *Techitella legumen*, Norman.

Bukken Fiord, 3—400 metres (Norman); Tjernaglène in the Hardanger Fiord (M. Sars); Bergen, 100—520 metres.

Distribution: The Koster Isles of Bohuslæn—The Antarctic Ocean, 100—4000 metres.

23. *Crithionina abyssorum*, Kier.

Of this handsome and peculiar form, represented in some of the samples of the bottom obtained by The Norwegian North Atlantic Expedition, I have found one specimen in Professor G. O. Sars' material from Moldøen, near Stadt, and many specimens in the material from Selsøvig, Lofoten, about 400 metres.

24. *C. granum* Goës.

25. *C. mamilla* Goës.

The two latter species were found at Bergen, where, according to Schaudinn, they are not uncommon at a depth of 150—520 metres.

Distribution: Goës states that *C. granum* occurs in the Skagerrak, at a depth of 300 metres, and *C. mamilla*, occasionally, on the Bohuslæn coast, at a depth of 106 metres, where it generally is found adhering to decaying zostera.

26. *Batysiphon filiformis*, M. Sars.

I have succeeded in finding some very small tubes of this species at Storemedet (Drøbak), 100—200 metres; at Hvidsten, about 200 metres; Rødtangen, 120 metres, and off the group of islands named Misingerne, in the southern part of the fiord, at a depth of about 340 metres.

Otherwise found in the Hardanger Fiord, 350—900 metres; Kors Fiord, 300 metres; at Bergen, 100—520 metres, and in the Sogne Fiord, about 1200 metres.

Distribution: S. E. of Ireland, 140—210 metres (Wright); the Bay of Biscay, in deep water (Norman); the Banda Sea, East Indies, 2600 metres (Brady).

27. *Botellina labyrinthica*, Brady.

At Bergen, 150—520 metres, single specimens (Schaudinn).

Distribution: The Rhabdammina clay, N. of Hammerfest, 349 metres (one specimen); Koster, Bohuslæn, 35 metres; Faeroe Channel, about 800 metres.

28. *Webbina clavata*, Parker & Jones.

Obtained by M. Sars at Bygdø, 10—50 metres. In the matter obtained from soundings at Storemedet, Drøbak, I found some specimens, 150—200 metres; and at a depth of about 100 metres, between Haaøen and Graaøen.

The species was, furthermore, observed by M. Sars in the Hardanger Fiord (Utne 900 metres), and by Schaudinn, at Bergen, 100—520 metres.

Of other places at which it has been found, I may mention: The Sogne Fiord, 1200 metres; Moldøen, about 500 metres; outside the entrance of the Trondhjem Fiord, 326 metres.

Distribution: Western Rhabdammina Clay—Antarctic Ocean.

29. *Webbina tenuicollis*, M. Sars.

Fig. 12—13.

Oblong or circular, more or less convex, rooted, long and slender arm, with a terminal orifice; colour, yellowish.

Under the term *W. tenuicollis*, I intend to include two different types, which resemble each other in a rooted habitation, the rounded arcuate form, a more or less slender arm with an indistinct aperture.

One of these types exhibits an elongated, prominently convex shell. The cause of this shell being elongated seems ascribable to its attachment to a *Rhabdammina abyssorum* reed. There are only two specimens of this type to be met with. The arm, being comparatively thick, suggests the probability of a fragmented portion which, originally, attained a greater length than here presented. The sutural margin is somewhat protuberant, and corresponds with the unevenness of the *Rhabdammina* reed (fig. 12).

The other type, of which there exists but one specimen (fig. 13), is rooted to a mussel shell, thus commanding a comparatively large space of expansion.

It is practically circular and slightly convex. The shell is extorted into a flat border of the peripheral margin, with elevations or projections at unequal interstices, which, from the convex shell, traverse the border terminating in the outer margin of the same. The arm is much thinner than that of the former type, though practically of equal length, and, possibly, also broken at the end.

This specimen was found by M. Sars at Storemedet, near Drøbak, at a depth of about 100 metres, while the two formerly mentioned specimens were secured at Skraaven, in the Lofotens (about 500 metres). These greatly remind one of *Webbina davata*, and do not differ from that species except in the yellowish white colour, a slenderer arm and, possibly, by a somewhat more arcuate shell, which fills up the space between its basal margin, and the object to which it is rooted by a white coloured shell-like substance.

30. *Rhabdammina linearis*, Brady.

Found by Norman in the Hardanger Fiord, about 200 metres, and at Bergen, by Schaudinn, 100—520 metres; not uncommon in the latter locality.

Distribution: Ireland—New-Zealand, 100—3600 metres-

31. *Rhabdammina abyssorum*, M. Sars.

Represented by single specimens in the Christiania Fiord, at Bygdø; Storemedet, near Drøbak; Rødtangen, 125 metres; in the Drammen Fiord, a little N. of Svelvik, 125 metres; Engelsviken, N. of Hankø, 50—100 metres; Misingerne, off Hankø, about 350 metres.

It is also found in the Hardanger Fiord, about 900 metres; by M. Sars, at Bergen, 100—520 metres; in the Sogne Fiord, about 1200 metres; at Moldøen, Stadt, about 500 metres; Guldbrandsøerne and Selsøvig in the Lofotens, 200—400 metres; Vest Fiord, 624 metres, and in the Ram Fiord at Tromsø.

Distribution: Franz Joseph Land—the Antarctic Ocean, 400—4500 metres.

Systematical Remarks.

Under the term of *Rhabdammina abyssorum*, I have intended to include all short, as well as long, one-stemmed and cylindrical tubes, which do not essentially differ in structure from the genuine, branched type, and which do not by plain constrictions claim the affinity of *R. discreta*.

Such one-stemmed tubes are frequently met with in abundant numbers on the *Rhabdammina* Clay, and in the fiords of the west coast, the branched specimens, throughout, being much more uncommon than the one-stemmed.

I have never found any branched specimens in the fiords of the east coast; though a single specimen in the Sogne Fiord.

The specimens derived from the soundings of the Christiania Fiord, Sogne Fiord, and also, partly, from the western *Rhabdammina* Clay, are much thinner than the genuine branched specimens from the *Rhabdammina* Clay proper.

The one-stemmed specimens cannot well be referred to *R. linearis*, as they never contain any expansion resembling the oval, or spherical chamber of this species. Neither may they be deemed to be fragments of *Hyperammina elongata* or *friabilis*, as it seems incredible that, in a multitude, no specimen should be found possessing these extended terminal parts, which are characteristic of these particular species. Again, they generally display a peripheral roughness throughout, but the single tube expands and contracts, here and there, just like the branched specimens, and, it must be remembered, not like the *R. discreta*.

When, in addition to this, amongst the material obtained from the Sogne Fiord, fragments of the branched form, actually were met with, that is to say the central part, on which the branches are broken almost at the base, and this centre part was of the same slender form as the one-stemmed fragments, one needs scarcely have any doubt as to the advisability of including the above mentioned one-stemmed tube amongst the *R. abyssorum*.

32. *Rhabdammina discreta*, H. B. Brady.

Occurs, according to Goës, in the Norwegian fiords, along with, though less frequent than, the preceding species, and single specimens at Bergen, 100—520 metres (Schaudinn).

Distribution: Found in a few places on the Rhabdammina-Clay S. and E. of Beeren Eiland, about 360 metres, the species, moreover, has a wide distribution: Greenland—Kerguelen, about 40—4600 metres.

33. *Halyphysema tumatoviczii*, Bowerb.

Of this species, Schaudinn found single specimens at Bergen, 150—300 metres.

Distribution: The North Sea—Mediterranean, about 40 metres. A variety, *H. abyssicola*, Goës, exists in the North Sea, 540 metres, though rather uncommon.

34. *Hyperammina elongata*, Brady.

Single specimens in the Christiania Fiord, at Storemedet, Drøbak, 100—200 metres; also at a depth of 100 metres between Haaøen and Graaøen, and another locality near Drøbak, about 100 metres (M. Sars).

Again at Hvidsten, 200 metres; Misingerne off Hankø, about 350 metres.

According to Schaudinn, it is frequently found at Bergen, at a depth of 100—520 metres. In the matter obtained by G. O. Sars' soundings at Moldøen, S. of Stadt, about 500 metres, one specimen was found. M. Sars collection contained some specimens from Skraaven, about 500 metres.

In the Northern Ocean it is found in some localities, from the western Rhabdammina Clay to The Faeroe islands, 1000—2000 metres.

Distribution: Franz Joseph Land—Kerguelen, 150—6000 metres.

35. *Hyperammina friabilis*, Brady.

Common at Bergen, 100—520 metres (Schaudinn).

Distribution: Bohuslen—East Indies, 100—2600 metres.

36. *H. ramosa*, Brady.

Found by Norman in the Hardanger Fiord, 350 metres; at Bergen single specimens, 100—520 metres (Schaudinn); in the Sogne Fiord, about 1200 metres, common; at Moldøen, Stadt, about 500 metres, some specimens; E. of The Trondhjem Fiord, 911 metres, single specimens.

Distribution: Franz Joseph Land—West Australia, here and there, 100—6000 metres. Fossil condition in the Jurassic formation, Switzerland.

37. *H. arborescens*, Norman.

In the By Fiord, at Bergen, 200 metres (Schaudinn), very rare.

Distribution: Novaya Zemlya—in some parts of the South Atlantic, 40—700 metres.

VI. Subfam. Hippocrepinae.

38. *Iaculella acuta*, H. B. Brady.

Brady records, that this species was found by Norman on the west coast of Norway.

Distribution: The Shetland Isles—New Zealand, 100—5500 metres, greatly dispersed.

39. *S. obtusa*, H. B. Brady.

At Bergen, 100—520 metres, single specimens.

Distribution: Koster, Bohuslæn, 60—180 metres, not uncommon (Goës); Faeroe Channel, warm area, 600—1000 metres.

VII. Subfam. Girvanellinae.

40. *Tholypammia vagans*, Brady.

Schaudinn found this species at Bergen, 100—520 metres, single specimens.

Distribution: Spitsbergen 30 metres—Southern Pacific, 5500 metres. As a fossil it is found in the Jurassic formation, Switzerland.

II. Fam. Ammodiscidae.

A. Arenaceous forms.

41. *Ammodiscus incertus* d'Orb.

M. Sars observed this species in the Christiania Fiord, at Bygdø, 10—60 metres; I, myself, have found it at Hvidsten at a depth of about 200 metres, and in the Frier Fiord, about 86 metres.

Otherwise it is found on the west coast of Norway in several parts, thus at Bergen, 100—520 metres, singly distributed throughout.

Distribution: Spitsbergen—Southern Pacific, 100—6000 metres, some localities. Fossil deposits in England (Carbon), at Vienna (Tertiary).

42. *Ammodiscus tenuis*, Brady.

Obtained by M. Sars at Drøbak, about 100 metres, and, by the author, at Engelsviken, N. of Hankø, 50—60 metres, single specimens.

Independent of the Christiania Fiord, this species has been observed on the Bohuslæn coast (Goës), and W. of Tromsø on the Vesteraals-eggen, 1187 metres, and in the Ram Fiord, at Tromsø, universally rare.

Distribution: Certain localities, New York—New Zealand, 80—2600 metres.

43. *Gordiammina charoides*, Park. & Jones.

On examination of the matter procured from soundings made by The Norwegian North Atlantic Expedition in the Sogne Fiord, at a depth of about 1200 metres, I observed a single specimen.

Distribution: The Faeroe Channel—South Pacific, 100—5000 metres, widely dispersed.

Fossil deposits in Germany (Tertiary), and in Switzerland (Jura).

44. *G. gordialis*, Park. & Jones.

One single specimen was found in the matter taken from the bottom of the Frier Fiord, at a depth of about 86 metres.

Common at Bergen, 2—50 metres (Schaudinn).

Distribution: Franz Joseph Land—Kerguelen, 100—4000 metres, common. Fossil deposits in England (Carbon), Switzerland (Jura), and at Vienna (early Tertiary period).

45. *G. patelliformis* n. sp.

Consists of about 8 rounds, of which the final forms a projected margin encircling the preceding planospiral convolutions. Initial chamber large. The first convolutions very thin.

Differs from *Ammodiscus incertus* only in the construction of the final convolution.

The Bunde Fiord, about 100 metres; at Drøbak, at a depth of 100 metres, between Haaøen and Graaøen; Rødtangen, 125 metres; the Frier Fiord, about 86 metres, single specimens.

B. Calcareous forms.

46. *Cornuspira foliacea*, Phil.

This species occurs in the following localities of the Christiania Fiord: the Bunde Fiord, 30—60 metres; Drøbak, about 100 metres (M. Sars); Misingerne, W. of Hankø, about 340 metres, singly distributed throughout.

The species is found in the Brevik Fiord, about 100 metres; at Christiansand, and in numerous places along the Norwegian coast, right to the northern part of Vesteraalseggen, 150—1187 metres, generally common.

Distribution: Spitsbergen—Austral-Asia, 10—2800 metres, common.

As a fossil it is found in the tertiary and post-tertiary deposits of Scotland—Italy, also in the post-tertiary deposits of Norway, namely at Sparebakken, Skien (Crosskey & Robertson).

47. *C. carinata*, Costa.

In the Christiania Fiord, this species is only observed at Storemedet, Drøbak, 150—200 metres, single specimens.

Otherwise it is found existing at Utne, in the Hardanger Fiord, about 900 metres (M. Sars); at Bergen, 150—520 metres (Schaudinn); outside the Trondhjem Fiord, 911 metres; several localities in the Lofotens, 200—600 metres.

Distribution: Ireland—West-Australia, 100—3000 metres.

As a fossil it is found in the tertiary deposits of Germany and Italy.

48. *C. involvens*, Rss, (*marginata*, M. Sars).

Found in some parts between the Hardanger Fiord and the Lofotens, 30—900 metres.

Distribution: Franz Joseph Land—South Pacific, 10—3500 metres, some parts.

As a tertiary fossil, in Ireland—Austria.

49. *C. peneroploides*, M. Sars, (*striolata*, Brady).

Found in the matter procured by soundings taken on the Norwegian North Atlantic Expedition, at Stations 251 and 192; Vesteraalseggen, 1100—1200 metres, and at Skraaven, Lofoten, about 500 metres, also at Svolveær same place, about 200 metres (M. Sars's collection).

The specimens from the latter mentioned locality were minute and

insignificant, while those from The Norwegian North Atlantic Expedition, were very fine and large.

Distribution: The coast of Siberia, 150 metres (Goës); Norwegian North Atlantic Expedition, Station 312, W. of Beeren Eiland, 1203 metres; the cold area of the Faeroe Channel, about 1000 metres.

III. Fam. Spirillinidae.

50. *Spirillina vivipara*, Ehrenberg.

Schaudinn found this species at Bergen, 2—150 metres, not uncommon; it has also been found by Mc Andren on the northern coast of Norway (Parker & Jones).

Distribution: Arctic Ocean, 83⁰—Kerguelen, 40—1200 metres, in some parts. Fossil condition in the tertiary deposits (Ireland, Vienna).

51. *Patellina corrugata*, Will.

Found at Hvidingsø (Schulze), 0—5 metres; Glesvær, and at Bergen, 2—100 metres; Vesteraalseggen, Station 192, 1187 metres.

Distribution: Novaya Zemlya—South Pacific, 10—1200 metres, common on various coasts with a muddy sea-bottom. As a fossil it is found in the post-tertiary beds of Denmark, Scotland and Ireland.

IV. Fam. Nodosinellidae.

52. *Nodulina scorpiura* Montf.

This species was observed in nearly all the matter procured from soundings taken at a moderate depth in the Christiania Fiord; thus in the Bunde Fiord, 80—100 metres; Bygdø, about 50 metres; Storemedet, near Drøbak, 150—200 metres; Hvidsten, about 200 metres; Engelsviken, N. of Hankø, 50—60 metres.

Other places at which it has been observed are: Brevik Fiord, 80—100 metres; Bergen, 80—520 metres; Moldøen, near Stadt, about 500 metres; in several localities of the Lototens, 100—600 metres, and at Vardø, 271 metres, and Vadsø.

Distribution: Spitsbergen—Antarctic Ocean, 5—7500 metres, common.

N. scorpiura was found by Crosskey and Robertson in the marleceous clay, at Bryn, in the district of Aker, near Christiania, 75 metres

above the level of the sea, and in the mussel clay, at Bisæt brickworks, near Christiania, about 24 metres above the sea level.

It also occurs, according to Brady, in the Jurassic formation of Switzerland.

53. *Nodulina dentaliniformis*, Brady.

Bergen, 80—520 metres, not uncommon (Schaudinn).

Distribution: The Skagerak—Southern Atlantic, 80—6000 metres, certain localities, especially at great depths.

54. *Nodulina gracilis* n. sp.

Test elongate, composed of about 19 loosely sutured segments, which at the outset are short and wide, gradually assuming an elongated and pointed form, however, with almost horizontally sectioned basal parts.

Smooth and even forms. Test of a fine arenaceous texture of a yellowish grey, or light brown pellucid colour. Length about 1.2 mm. Differs from *N. nodulosa*, Brady, and *scottii* Chaster*) by the much more openly sutured segments.

Length of 1st segment was 0.023 mm., 12th segment: 0.063 mm., 19th do.: 0.15 mm.

In the Christiania Fiord it is only found, at a depth of 100 metres, between Haaøen and Graaøen, and S. of Stor-skjær, near Drøbak, 150—200 metres, a single specimen.

In the Drammen Fiord, at a depth of 125 metres it is more numerous.

In the Frier Fiord, a great number occur at a depth of about 86 metres.

In the post-tertiary deposits at Øvre Foss, Christiania, I have met with not a few specimens.

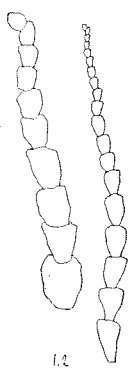
N. nodulosa, Brady, is found at Koster, Bohuslæn (small, fragmented specimens), and in the North Atlantic, 1750 metres (Goës).

The distribution includes, according to Brady, Franz Joseph Land to the Antarctic glacial barrier (cosmopolitan).

55. *N. sabulosa*, Brady.

One single specimen was obtained from the matter derived from soundings at Station 87, W. of the Trondhjem Fiord, 911 metres, during The Norwegian North Atlantic Expedition.

*) The First Report of the Southport Soc. of Nat. Science. 1890—91. Report upon Foraminifera by G. W. Chaster.



Distribution: The Rhabdammina Clay, certain parts, 300—400 metres; the Biloculina Clay, near the Faeroe Isles, 2000 metres; the Faeroe Channel, about 1000 metres.

56. *Aschemonella catenata*, Norman.

A single specimen was found in the matter obtained from soundings in the Sogne Fiord, at a depth of about 1200 metres.

Distribution: Atlantic Ocean and the Pacific, 400—5500 metres.

V. Fam. Miliolinæ.

Subfam. Miliolinae.

57. *Biloculina laevis*, DeFrance.

Occurs along the northern coast of Norway at a great depth. The shallowest place at which it has, hitherto, been observed, 911 metres, being W. of the Trondhjem Fiord.

Distribution: The Norwegian Northern Ocean, 911—3667 metres, not uncommon.

Fossil condition in the tertiary deposits at Paris and Vienna.

58. *B. simplex* d'Orb (Goës).

The following indicates the various parts of the Christiania Fiord where this species is found: The Bunde Fiord, about 100 metres; Bygdø, about 50 metres; Drøbak, about 100 metres (M. Sars); the Drøbak Bank, 20—30 metres; S. of Storskjær, near Drøbak, 150—200 metres.

Otherwise it is common along the Norwegian coast, at least as far as Tromsø, though never abundantly distributed in any particular locality.

Distribution: Common in all seas at depth of 2—6000 metres.

Fossil condition in the eocene beds at Paris, and in the post-tertiary deposits of the South of Norway, thus in the old glacial clay by Moss.*)

59. *B. elongata*, d'Orb.

Found in various parts of the Christiania Fiord, namely:

The Bunde Fiord, about 100 metres; Bygdø, about 30 metres; Drøbak, 10—15 metres and 100 metres; Skiphellebugten, same place, about 50 metres; Storemedet, 150—200 metres.

*) Minute specimens of a peculiar form (= *B. irregularis* d'Orb?) occurs in certain parts, namely: Engelsviken, N. of Hankø, in the material obtained by The Norwegian North Atlantic Expedition, and at the Hebrides.

Distribution: The coast of Norway, and similar to that of the preceding species, though not in a fossil condition at Paris.

Biloculina simplex, and *elongata*, is found in some parts of the post-tertiary deposits of south eastern Norway.

60. *Biloculina comata*, Brady.

Occasionally met with in M. Sars' collection from the Lofotens, 200—600 metres.

Distribution: Bohuslæn, the Faeroe channel—Australia, 500—2000 metres, some localities.

61. *B. depressa*, d'Orb.

This species has only been identified at one or two spots in the Christiania Fiord: Drøbak, about 100 metres (M. Sars); Misingerne, W. of Hankø, 345 metres.

On the west coast of Norway it is only found at Stavanger (Terq.); Bergen, 150—520 metres, and in the Lofotens, 200—600 metres.

Distribution: Spitsbergen, 900—1800 metres; England—Australia, like the preceding species.

French Lias. Post-tertiary deposits at Skien (Münsters collection).

62. *B. sphaera*, d'Orb.

The Bunde Fiord, 100 metres; Bygdø, about 40 metres; Misingerne, 345 metres; Brevik Fiord, 90 metres; West coast of Norway to the Vesteraalseggen, 150—1200 metres, here and there.

Distribution: Greenland—Indian Ocean, 70—4400 metres.

63. *Triloculina oblonga*, Montag.

The Bunde Fiord, 80 metres; Drøbak, 100 metres; Bergen, 20—100 metres; Lofoten, 400—600 metres; Vesteraalseggen, 1200 metres.

All seas and all depths, but not north of Greenland. Fossil condition in the Eocene formation.

64. *T. valvularis*, v. Reuss.

In the Christiania Fiord only obtained at Drøbak, 100 metres, and at Engelsviken, N. of Hankø, 56 metres; Lofoten, 200 metres.

Distribution: Western Rhabdammina Clay, 200 and 500 metres; North Atlantic, 1740 metres; New Zealand, rare. Fossil condition in the tertiary deposits at Hermsdorf (Reuss).

65. *T. bucculenta*, Brady.

This species has, hitherto, only been observed on the northern shores of Norway, namely at Storeggen off Christiansund, at a depth of

800 metres; in a few parts of the Lofotens, about 200 metres, and at Vesteraalseggen, about 1200 metres*).

Distribution: Western Rhabdammina Clay, northern part of the Northern Sea, 200—1400 metres, here and there; the Faeroe Channel, about 1200 metres; North Atlantic Ocean, 3—4000 metres; the Azores.

66. *Triloculina trigonula*, Link.

Found at a depth of 100 metres at Drøbak, and in certain localities from Mandal to Vadsø, 50—1200 metres.

Distribution: The temperate and tropical seas, 50—4400 metres. Tertiary beds in Scotland—Italy. Post tertiary deposits in the South of Norway.

67. *T. tricarinata*, d'Orb.

West coast of Norway, from Bergen to Vadsø, 50—600 metres.

Distribution: Franz Joseph Land—Antarctic Ocean, 10—4600 metres. Fossil condition in the post-tertiary deposits of the South of Norway.

68. *Quinqueloculina seminulum*, Lin.

This species is common in the Christiania Fiord. Amongst places at which it has been observed, I may mention: the Bunde Fiord, about 100 metres; Bygdø, 40 metres; Drøbak, 10—200 metres; Engelsviken, N. of Hankø, 50 metres; Misingerne, 345 metres. Moreover it is common along the Norwegian coast right up to Vardø, at all depths (2—1200 metres).

Distribution: Like the preceding species.

Independent of this, it is found in the eocene beds at Paris and London.

69. *Q. auberiana*, Lin.

Bergen, 150—520 metres, not uncommon (Schaudinn).

Distribution: Bohuslän and Ireland—Patagonia, 50—4500 metres, here and there. Fossil condition in the Miocene beds at Vienna.

70. *Q. subrotunda*, Walk & Boys.

Found in the Bunde Fiord, at a depth of 100—150 metres, and in some parts about Drøbak, adhering to seaweed, 5—15 metres, and in Skiphellebugten at Drøbak, at a depth of 50 metres. On the west coast

*) M. Sars's collection from the Christiania Fiord, contains some specimens termed *T. cryptella*, moreover M. Sars, in his «Bemærkninger om det dyriske livs udbredning i havets dybder» and in his «Fortsatte bemærkninger» reports *T. cryptella* as occurring on the coast of Norway. *T. cryptella* represents, according to Brady, bucculenta, while M. Sars's specimens from the Christiania Fiord were *Biloculina sphaera*. Sars's collection contained many specimens of *T. bucculenta* from the northern part of Norway.

of Norway, it occurs in some places, thus at Bergen, 0.5—300 metres; Skraaven, in the Lofotens, about 500 metres; in the Øx Fiord, near Tromsø, and on the Vesteraalseggen, about 1200 metres.

Distribution: Arctic—Antarctic coasts, 0.5—300 metres. Miocene beds at Vienna.

71. *Q. agglutinans*, Park. & Jones.

The Bunde Fiord, about 100 metres; Bygdø, 40 metres; Drøbak 100 metres (M. Sars); Storemedet, near Drøbak, 150—200 metres; the Drammen Fiord, 56 and 125 metres.

Common on the western and northern coast of Norway to Porsanger, at depths from 20—650 metres.

Distribution: Franz Joseph Land—South Atlantic, 5—840 metres. Also in brackish water.

Post-tertiary deposits in Scotland, and south eastern Norway.

72. *Q. concava*, v. Reuss.

Kilsund, at Bergen, 60—70 metres, rare (Goës).

Distribution: Except on the coast of Norway, it is only found in a fossil state at Vienna (Miocene and Oligocene, according to Reuss).

73. *Q. secans* d'Orb.

Single specimens at Bergen, 20—100 metres; Bohuslæn.

Distribution: Temperate and tropical coasts in shallow water. Tertiary deposits at Vienna—Italy. Post-tertiary deposits in Scotland and Ireland, also in Norway (Sparebakken, near Skien, Crosskey and Robertson).

74. *Q. angulata*, Will.

Single specimens found at Bergen, 20—100 metres.

Distribution: The Vesteraalseggen, about 1200 metres. Bohuslæn. The Pacific Islands, 12—70 metres. Miocene beds in Austria.

75. *Q. contorta*, d'Orb.

Terquem found this species at Christiansand.

Distribution: West coast of Sweden, 50—70 metres; Greenland 100 metres; Spitsbergen, 25 metres, rare (Goës).

76. *A. bicornis*, Walk & Boys.

This species is not included amongst the recent Thalamophores of Norway, but is found in the post-tertiary deposits (M. Sars, Münster).

Distribution: Bohuslæn, 50 metres (Goës); temperate and tropical coasts, 80—200 metres. Miocene — present day.

77. *Q. pulchella*, d'Orb.

Not recent, but like the preceding species only as a fossil in Norway.

Distribution: Like the above, though as a fossil, only in the tertiary deposits of Vienna and Italy.

78. *Spiroloculina planutata*, Link.

Drøbak, 100 metres (M. Sars). Occasionally met with on the west coast of Norway, 2—600 metres, single specimens.

Distribution: Scotland—North Atlantic Ocean at every depth down to 4000 metres, though, chiefly, in comparatively shallow water.

As a tertiary fossil in England—Italy. Post-tertiary deposits in Norway.

79. *S. limbata*, d'Orb.

This species was found by M. Sars at Drøbak, at a depth of about 100 metres, the exact locality is not given. It was, subsequently, found by me in the same neighbourhood at Storemedet, 150—200 metres, a single specimen.

Distribution: Along the Norwegian coast, and in all respects like that of the preceding species.

80. *Ophthalmidium tumidulum*, Brady.

The matter obtained from soundings taken, during the Norwegian North Atlantic Expedition, at Station 192, Vesteraalseggen, 1187 metres, yielded a minute specimen of this peculiar form.

Distribution: Only found on the coasts of the West Indies, 740 metres, and in the north Pacific, 4300 metres.

VI. Fam. Orbitolitidae.

Hitherto, no species of this family has been identified as existing on the coast of Norway.

VII. Fam. Textularidae.

I. Subfam. Textularinae.

81. *Textularia agglutinans*, d'Orb.

At Drøbak, this species is only found, at a depth of about 100 metres, between Haaøen and Graaøen.

Its appearance in the Christiania Fiord is evidently rare, as apart

from the above named place at Drøbak, it has only been observed in the Hankø-sound, 27 metres.

On the west and northern coasts of Norway, however, the species is not uncommon at depths varying, from 20—1200 metres.

Distribution: Franz Joseph Land—Antarctic Ocean, 10—6000 metres.

As a fossil it is found in the tertiary deposits of England—Sicily.

82. *T. intermedia*, Goës.

According to Goës, it is singly distributed in the Norwegian fiords at a depth of 500 metres.

The matter obtained from soundings taken in the Sogne Fiord, about 1200 metres, during the Norwegian North Atlantic Expedition, yielded a few specimens.

Moreover it was found by M. Sars off the Guldbrandsøerne, Lofoten, at a depth of about 200 metres.

Distribution: This form being a variety of the preceding species, suggests a similar distribution.

83. *T. aspera*, Brady.

Christiansand (Terquem), Sogne Fiord, 1200 metres; Lofoten, 200 metres; western Rhabdammina Clay, 260 metres.

Distribution: Atlantic Ocean and South Pacific, 300—2500 metres.

84. *T. trochus*, d'Orb.

M. Sars found this species on the Norwegian coast at a depth of 564 metres.

Distribution: Cosmopolite. Tertiary deposits.

85. *T. Williamsoni*, Goës.

Lofoten, Vesteraalseggen, 200—1200 metres.

Distribution: Temperate and tropical coasts.

Miocene beds (at Vienna). Post-tertiary clay in the South of Norway (Münster).

86. *Bigenerina nodosaria*, d'Orb.

Brevik Fiord, about 100 metres. Otherwise from the Hardanger Fiord to Lofoten, 150—900 metres, here and there.

Distribution: Cosmopolitic, though not common, 10—3000 metres. Tertiary deposits in the North of Germany—Spain.

87. *B. digitata*, d'Orb.

Belongs to the most general Thalamophores occurring in rather deep

water in the Christiania Fiord, and other fiords of the west-coast up to the Lofotens.

Distribution: Bohuslæn—Shetland Isles—Mediterranean, 70—2300 metres. Fossil condition in the tertiary deposits of Italy and Spain, and in the post-tertiary deposits at Vik(Ørlandet).

88. *B. Sarsi*, *H. Kier*.

Fig 1—10.

M. Sars's collection contained many specimens from the Lofotens, 200—1200 metres.

Systematical remarks:

The specimens must be assigned to the *Bigenerina*, and not the *Spiroplecta*, as they taper anteriorly.

The segments gradually assume a greater length, height and thickness, until they reach a certain maximum, when they, subsequently, decrease in length and thickness while increasing in height.

One may, therefore, reasonably assume that, the specimens finally adopt the uniserial system, which is the last stage in the life of the genuine *Bigenerina*.

Of the many specimens, subjected to my research, it seems odd that I have not found a single one displaying decisive marks of the uniserial system. In all probability the means of existence has been unfavourable.

A few specimens suggest a transition to the uniserial structure, thus as in Fig. 1.

The spiral is not always distinct on both sides.

B. Sarsi, differs from *B. capreolus*, and *pennatula*, by the more horizontally connected segments, their far greater number in the biserial series, and the elongated form, tapering towards the apex.

Schaudinn reports *Spiroplecta americana* from Bergen, 150—520 metres. I do not doubt the identity of this species with that already recorded by me, *B. Sarsi*.

89. *Spiroplecta biformis*, *Park & Jones*.

Common in the Frier Fiord, about 86 metres, but, chiefly, in the Drammen Fiord, 56—125 metres. Not uncommon at Bergen, 150—520 metres.

Distribution: Common in the Arctic Seas, 40—270 metres. Rare in the Atlantic, and the South Pacific, 2500—4400 metres.

It is, moreover, found off the Bohuslæn (150 metres), and Helsingborg, 30 metres (arctic outliers).

Fossil condition in Ireland (Gault, chalk, post-tertiary deposits).

90. *Valvulina conica*, Park & Jones.

Bygdø, 40 metres; Drøbak, 100 metres, 50 metres (Skihellebugten), 150—200 metres (Storemedet); Hvidsten, about 200 metres; Rødtangen, 125 metres, occasionally.

Frequent in the fiords of the west and northern coast, up to Vardø.

Distribution: Cosmopolitan, 90—2500 metres.

91. *V. fusca*, Will.

Here and there from the Bukn Fiord to the Lofotens, 80—600 metres.

Distribution: Like the preceding species.

92. *Gaudryina chilostoma*, Rss.

Occasionally met with on the coast of Norway, from Storeggen, off Christiansund, to the Vesteraalseggen, 200—1200 metres, though not common.

Distribution: North Atlantic—Pacific islands, 100—2600 metres, not common. Tertiary fossil in Holland—Hungary.

93. *G. pupoides*, d'Orb.

Norwegian fiords, for instance at Bergen, 10—520 metres.

Distribution: Like the above species. As a fossil, however, only in England—Switzerland (chalk, tertiary).

94. *Verneuilina polystropha*, Rss.

One of the most general Thalamophores occurring in the Christiania Fiord, at depths varying from 5—200 metres, and on the west-coast of Norway, at least to the Vesteraalseggen, 200—1200 metres.

Distribution: Cosmopolitan, 10—100 metres, though much dispersed. Post-tertiary deposits in Norway—Ireland.

95. *V. propinqua*, Brady.

Moldøen, S. of Stadt, single specimens, 500 metres.

Distribution: Atlantic Ocean—Pacific, 200—5500 metres.

II. Subfam. Buliminae.

96. *Chilostomella ovoidea*, v. Rss.

Øster Fiord, 180—350 metres; Bergen, 150—520 metres; frequent.

Distribution: Temperate and tropical seas, 20—600 metres. Tertiary deposits: Stettin—Calabria.

97. *Bulimina pyrula*, *d'Orb.*

The Bunde Fiord, 100 metres; Bygdø, 40 metres; Drøbak, 100 metres (between Haaøen and Graaøen); Rødtangen, 125 metres; Brevik Fiord, 90 metres. Occurs along our coasts towards Lofoten.

Distribution: Cosmopolitic, 70—5000 metres. Trias and tertiary deposits of England.

Post-tertiary deposits of Norway.

98. *B. elipsoides*, *Costa.*

Common in the Christiania Fiord in fairly deep water.

Distribution: Along our coasts and, on the whole, similar to that of the preceding species.

99. *B. marginata*, *d'Orb.*

Very common throughout the Christiania Fiord, and on the Norwegian coast to the North Cape, 10—1200 metres.

Distribution: Jan Mayen—Antarctic, 10—3000 metres.

Fossil condition in the tertiary formation of Italy and in the post-tertiary deposits of Norway—Ireland.

100. *B. subteres*, *Brady.*

West-coast of Norway, 60—350 metres. Lofoten, 200 metres.

Distribution: Novaya-Zembla—Antarctic, 50—2000 metres.

Post-tertiary beds met with in the south eastern part of Norway.

101. *B. normanni* *Goës.*

Drøbak, 100 metres. Brevik Fiord, 90 metres. Occurs in some parts of the western fiords, and on the oceanic banks at Lofoten.

Distribution: Not found beyond Norwegian territory.

102. *B. convoluta*, *Will.*

Christiansand, Stoksund, Bergen, 80—200 metres, rare; Vesteraals-eggen, 1187 metres, common.

Distribution: The Shetland Isles, Africa—Australia, 200—2000 metres.

103. *Virgulina squamosa*, *d'Orb.*

Sandspollen, and Sætrepollen, near Drøbak, 10—15 metres, single specimens; Engelsviken, N. of Hankø, 100 metres; Misingerne, 345 metres. Here and there in the fiords on the west coast, 180—530 metres.

Distribution: North and South Atlantic, 50—5700 metres.

Miocene—present day, England.

Arctic-clay at Moss, Arca and Irocardia clay near Svenengen, Christiania.

104. *Virgulina obscura*, Goës.

The fiords on the west-coast, 300—520 metres, rare.

Distribution: North Atlantic-Ocean, the Pacific, 70—4000 metres. Chalk and tertiary deposits.

105. *V. schreibersiana*, Czjzk.

Found at Drøbak, between Haaøen and Graaøen, at a depth of 100 metres, and in the Drammen Fiord, 100—125 metres, also in the Brevik Fiord, about 100 metres. This species also occurs along the west and northern coasts of Norway up to the Tana Fiord, though, generally, only singly.

Distribution: Franz Joseph Land—Southern Pacific, 20—6000 metres. Tertiary—present day.

106. *V. subsquamosa*, Egger.

The Brevik Fiord, 90 metres, single specimens.

Distribution: Bohuslæn, 150 metres, rare. The Atlantic—Pacific, 600—1200 metres. Miocene—present day.

107. *Bolivina punctata*, d'Orb.

Norwegian west-coast, 150—520 metres, Lofoten—Alten Fiord, 200—600 metres.

Distribution: Novaya Zemlya—South Pacific, 4—5000 metres. Tertiary—present day.

108. *B. aenariensis*, Costa.

109. *B. dilatata*, Rss.

These two species, like *B. punctata*, occur on the west-coast of Norway, *B. dilatata* right up to the Alten Fiord.

Distribution: Atlantic Ocean, 20—3000 metres. Tertiary.

110. *B. difformis*, Will.

The Øster Fiord, 170—360 metres; Bergen, 150—520 metres; rare.

Distribution: The Faeroe Channel, 1000 metres; Tristan da Cunha, 200—300 metres.

III. Subfam. Cassidulinae.

111. *Cassidulina laevigata*, d'Orb.

Universally common throughout the Christiania Fiord, and the Norwegian coasts as far as Vadsø, 10—1200 metres.

Distribution: All latitudes, 50—3000 metres. Tertiary—present period, post-tertiary deposits in Norway.

112. *Cassidulina crassa*, d'Orb.

In the Christiania Fiord this species is only found in the Skiphellebugten, 50 metres, and at Storemedet, about 150 metres (Drøbak).

Distribution: Along our coasts, and, on the whole, like that of the preceding species.

113. *C. bradyi*, Norman.

The Øster Fiord, 170—360 metres, rare; Bergen, 150—520 metres, not uncommon.

Distribution: Temperate and tropical seas, 170—3000 metres.

VIII. Fam. Nodosarinae.

1. Subfam. Nodosarinae.

114. *Nodosaria communis*, d'Orb.

In the Christiania Fiord this species is only found at Bygdø, 40 metres, and at Drøbak, 100 metres (M. Sars). Christiansand, Utne, Hardanger Fiord, about 900 metres; Bergen, 100—520 metres; Skraaven, Lofoten, about 500 metres; Alten Fiord, 146 metres.

Distribution: Arctic, temperate and tropical seas, littoral zone—6000 metres, universally rare. Perm—present day, post-tertiary deposits in Norway.

115. *N. pauperata*, d'Orb.

The Brevik Fiord, about 90 metres; Stavanger; Christiansand; the Romsdals Fiord, 300 metres; Vardø, 271 metres (Station 262), single specimens.

Distribution: Norwegian Northern Sea; Atlantic—South Pacific, 200—3000 metres. Tertiary—present day, in Norway in the post-tertiary formation.

116. *N. inflexa*, Reuss.

Storeggen; Lofoten; Vesteraalseggen, 200—600 metres; quite singly distributed.

Distribution: Atlantic Ocean, Pacific, 170—2700 metres.

117. *N. pyrula*, d'Orb.

A single specimen found at Drøbak, about 100 metres; Stavanger.

Distribution: Cosmopolitic, littoral zone—1200 metres, singly distributed throughout. Tertiary—present day, not in Norway.

118. *Nodosaria obliqua*, Lin.

Hardanger Fiord, 90—180 metres; Bergen, 300 metres; Lofoten, 200—600 metres, rare.

Distribution: All seas extending northwards to Spitsbergen. Lias—present day.

119. *N. soluta*, v. Reuss.

Bergen (Terquen); Lofoten, 200—600 metres; Vadsø, 200 metres.

Distribution: Like *N. communis*.

120. *N. filiformis*, d'Orb.

Stavanger; Skraaven, about 500 metres; Guldbrandsørerne, about 200 metres (Lofoten).

Distribution: Temperate and tropical coasts, 100—900 metres. Lias—present day.

121. *N. calomorpha*, v. Reuss.

Bukn Fiord, 260—350 metres; Bergen (Terquem); N. of Storeggen, 326 metres (Station 92).

Distribution: Atlantic Ocean and the Pacific, about 200—2000 metres. The Falkland Isles, about 11 metres. Septaria Clay, Pietzpuhl, Germany. Post-tertiary deposits in south eastern Norway (Münster).

122. *N. scalaris*, Batsch.

Single specimens found at Storemedet, Drøbak, 150—200 metres. Occasionally met with along our coasts, any way up to the Vesteraalseggen, at depths varying from 90—1200 metres, though never abundant.

Distribution: British coasts—the Pacific Isles, 4—3000 metres. Tertiary—present day.

123. *Glandulina laevigata*, d'Orb.

The Bunde Fiord, 100 metres; Drøbak, 100 metres (W. of Haaoen). Common along our coasts from the Brevik Fiord to the Vesteraalseggen, 90—1200 metres.

Distribution: Cosmopolitic, 10—2500 metres. Upper Trias—present day.

124. *G. aequalis*, v. Reuss.

Exists along the west and northern coast of Norway, like the preceding species, though not so frequent.

Distribution: Not distinguishable from the preceding species.

125. *Marginulina glabra*, d'Orb.

West-coast of Norway, 100—200 metres, at least at Bergen, rare.

Distribution: Atlantic Ocean and the Pacific, littoral zone—5000 metres.
Lias—present day.

126. *M. spinosa*, M. Sars. (*Vaginulina spinigera*, Brady).

M. Sars's collection contains a few samples. Guldbrandsøerne; Lofoten, about 200 metres.

Distribution: Northern Atlantic—Australia, 200—2200 metres.

127. *M. costata*, Batsch.

Does not actually belong to the Norwegian fauna. Obtained SW. of Beeren Eiland, 1403 metres (Station 283), singly distributed.

Distribution: British Isles to New-Zealand, about 100—2200 metres.
Lias—present day.

128. *Vaginulina laevigata*, Roem.

This species has hitherto only been observed in some localities of the Lofotens, at depths varying from 200—624 metres.

Distribution: Cosmopolitan, about 10—4000 metres. Lias—present day.

129. *V. linearis*, Montag.

Found by M. Sars at Bygdø, about 40 metres, and at Drøbak, about 100 metres.

Otherwise the species has only been observed at Storeggen, outside Christiansund, 911 metres, and at Skraaven, Lofoten, about 500 metres.

Distribution: British coasts—South America, 30—800 metres. Tertiary period.

130. *V. badensis*, d'Orb.

Bergen, 520 metres, rare.

Distribution: North Atlantic, 1700 metres, rare. Tertiary period.

II. Subfam. Lageninae.

131. *Lagena laevis*, Walker & Boys.

Drøbak, 100 metres (M. Sars). Occasionally met with along our coast up to Vardø, 90—300 metres.

Distribution: Cosmopolitan, about 10—4500 metres. Upper Silurian—present day.*

*) In giving the following indications of the fossil condition of the various species up to the present day, it must be understood that the species are represented in the post tertiary deposits of Norway, when not otherwise stated.

132. *Lagena hispida*, Reuss.

Stavanger, Bukn Fiord, 270—350 metres (Norman); Vesteraalseggen, about 1200 metres.

Distribution: Like the preceding species.

Fossil condition however only from Lias—present day, and not in Norway.

133. *L. clavata*, d'Orb.

Stavanger; Skagerrak, 500 metres.

Distribution: like *L. laevis*, though not found in a fossil condition in Norway.

134. *L. gracillima*, Seg.

Single specimens found at Storemedet, near Drøbak, about 150 metres.

Otherwise it has been observed in some localities between Bergen and the Vest Fiord, 300—1035 metres, always singly distributed.

Distribution: as *L. laevis*. Fossil, however, only from the Tertiary period.

135. *L. striata*, d'Orb.

The Bunde Fiord, 100 metres; Drøbak, 100 $\frac{3}{4}$ metres, (between Haaøen and Graaøen) and about 150 metres (Storemedet). Furthermore it is met with, moreover, here and there along our coast up to Vardø, at all depths from 50—1200 metres.

Distribution: like *L. gracillima*.

136. *L. semistriata*, Will.

Single specimens obtained from the soundings of the Norwegian North Atlantic Expedition Station 9, 377 metres, outside the entrance of the Sogne Fiord, and Station 192, 1187 metres; northern part of Vesteraalseggen.

Distribution: as *L. laevis*. † Not found in a fossil condition in Norway.

137. *L. distoma*, Brady.

Storemedet, near Drøbak, about 150 metres; E. of Haaøen, about 100 metres. This species is represented on the Norwegian coast up to the North Cape, at various depths, from 90—1200 metres.

Distribution: as *L. gracillima*.

138. *L. gracilis*, Will.

Stavanger; Vesteraalseggen, 1187 metres.

Distribution: like *L. gracillima*.

139. *Lagena Hertwigiana*, Brady.

The Bukn Fiord, 156—260 metres; rare (Norman).

Distribution: Australian seas, 300—5000 metres.

140. *L. globosa*, Walk & Boys.

Single specimens found at Storemedet, near Drøbak. Other places at which it has been observed in this country being: Stavanger; Bergen, 2—50 metres (common); Vesteraalseggen, 1187 metres.

Distribution, as *L. gracillima*.

141. *L. sulcata*, Walk & Boys.

This species is found singly distributed in a few places, thus at Storemedet, near Drøbak, about 150 metres, and at Engelsviken, N. of Hankø, about 50 metres. Otherwise it is represented along the entire coast up to the North Cape, and is, in several localities, very common, 40—1200 metres.

Distribution, like *L. laevis*.

142. *L. williamsoni*, Alcock.

Storemedet, near Drøbak, about 150 metres; W. of Haaøen, about 100 metres.

On the west-coast: Stoksund, 150—180 metres, the Norwegian North Atlantic Expedition's Station 92, N. E. of Storeggen, 326 metres; Station 192, Vesteraalseggen, 1187 metres.

Distribution, common off the British Isles; Spitsbergen, 180 metres.

143. *L. squamosa*, Montag.

Occurs at Drøbak (W. of Haaøen, about 100 metres), and here and there along our coasts up to Vadsø, occasionally, however, rather common.

Distribution, like *L. gracilis*.

144. *L. hexagona*, Will.

Storemedet, near Drøbak, about 150 metres. The southern, western and northern coasts of Norway, towards the North Cape, 50—1200 metres.

Distribution, like *L. gracillima*.

145. *L. marginata*, Walk & Boys.

In the Christiania Fiord: to the westward of Haaøen, about 100 metres; Storemedet, about 150 metres (Drøbak); Misingerne, about 345 metres. Very common all along the coast up to Vardø, 20—1200 metres.

Distribution, as *gracillima*.

146. *Lagena orbignyana*, Rss.

Vest Fiord, Lofoten, 624 metres; Vesteraalseggen, 1187 metres, singly distributed.

Distribution, as *L. gracillima*, in the post-tertiary deposits of Norway, an approximately related species or variety is the only representative, namely *L. bicarinata* Terquem.

147. *L. pulchella*, Brady.

Sartorø; Bukn Fiord, 40—70 metres, rare (Norman).

Distribution: Irish coast.

148. *L. lucida*, Will.

Found in the plankton from the Isle of Røst, Lofoten, 0 metres (the variety); Vesteraalseggen, 1187 metres, single specimens.

Distribution: British coasts.

149. *L. iagenoides*, Will.

Vest Fiord, 624 metres.

Distribution, like *L. gracillima*, though rare, and not found in a fossil condition in Norway.

150. *L. striatopunctata*, Park & Jones.

Obtained at one spot N. of Namsos, 315 metres.

Distribution, like *L. gracillima*, always poorly represented in every locality. Not found in a fossil condition in Norway.

151. *L. acusticosta*, Rss.

Christiansand; Vesteraalseggen, 1187 metres.

Distribution, like *L. gracillima*, though always scarce and, as a fossil, not found in this country.

152. *L. curvilineata*, Balkw. & Millet.

Vesteraalseggen, 1187 metres.

Distribution: The Irish Channel, deep water.

153. *L. apiculata*, Rss.

Stavanger. In the Northern Sea off the Norwegian coast in deep sea-water. According to Brady it is found existent at all depths.

Distribution, like *L. gracillima*.

154. *L. semiornata*, Terquem.

Christiansand.

155. *L. caudata*, d'Orb.

M. Sars found this species on the Norwegian coast, at a depth of 564 metres.

Distribution: Temperate coasts, 50—1200 metres. Post-tertiary deposits in Scotland and Ireland.

III. Subfam. *Cristellarinae*.

156. *Cristellaria rotulata*, Link.

Drøbak, 100 metres; Storemedet, about 150 metres, same locality, the Drøbak Shoal, about 20 metres. Occasionally met with along our coasts towards the North Cape.

Distribution: Cosmopolitan, 1—4000 metres. Lias—present day.

157. *C. crepidula*, Ficht & Moll.

Not found in the Christiania Fiord, it is distributed along our coasts, and, generally, its distribution can not be distinguished from that of the preceding species, still it is never found in the post-tertiary deposits of Norway.

158. *C. compressa*, Brady.

Single specimens at Bergen, 100—520 metres.

Distribution: Northern Atlantic, 600—2000 metres. As a tertiary fossil in Austria.

159. *C. subarcuatula*, Montag.

West coast of Norway, 90—450 metres, singly distributed.

Distribution: North Atlantic Ocean, 200—1200 metres.

IV. Subfam. *Polymorphinae*.

160. *Polymorphina lactea*, Walk & Jacob.

Storemedet, near Drøbak, about 150 metres. Existing along our south, west and northern coast to the North Cape.

Distribution: Cosmopolitan, 1—4000 metres. Lias—present day.

161. *P. gibba*, d'Orb.

Not found in the Christiania Fiord.

Distribution, along our coasts and, generally, like that of the preceding species.

162. *P. acuta*, Bornem.

Vesteraalseggen, 1187 metres.

Distribution, along our coasts and, in general, similar to that of *P. lactea*, though more dispersed.

Apparently not found in a fossil condition in Norway.

163. *Polymorphina rotundata*, Bornem.

The Bunde Fiord, about 100 metres; Bygdø, 40 metres; Drøbak, 100 metres, and 10—15 metres (Bergholmene). Common along the western and northern coasts of Norway towards Vadsø, 80—1200 metres.

Distribution: Temperate and tropical coasts, 100—3500 metres. Tertiary period.

164. *P. oblonga*, d'Orb.

Vesteraalseggen, 1187 metres.

Distribution, as *P. lactea*, though, like *P. acuta*, not found in a fossil condition in Norway.

165. *P. compressa* d'Orb.

Bygdø, about 40 metres; Bergholmene, near Drøbak, 10—15 metres.

Distribution, along our coasts, and, generally, similar to that of *P. lactea*, though not at a greater depth than 1200 metres.

166. *Uvigerina pygmaea*, d'Orb.

Storemedet, near Drøbak, 150 metres; Engelsviken N. of Hankø, 100 metres.

U. pygmaea is one of the most common Thalamophores generally met with in Norwegian waters, from 20—1200 metres.

Distribution: All latitudes, 2—5000 metres. In the Northern-Sea, however, at no greater deep than 1200 metres. Lias—present day.

167. *U. angulosa*, Will.

In the Christiania Fiord this form has only been obtained at the following localities, near and about Drøbak. Bergholmene, 10—15 metres; Skiphellebugten, about 50 metres; between Haaøen and Graaøen, about 100 metres, at Storemedet, about 150 metres.

Distribution: The coasts of Norway and, in general, similar to that of the preceding species, though only from the tertiary period.

168. *Sagrina dimorpha*, Park & Jones.

Christiansand; Bukn and Øster Fiord, 260—350 metres; Bergen, 80—300 metres; Vest Fiord, 624 metres.

Distribution: Temperate and tropical coasts, 1—1200 metres.

IX. Fam. Endothyridae.

Subfam. Endothyrinae.

169. *Placopsilina cenomana*, d'Orb.

M. Sars's material from the Guldbrandsøer, Lofoten yielded a single specimen, about 200 metres.

Distribution, like the preceding species. Fossil condition in Lias and Chalk.

170. *Haplophragmium canariense*, d'Orb.

The Bunde Fiord, 100 metres; Bygdø, 40 metres; W. of Haaøen, Drøbak, about 100 metres; Storemedet, same locality, about 150 metres; Misingerne, W. of Hankø, 345 metres. Common along the coast of Norway to Vadsø, 10—1200 metres.

Distribution: All latitudes, 1—7500 metres. Post-tertiary deposits of Norway—Ireland.

171. *H. crassimargo*, Norman.

West coast of Norway, 10—520 metres, frequent.

Distribution: Spitsbergen, Greenland, 10—500 metres.

172. *H. latidorsatum*, Bornem.

The Bunde Fiord, 100 metres; Bygdø, about 40 metres; Storemedet, near Drøbak, about 150 metres; Hvidsten, 200 metres; Misingerne, 345 metres. *H. latidorsatum* is, practically, common along the entire coast of Norway, at a depth of 90—1200 metres.

Distribution: Cosmopolitic, 200—7000 metres. Tertiary period.

173. *H. nanum*, Brady.

In the Christiania Fiord, this species was found in the Skiphellebugten, near Drøbak, at a depth of 50 metres. Otherwise only observed at Brevik, 90 metres; E. of Storeggen, 326 metres; the Guldbrandsøer, Lofoten, 200 metres, and at Vadsø.

Distribution: All seas, 200—6000 metres, greatly dispersed.

174. *H. globigeriniforme*, Park & Jones.

At Drøbak, to the West of Haaøen, about 100 metres; Hvidsten, 200 metres; Misingerne, 345 metres; Skraaven, Lofoten, about 500 metres; Vesteraalseggen, 1187 metres.

175. *H. glomeratum*, Brady.

Common in the Christiania Fiord below the 100 metre curve; Frier Fiord, about 86 metres; Bergen, 300 metres; Vadsø, rare.

Distribution: Cosmopolitic, 20—5000 metres.

176. *H. pseudospirale*, Will.

Engelsviken, N. of Hankø, 50 metres. Stavanger; Christiansand; Bergen (*H. calcareum* Terquem).

Distribution: Bohuslæn, 20—170 metres; west-coast of Scotland, 50—100 metres; Ireland, 150—500 metres.

177. *Trochammina inflata*, Montf.

Bergen, 2—50 metres; frequent.

Distribution: Swedish coasts, British Isles—Spain, shallow water, estuaries. Jurassic and post-tertiary formations, though not in Norway.

178. *T. nitida*, Brady.

Obtained between Haaøen and Graaøen, in the Christiania Fiord, about 100 metres. Øster Fiord, 180 metres; Bergen, 200 metres; Vester-eggen, 1187 metres; singly distributed throughout.

Distribution: Novaya Zemlya—Spitsbergen, 20—1734 metres; South Atlantic, 100—2000 metres.

179. *T. robertsoni*, Brady.

The Bunde-Fiord, 100 metres; Bygdø, 40 metres; Drøbak, 100 metres (between Haaøen and Graaøen), and 50 metres (Skiphellebugten); Misingerne, 345 metres; the Drammen Fiord, 20—120 metres, common. Here and there is met with along our coasts up to Vadsø, 80—600 metres.

Distribution: Scotland—Ireland.

180. *T. vescicularis*, Goës.

The Brevik and Frier Fiords, 80—100 metres, singly distributed.

Distribution: Beeren Eiland, 455 metres; Spitsbergen, 350 metres, uniformly rare.

181. *T. squamata*, Park & Jones.

Frier Fiord, 86 metres; Vesteraalseggen, 1187 metres.

Distribution: Atlantic Ocean and the Pacific, 20—2000 metres. Jurassic and tertiary period.

X. Fam. Rotalidae.

I. Subfam. Rotalinae.

182. *Discorbina berthélothiana*, Park & Jones.

The Brevik Fiord, about 80 metres; Norwegian west coast, 80—540 metres; Lofoten, 200—600 metres; Vesteraalseggen, 1187 metres, not uncommon.

Distribution: All latitudes, 200—4000 metres.

183. *D. parisiensis* d'Orb, and *var. opercularis*, d'Orb.

Some specimens, pertaining to this species and its variety, were found in M Sars's collection from the post-tertiary deposits of Kirkøen.

Distribution: The Island of Hveen, in the Sound; Irish and French coasts; West-Indian, and Australian waters, 40—7000 metres.

Parisian eocene, crags of Suffolk and Norfolk.

184. *D. rosacea*, d'Orb.

West coast of Norway, 600 metres (M. Sars); Vesteraalseggen, 1187 metres.

Distribution: Temperate and tropical coasts, 1—5000 metres. Tertiary—present day, though not found in a fossil condition in Norway.

185. *D. globularis*, d'Orb.

Norwegian west coast, 2—150 metres; Lofoten—Vesteraalseggen, 200—1200 metres, common.

Distribution: Cosmopolitan, 1—3000 metres. Tertiary—present day.

186. *D. vilardeboana*, d'Orb.

Bergen, 20 metres, frequent.

Distribution: Norwegian Northern Sea—Australian waters, 1—3000 metres.

187. *D. obtusa*, d'Orb.

Single specimens at Storeggen—Vesteraalseggen, 300—1200 metres.

Distribution: Davis Straits, Scotland. Mauritius, 50—800 metres.

188. *Planorbulina mediterranensis*, d'Orb.

Occasionally met with on the southern, western and northern coasts of Norway to Tromsø, 2—500 metres, singly distributed.

Distribution: Temperate and tropical coasts, 1—2000 metres. Tertiary—present day.

189. *Truncatulina lobatula*, Walk & Boys.

Common throughout the Christiania Fiord, and along the coast of Norway to Vadsø, 2—1200 metres.

Distribution: All latitudes and depths. Carbon—present day.

190. *T. refulgens*, d'Orb.

A denizen of the same habitat as the preceding species.

Fossil condition, however, only from the tertiary—present day.

191. *T. wüllersdorffi*, Schwag.

Bergen, 300—520 metres, rare. Common along the northern coast of Norway in the Transition Clay, 911 metres and at greater depths.

Distribution: All seas 400—4000 metres. Tertiary period.

192. *T. akneriana*, d'Orb.

Misingerne, W. of Hankø, in the outer part of the Christiania Fiord, 345 metres.

Has the same distribution as *T. lobatula*, though generally much less frequent in most places.

193. *T. ungeriana*, d'Orb.

Drøbak, 100 metres. Sparingly distributed along our coasts to the Vesteraalseggen, 100—1200 metres.

Distribution: Temperate and tropical seas, 60—5000 metres. Tertiary—present day.

194. *Anomalina coronata*, Park & Jones.

Bergholmerne, near Drøbak, 10—15 metres, W. of Haaoen, 100 metres. More or less frequently met with from the Christiania Fiord to Vadsø, 50—1200 metres.

Distribution, like that of the preceding species.

195. *A. ariminensis*, d'Orb.

Bergen, 150 metres, rare; E. of Storeggen, 326 metres, rare.

Distribution, similar to that of *T. ungeriana*, though not found as a fossil in Norway.

196. *Rupertia stabilis*, Wallich.

Storeggen off Christiansund, 911 metres; Vesteraalseggen, 1187 metres, single specimens.

Distribution: Arctic seas, temperate seas of both hemispheres, 10—2000 metres.

197. *Pulvinulina punctulata*, d'Orb

Drøbak, 100 metres, single specimens; fiords of the west-coast, 90

—300 metres, rare. Lofoten—Vesteraalseggen, 200—1200 metres, common.

Distribution: The adjacent coasts of the Atlantic ocean, 100—400 metres. Tertiary—present day

198. *Pulvinulina concentrica*, Park & Jones.

Quite singly distributed on the western and northern coasts of Norway up to the North Cape.

Distribution: Temperate and tropical coasts, 100—2000 metres. Miocene beds in Italy.

199. *P. karstenii*, Reuss.

Here and there on the coast, northward of Storeggen to Vadsø, 200—1200 metres.

Distribution: Arctic, Antarctic, and partly the northern temperate coasts, 20—400 metres. Chalk—present day.

200. *P. elegans*, d'Orb.

Does not truly belong to recent Norwegian fauna, as it is exclusively found in the post-tertiary deposit of Haaøen, at Drøbak.

Distribution: Cosmopolitic, 1—3200 metres. Upper Trias—post-tertiary period.

201. *P. auricula*, Ficht & Moll.

Stavanger; Christiansand; Bergen, 100—200 metres; Lofoten, 200 metres, singly distributed.

Distribution: The North Sea, Atlantic Ocean and the Pacific, 30—1000 metres. Tertiary—present day.

202. *P. menardi*, d'Orb.

M. Sars reports this species as met with on the Norwegian coast, 540 metres.

Distribution: Temperate and tropical seas, 0—5000 metres, between Lat. 55° 11' North, and Lat. 51° 36' South. Tertiary period.

203. *Rotalia beccari*, Lin.

Common throughout the Christiania Fiord, and on the south-coast of Norway, 5—150 metres; Lofoten, 4—90 metres, rare.

Distribution: Temperate and tropical coasts, downwards to 100 metres; single specimens met with down to a depth of 5500 metres. Tertiary—present day.

204. *R. soldanii*, d'Orb.

Singly distributed, Christiansand—Lofoten, 140—624 metres.

Distribution: Temperate and tropical seas, 200—600 metres. Tertiary—present day.

205. *R. orbicularis*, *d'Orb.*

The Bunde Fiord, 100 metres; Bygdø, 40 metres; Sands and Sætrepollen, near Drøbak, 10—15 metres, single specimens; Vesteraalseggen, 408 and 1187 metres.

Distribution, similar to that of the preceding species.

II. Subfam. Tinoporinae.

206. *Gypsina inhaerens*, *Schulze.*

Bergen, 2—100 metres, frequent (Schaudinn).

Distribution: Temperate and tropical coasts.

207. *G. vesicularis*, *Park & Jones.*

Norwegian west-coast, 2—1000 metres (Schaudinn, Goës).

Distribution, similar to that of the preceding species. Tertiary—present day.

208. *G. globulus*, *Reuss.*

Selsøvig; Lofoten, 360 metres, single specimens.

Distribution, similar to that of *G. vesicularis*.

III. Subfam. Globigerininae.

a. spiniferous forms.

209. *Globigerina bulloides*, *d'Orb.*

Common along the Norwegian coast from Bergen to Vardø, 20—1200 metres, more especially at great depths; at the head of the fiords only singly. Pelagic at the entrance to the Eids Fiord.

Distribution: All latitudes, 0—6000 metres. Chalk—present day.

210. *G. pachyderma*, *Brady.*

Occasionally met with on the northern coast, from the entrance to the Sogne Fiord northwards to Vardø in deep water, 200—1200 metres.

Distribution: Arctic and Antarctic seas, 200—6000 metres.

211. *G. inflata*, *d'Orb.*

Obtained amongst the material of the Norwegian North Atlantic Expedition procured at a few stations outside the entrance of the Sogne

Fiord, 366—377 metres, and in one locality N. E. of Storeggen, 326 metres, single specimens.

Distribution: Smith's Sound—Antarctic Ocean, 100—6000 metres.

212. *Orbulina universa*, d'Orb.

This embryonal chamber of the Globigerinae was obtained from certain stations of the Norwegian North Atlantic Expedition, thus at the entrance to the Sogne Fiord, 366 metres; N. E. of Storeggen, 326 metres; and at Vesteraalseggen, 1187 metres (Station 192), single specimens.

Distribution: Novaya Zemlya—the Straits of Magellan, 0—3000 metres. Lias—post-tertiary period.

213. *O. nitida*, Terquem.

Stavanger.

214. *Hastigerina pelagica*, d'Orb.

A single pelagic specimen was found by Nordgaard in the Herlø Fiord, near Bergen, on the 10th of October 1898, 0—400 metres.

Distribution: Temperate and tropical seas, 0—6000 metres.

β. Glabrous forms.

215. *Sphaeroidina bulloides*, d'Orb.

Occasional parts of the Norwegian coast from Stavanger—Lofoten, 40—600 metres.

Distribution, similar to that of the preceding species, 60—5000 metres. Tertiary period.

216. *Pullenia sphaeroides*, d'Orb.

Hvidsten, 200 metres; the Drammen Fiord, 125 metres, a little north of Svelvik; Misingerne, W. of Hankø, 345 metres, single specimens. Common in many localities between Stavanger and Vardø, 100—1200 metres.

Distribution: All latitudes, 1—5000 metres, though, chiefly, below the 500 metres' curve. Chalk—present day.

217. *P. quinqueloba*, Reuss.

Hvidsten, about 200 metres, singly distributed. Occasionally existent along the coast from Stavanger, northwards, to the Vesteraalseggen, 200—1200 metres.

Distribution: Temperate and tropical seas, 200—5000 metres. Tertiary period.

IV. Subfam. Polystomellinae.

218. *Nonionina umbilicatula*, Montag.

One of the most general forms from the head of the Christiania Fiord, along the entire coast to Vardø, 20—1200 metres.

Distribution: All latitudes, 40—6000 metres. Tertiary—present day.

219. *N. depressula*, Walk & Jones.

Drøbak, 100 metres and about 150 metres (Storemedet).

Distribution, along our coasts and, generally, similar to that of the above species, though, at least in Norwegian waters, much less represented than the former.

A specimen, probably, belonging to the variety *orbicularis*, Brady, was found in the matter derived from soundings taken at Station 191, a little eastward of Vesteraalseggen, at a depth of 455 metres. The specimen forcibly reminds one of *N. pompilioides*, Ficht and Moll, namely

- 1) by the greatly increasing bulk of the segments, which gave the specimen, when viewed laterally, a conical shape tapering strongly downwards to the inferior extremity;
- 2) by only having 7 to 8 segments in the final convolution.

But as the specimen betrays narrow, plainly excavated sutural lines, dilated towards the coarse and irregular umbilicus, comparatively finely punctuated, it must belong to *depressula*, while its considerable thickness stamps its affinity to the variety *orbicularis*, which, possibly, as an exception, might possess less than 10 segments.

Terquem reports this variety as found at Stavanger.

Distribution: *N. orbicularis* was found at Novaya Zembla, 100 metres; Spitsbergen, 13 metres; the Faeroe Channel, 1200 metres; west-coast of Scotland, 45 metres; Valentia, 200 metres, while *N. pompilioides*, Ficht & Moll, is widely distributed in the temperate and tropical seas, from 2000—5000 metres, but does not extend northward of Ireland.

N. orbicularis is found as a fossil only in the post-tertiary deposits, though not in Norway, while *N. pompilioides* only occurs in the tertiary.

220. *N. scapha*, Ficht & Moll.

This has, invariably, a similar wide distribution as *Nonionina umbilicatula*.

212. *Nonionina turgida*, Will.

Occasional denizens of the south coast of Norway from the Brevik

Fiord to the Bukn Fiord, 90—350 metres, and is found at Svølvær, Lofoten, 200 metres; Vesteraalseggen, 1187 metres.

Distribution: All latitudes, 20—3000 metres. Post-tertiary deposits in Scotland—Norway.

222. *Polystomella striatopunctata*, Ficht & Moll, and var. *incerta*, Will.

At the following depths at Drøbak: 10—15 metres, Sandspollen and Sætrepollen, 100 metres (M. Sars), 150 metres, Storemedet.

In the outer part of the fiord, at Hankø sound, 5—7 metres.

In the Drammen Fiord, a little North of Svelvik, at a depth of 125 metres.

Along the Norwegian coast towards the North Cape, 2—1200 metres.

The variety *incerta*, suggests a predominant number throughout, while the typical forms are less frequent.

Distribution similar to that of *Nonionina umbilicatulata*, though perhaps not a greater depths than 4000 metres.

223. *P. subnodosa*, Münster.

The matter obtained from soundings taken at Station 87, Storeggen, 911 metres, yielded a single specimen. The specimen partly exhibits a double row of beaded lines, projecting septal lines, 14 segments, and is very compact.

Distribution: Novaya Zemlya, Newfoundland, Ireland, Australian waters, 10—300 metres.

Tertiary deposits in Germany.

224. *P. crispa*, Lin.

Occurs on the western and northern coasts of Norway, here and there, 1—200 metres.

Distribution: Temperate and tropical coasts, 1—600 metres. Tertiary—present day.

225. *Operculina ammonoides*, Gronow.

Common throughout the Christiania Fiord, and along the coast of Norway to Vadsø, never existent at greater depths than 624 metres, except in one locality, the Sogne Fiord, where it was found at a depth of 1036 metres.

Distribution similar to that of the preceding species, sometimes even reaching the depth of 4500 metres. Later tertiary, only in Calabria. Post-tertiary deposits in Norway.

Report on the Thalamophora occurring in the post-tertiary deposits of Norway.

In their previously cited works, Professor M. Sars and Messrs. Crosskey & Robertson furnish a list of the Thalamophora met with in the post-tertiary deposits of Norway.

I confine myself to these accounts, and simply add that Professor M. Sars's collection of fossil animal remains, deposited in the Mineralogical Museum, contains certain species which are not recorded in his list, thus:

<p>Discorbina parisiensis, d'Orb (e) and var. opercularis, d'Orb (e) Gypsina vesicularis, P. & J. (e) Rotalia soldanii (e)</p>	<p>Pulvinulina karstenii, Reuss (e) " elegans, d'Orb (e) Spiroloculina planulata (e)</p>
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Independent of this, Münster's collection, likewise kept in the Mineralogical Museum, contains many species derived from the post-tertiary deposits, gathered chiefly in the neighbourhood of Skien.

This collection has been inspected by me, and I, therefore, submit a list of the species:

<p>Textularia Williamsoni (n) Bulimina pyrula (e) " elipsoides (n) " marginata (n) Uvigerina angulosa (n) Lagena striata (e) " marginata (e) " Williamsoni (n) " sulcata (n) " squamosa (n) " hexagona (n) Discorbina globularis (n) " obtusa (e)</p>	<p>Polymorphina lactea (m) " var. fistulosa (m) " compressa (m) Vaginulina linearis (n) Nodosaria communis (n) Gypsina vesicularis (m) Truncatulina lobatula (m) " refulgens (m) " coronata (m) " akneriana (e) Polystomella striatopunctata (m) " crispa (m) Pulvinulina punctulata (m)</p>
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Rotalia beccari (m)	Nonionina scapha (n)
„ soldanii (e)	„ depressa (n)
Spiroloculina planulata (m)	Miliolina seminulum (m)
„ limbata (e)	„ oblonga (m)
Biloculina elongata (e)	„ trigonula (m)
„ simplex (m)	„ bicornis (n)
„ depressa (m)	„ pulchella (n)
Nonionina umbilicatula (m)	Christellaria rotulata (m)

Through the kindness of Professor Brøgger, I had an opportunity of examining some samples of clay, at the Mineralogical Institute, namely:

I. The old glacial Clay, near Moss.

Virgulina squamosa, d'Orb (n)	Nonionina depressula, Walk & Jac. (n)
„ Schreibersiana, Czjz (n)	„ scapha, Ficht & Moll (n)
Cassidulina laevigata, d'Orb (n)	Polystomella striatopunctata, P. & J.
„ crassa, d'Orb (n)	„ var. incerta, Will. (m)
Polymorphina rotundata, Born (n)	Miliolina seminulum, Lin. (n)
Lagena sulcata, Walk & Jac. (e)	„ tricarinata, d'Orb (n)
„ marginata, Walk & Boys (e)	„ subrotunda, Montag (e)
Biloculina simplex, d'Orb (n)	

II. Arca Clay, Svenengen, Christiania.

Bulimina subteres, Brady (e)	Cassidulina laevigata, d'Orb (n)
„ elipsoides, Costa (e)	„ crassa, d'Orb (n)
Virgulina Schreibersiana, Czjz (n)	Lagena striata, d'Orb (e)
„ squamosa, d'Orb (n)	Cristellaria sp., a young specimen.
Pullenia sphaeroides, d'Orb (e)	Nonionina scapha, Ficht & Moll (e)
Miliolina oblonga, Montag (n)	„ umbilicatula, Montag (e)
„ seminulum, Lin. (e)	Polystomella striatopunctata, P. & J.
Biloculina simplex, d'Orb (n)	„ var. incerta, Will. (n)
„ elongata, d'Orb (n)	

III. Isocardia Clay, Svenengen, Christiania.

Bulimina marginata, d'Orb (n)	Discorbina araucana, d'Orb (n)
Virgulina Schreibersiana, Czjz (n)	Polystomella striatopunctata, P. & J.
„ squamosa, d'Orb (n)	„ var. incerta, Will (e)

At Øvre Foss, near the Akerselven, Professor M. Sars found the glacial clay about 8 metres above the solid rock.

In order to investigate the Thalamophore fauna in this clay, I brought some samples from Øvre Foss, which were dug out in my presence, it was said from a depth of 4—6 metres above the solid rock.

As the Mollusc shells derived from this locality have not been examined, nothing can be ascertained as to the age of these samples of clay.

Still I have deemed it of interest to append a list of the Thalamophora procured from these samples.

Virgulina Schreibersiana (m)	Lagena striata (e)
Cassidulina laevigata (n)	„ distoma (e)
„ crassa (n)	„ gracillima (e)
Bulimina subteres (e)	„ marginata (n)
Polymorphina sp. (m)	„ bicarinata (e)
Nonionina umbilicatula (n)	Nodosaria communis (e)
Miliolina seminulum (e)	„ calomorpha (e)
„ oblonga (e)	Biloculina elongata (e)
„ agglutinans (e)	„ simplex (e)
Nodulina gracilis (m)	Cristellaria rotulata (e)
Polystomella striatopunctata (n)	

Concerning the occurrence of fossilized Thalamophore shells in Norwegian Fiords.

When examining the matter obtained from fresh soundings, one will generally find an abundance of living Thalamophora.

It is obvious, however, that a large quantity of the captured Thalamophora must be dead, as their testæ remain unaltered for a great length of time, and thus, co-existent with the living Thalamophora, shells of innumerable extinct generations are also found. But even though the Thalamophora in passing the intestinal canal of higher animals, or, when covered by new deposits, are gradually separated from the living Thalamophora by the increasing accumulation of mud, a quantity of empty shells may still lie within reach of the dredge and be brought up, along with the living Thalamophora, when the dredge is towed along the bottom and digs its way into the soft mud.

It seems, however, as if, in some places, one meets with an astounding number of empty Thalamophore shells, but this may be due to the supervening changes of the bottom, whereby certain species become extinct, or to the washing away of former deposits by the rivers, by which the dead shells are conveyed far from their original habitat.

Thus one finds in the soft brown mud, south of Drøbak, at a depth of 100—200 metres, exclusively empty Saccamina and Rhabdammina shells.

It must be owned, that these species are indeed but sparingly represented in the Christiania Fiord, but when the shells thus obtained are empty, it must still be remembered, that the species belong to an extinct, local fauna which have been denizens of those parts at earlier periods, under more favourable conditions of life.

The intervening changes in that locality arise from the upheaval of the sea-bottom, the setting in of a milder climate, and chemical changes in the mud.

Chiefly do the, so-called «Dead Fiords», viz., the Drammen Fiord and the Frier Fiord, indicate an extinct Thalamophore fauna.

I have, certainly, in the Drammen Fiord found some undoubtedly living Thalamophora, pertaining to the general species, but the majority of Thalamophora occurring in this fiord are dead, and belong to one particular species, which is not to be met with at any other part of the Norwegian coast except the Frier Fiord. Shells of this species are very abundant in the Drammen Fiord, and over the whole area from Drammen to Svelvik, at least at depths of 40—125 metres.

They are invariably met with on the sea bottom mixed up with decayed bits of wood, sand or clay.

As they are found close to the entrance of the Drammen Fiord, off Holmen and Tangen, at a depth of 50—60 metres, together with particles of wood and sand, they must have been washed down from post-tertiary banks of clay, of which there are several along the Drammen river.

Investigations respecting the pelagic Globigerinae of the Northern Sea.

The pelagic Globigerinae occurring on the coast of Norway, and in the North Atlantic pertain to *Globigerina bulloides*.

On the whole, it seems to me a question of little account whether there be any existent pelagic *Globigerina pachyderma*, which species we know was named from the thickness of its shell.

Firstly it seems to be inconceivable, that a thick-shelled species could be pelagic, as the density of the shell would, probably, prevent its floating on the surface of the sea. And if we treat the pelagic *G. pachyderma* as a thin-shelled species like *G. bulloides*, we would, thereby, deprive it of a characteristic criterion. There are certainly other means of identifying *G. pachyderma*, viz., by its slightly elevated and spherical chambers—its deficient umbilical vestibule, the shape and position of the aperture. As regards the less prominent spherical chambers of *G. pachyderma*, compared with those of *G. bulloides*, then this is an absolutely untenable criterion of a thin-shelled *G. pachyderma*, as well as the supposition that only the final convolution of segments should be visible on *G. pachyderma*. For on a thin-shelled *G. pachyderma* the segmentation must be more distinct, externally, and the sutures depressed. Neither are the chambers of *G. pachyderma* different in internal formation to those of *G. bulloides*, which is plainly shewn on Brady's, Goës' and Egger's plates of these two species.

Thus in comparing Fig. 757, Goës, with Fig. 20, Brady, it must be owned that the chambers of *G. bulloides* may be as compressed as those of *G. pachyderma*. And in glancing at Egger's figures, we will find that the chambers of *G. pachyderma* may almost attain a spherical form.

Concerning the lack of an umbilical vestibule on *G. pachyderma*, it may be remarked that, this is not always present in *G. bulloides*, at least not distinctly so, and it frequently shews a tendency to incline outwards on one side, whereby a depression is formed from the centre outwards to the periphery.

This depression is often very shallow, and occurs in the typical *G. pachyderma*.

The apertures of these two species are unquestionably built upon the same principle, their situation constituting the sole difference between the typical representatives of both species, inasmuch as the orifice of *G. bulloides* opens into the umbilical vestibule, and that of *G. pachyderma* into the marginal terminal chamber in the depression which runs from the centre out upon the periphery.

Here one meets with a great many variations and if Brady's Fig. 6 (pl. LXXIX) be reliable, the aperture of *G. bulloides* may be situated in a similar position to that of *G. pachyderma*.

On the whole, a great number of transitional forms arise between the two species, and the entirely typical specimens are, always, comparatively, rare.

This is in respect to the sea bottom forms. For the above mentioned reasons I regard it as doubtful, whether one can separate a thin-shelled *G. pachyderma* and a thin-shelled *G. bulloides*. I, at least, have not succeeded in finding any strongly defined *G. pachyderma* amongst the plankton material of the Northern Sea which I have examined.

All plankton forms observed, were thin-shelled, the majority typical *G. bulloides*, some few, only, suggesting their affinity to *G. pachyderma*, though not ascribable to this species. The incisions between the chambers are always sharp, while the orifice is sometimes like that of *G. pachyderma*.

The majority were entirely devoid of spines, only a few being armed with numerous short spines.