

DET KONGELIGE DEPARTEMENT
FOR HANDEL, SJØFART, INDUSTRI, HÅNDVERK OG FISKERI

NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER
LEDER: ADOLF HOEL

MEDDELELSE Nr. 43

SOME PELECYPODS
FROM FRANZ JOSEF LAND, VICTORIAØYA
AND HOPEN

COLLECTED
ON THE NORWEGIAN SCIENTIFIC
EXPEDITION 1930

BY
T. SOOT-RYEN

WITH 1 PLATE AND 1 MAP

OSLO
I KOMMISJON HOS JACOB DYBWAD
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A. W. BRØGGERS BOKTRYKKERI A/S

Introductory.

The archipelago of Franz Josef Land, probably discovered by Norwegian sealers in 1863 and explored and named by the Austro-Hungarian expedition in 1872—74, is the northernmost of the European Arctic islands. It is situated between lat. $79^{\circ} 50'$ and $81^{\circ} 50'$ N. and long. 42° and 65° E. Franz Josef Land consists of several larger and many small islands, separated by sounds of which at least some have depths above 100 metres. Referring to the accompanying map where an attempt to draw the isobaths for each 100 m depth from the various scattered soundings is made, the configuration of the sea bottom may be as follows: The archipelago is separated from the Spitsbergen shelf by a channel with depths upwards to some 400 m close to the west of the Aleksandra Island. The same depths are found on the eastern side, and also to the north of Novaya Zemlya. These deep parts follow the southern coast of the islands from both sides where the depths are between 300—400 m. Between the parallels 79° and 80° we find two shallow depths, the western with depths of 55 m, and the eastern with depths of 142 m. Between these the depths vary from 230 to 368 m. The soundings on the northern side of the archipelago are sparse and show depths of 114 to 280 m increasing towards the north. The depth in the Nightingale Strait is rather great: 460 m according to Cagni (1903).

The marine fauna of Franz Josef Land should perhaps be limited to the shelf bordered by the 200 or 300 m isobath, but the zoological stations in these areas are very few, and therefore I take the limits of the area from the 79° parallel northwards, and from long. 40° to about 67° E.

The hydrographical conditions in this rather large area are, according to Dushetshkina (1935) and Sokolow (1932) and measurements from various other sources, chiefly influenced by the Atlantic

water penetrating into the southern basin, or the northern part of the Barents Sea, from the south-west and through the two deeper channels to the east and west of Franz Josef Land. The “Malygin”-expedition 1932 (cf. Dushetshkina (1935)) found water to the north of Franz Josef Land with salinities over 35 ‰ and temperatures from about 1,5° upwards to 2,06° in depths from about 150 m downwards. This warm water to the north of the archipelago is by no means a constant feature. I am inclined to see it as exceptional.

In the year 1929 the temperatures were much lower as the “Sedow”-expedition measured \div 1.16° C in 170 m depth in the same region, and to the east and south of Franz Josef Land the “Yermak”-expedition in 1901 with one exception met only negative temperatures. In the summer months the uppermost 50—100 m have shown negative temperatures, and salinities from 33 ‰ to 34.7 ‰.

These few remarks on the hydrographical conditions of this vast area must be sufficient. The scattered observations show that rather great changes take place, not only in the surface layers but also in the water masses which fill the deeper parts of the area where the temperatures seem to vary between 2° C and \div 1.7° C from time to time.

Contributions to the knowledge of the Pelecypod-fauna of the Franz Josef Land have been given by some earlier expeditions. The material collected by the Jackson-Harmsworth expedition 1896—97 is worked out by Melvill & Standen (1900). They list in all 18 species and one variety of Pelecypods. The localities, where the Mollusca were collected, are for the most part situated in the neighbourhood of Cape Flora and westwards to Mabel Island. One dredging station from off Cape Mary Harmsworth in the western part of the Aleksandra Island, 53—93 fathoms, and one near Wilczek Land, one of the eastern islands, 127 fathoms, are also reported, but without exact positions. Further, some species are recorded only as dredged without proper locality.

During the years 1899—1900 some Pelecypods were collected by the members of the Polar expedition of the Duke of the Abruzzi. Pollonera (1903), who has worked out the material of Mollusca, has described two new *Astarte*-species, which, however, are only known varieties of *A. borealis*. In all four species are mentioned. Only three localities are given, viz: Cape Flora, Cape Fligely and Teplitz Bay. The two last named localities are situated on the Rudolph Island in

lat. about 81° 50' N., and Mollusca from these localities surely represent the northernmost finds of Pelecypods hitherto recorded.

The Russian ice-breaker "Yermak" visited in 1901 some places especially in the southeastern part of the area here treated as belonging to the Franz Josef area.

In a preliminary report by N. Knipowitsch (1901) the following stations are mentioned:

No.	Date	Lat. N.	Long. E.	Depth	Temperature
63	July 27, 1901	79° 55'	49° 18'	26 m	÷ 1.2° C
63a	July 27, 1901	79° 55'	49° 18'	34 »	—
65	July 28, 1901	79° 38'	50° 38'	110 »	÷ 1.7° C
79	Aug. 2, 1901	79° 30'	60° 50'	225 »	÷ 1.6° C
80	Aug. 2, 1901	79° 15'	60° 44'	325 »	÷ 1.1° C
82	Aug. 3, 1901	80° 26'	64° 14'	204 »	—
83	Aug. 3, 1901	79° 45'	65° 09'	358 »	0.5° C

Knipowitsch lists 13 species and two varieties of Pelecypods.

In the year 1911 the German zoologist Dr. Ernst Hentschel followed a hunting expedition, leader Mr. Gisbert, and visited the Franz Josef Land in the later days of August. The Mollusca collected during this visit were worked out by M. Leschke (1915). Only two dredging stations were taken. One at 79° N., 47° 45' E. on Aug. 25 in depths above 300 m, and one the next day at Cape Flora in depths from 15—30 m. Leschke lists 6 species of Pelecypods.

The interesting work by Messjatzev (1931) on the Pelecypoda of the Barents Sea, especially the collections made by the "Persej"-expeditions, but unfortunately published in Russian, comprises 6 stations lying in the southwestern part of the area. A list of these stations is given below.

No.	Date	Lat. N.	Long. E.	Depth
96	Aug. 29, 1923	79° 10'	40° 30'	380 m
97	Aug. 30, 1923	79° 50'	40° 30'	334 »
98	Aug. 31, 1923	79° 47'	48° 35'	325 »
99	Aug. 31, 1923	79° 9'	46° 50'	75 »
571	Aug. 28, 1926	79° 8'	43° 10'	261 »
572	Aug. 28, 1926	79° 23'	42° 0'	315 »

From these stations 16 species and 1 variety of Pelecypoda are mentioned.

Many other expeditions have visited the Franz Josef Land (see Horn 1930) during the last 60 years. Scientific collections were

surely made by some of them, but I have been unable to find other publications on the Pelecypods than those mentioned above.

In the summer of 1930 a scientific expedition to Franz Josef Land in the sealer *Bratvaag*, and led by Dr. Gunnar Horn, was sent out by *Norges Svalbard- og Ishavs-undersøkelser*. The zoologist of the expedition was cand. real. Adolf Sørensen. During this expedition some dredging stations were also taken. Those containing Pelecypods are listed below. The list includes also 2 stations from Hopen Island ¹ and one from east of the Victoria Island ²

No.	Date	Locality	Depth in fathoms
I.	Aug. 3	Off Thorkelsenskardet (T. pass), Hopen	5— 6
II.	Aug. 3	Off Thorkelsenskardet, Hopen	beach
VIII.	Aug. 8	10 nautical miles east of Victoria Island (V. øya)	20
X.	Aug. 11	S. W. of Bell Island (B. øya)	c. 40
XII.	Aug. 12	N. of Cape Flora	12—13
XIV.	Aug. 15	In sand (gravel) Camp Ziegler on Alger Island (A. øya)	on land
XV.	Aug. 15	S. W. of Camp Ziegler on Alger Island	30—40
XVIII.	Aug. 16	1—2 nautical miles off Cape Flora	25—30
XIX.	Aug. 17	Eira Harbour (E. hamna), Bell Island	45
XX.	Aug. 17	Eira Harbour, Bell Island	25—30
XXIV.	Aug. 23	Gunther Bay (G. bukta)	25

From these stations a total of 15 species and 2 varieties of Pelecypods were collected.

I beg to express my best thanks to the curators of the University Zoological Museum, Oslo, Mr. J. Huus and Mr. P. Løyning, who have placed the material in my hands for determination. Further I am indebted to Mr. Adolf Hoel for the reproduction of the accompanying map and to Dr. Wilfred Jackson, Manchester, for his kindness to lend me some of the specimens collected by the Jackson-Harmsworth expedition.

The information on the Pelecypod fauna of this part of the Arctic is scanty and given in various papers together with more comprehensive collections from neighbouring waters. I have therefore tried to compile all available data in the following systematic part.

The localities visited by the various expeditions are marked on the map.

¹ Lat. 76° 30' N., long. 25° E. of Gr. Belongs to the Svalbard group.

² Lat. abt. 80° 10' N., long. abt. 37° E. of Gr.

Systematic part.

Nucula tenuis (Montagu).

- 1 specimen St. X. S.W. of Bell Island, abt. 40 fth.
1 » St. XIX. Eira Harbour north side of Bell Island, 45 fth.

The two specimens are rather different. One, St. X, has a length of 12.5 mm, a dark periostracum and is rather swollen, a var. *inflata*. The other specimen, St. XIX, has a length of 10.9 mm, a light periostracum and resembles var. *expansa*.

This circumarctic species is new to the fauna of Franz Josef Land proper, but is recorded by Messjatzev from a depth of 261 m, St. 571, to the S.W. of the archipelago.

Leda pernula (Müller).

- 4 specimens St. X. S.W. of Bell Island, 40 fth.
1 » St. XIX. Eira Harbour, 45 fth.
3 » St. XX. Eira Harbour, 25—30 fth.

All specimens have a light yellow periostracum. *L. pernula* is also reported by Melvill & Standen from Miers Channel (Walrus' stomach) west of Northbrook I., and by Knipowitsch, St. 80.

Portlandia (Yoldiella) intermedia (M. Sars).

Reported by Knipowitsch from St. 82, and by Messjatzev from St. 97, 571, and 572.

Portlandia (Yoldiella) lenticula (Møller).

Reported by Knipowitsch from St. 80, Leschke, 300 m, valves only; and by Messjatzev from St. 97, 571 and 572. Messjatzev describes three forms of *P. lenticula* (Russian) the medium inflated *typica*, the short and much inflated *polaris*, and the larger and longer *arctica*.

Portlandia (Yoldiella) persei Messjatzev.

This species described in Russian in the report of the Mollusca collected by the expeditions with S/S "Persej" is very closely related to *P. lenticula*. A distinct sinuation on the posterior ventral margin and a lighter periostracum seems to be the characters which separate

this species from *lenticula*. As I have seen no specimens referable to this species, I can form no opinion about its specific validity. Found at St. 572.

Portlandia (Yoldiella) fraterna (Verrill & Bush).

Reported by Messjatzev from St. 572.

Portlandia (Yoldiella) frigida (Torell).

Reported by Knipowitsch from St. 65.

Bathyarca (?) glacialis (Gray).

Reported by Knipowitsch from St. 65, 80, 83; and by Messjatzev from St. 96, 97, 571 and 572.

Bathyarca pectunculooides (Schacchi).

Reported by Messjatzev from St. 96, 97, and 572.

Musculus niger (Gray).

1 specimen St. XX. Eira Harbour, 45 fth.

Periostracum greenish-brown, dimensions $19 \times 10.5 \times 6$ mm, $\frac{H}{L}$ 55.3, $\frac{D}{L}$ 31.6. Melvill & Standen report this species from 5 localities.

Musculus corrugatus (Stimpson).

Mentioned by Knipowitsch from St. 63 a and by Leschke.

Musculus discors laevigatus (Gray).

- | | |
|-------------------------|--|
| 4 specimens and 1 valve | St. VIII. 10 nautical miles east of Victoria Island, 20 fth. |
| 4 » | St. X. S.W. of Bell Island, c. 40 fth. |
| 1 » | St. XII. N. of Cape Flora, 12—13 fth. |
| 14 » | St. XVIII. 1—2 nautical miles off Cape Flora, 25—30 fth. |
| 3 » | and 2 valves St. XX. Eira Harbour, 25—30 fth. |
| 2 » | St. XXIV. Gunther Bay, 25 fth. |

The colour of the periostracum of the larger specimens is brown to dark brown, while the young ones have a greenish periostracum and often posterior radiating striae. Maximal length is 31 mm. The ratio

$\frac{H}{L}$ varies between 60.9 and 67.9, and $\frac{D}{L}$ from 40 to 46.7, one small specimen even 50.

This subspecies is recorded by Melvill & Standen, Knipowitsch and Leschke. Messjatzev reports only *M. discors*.

Musculus discors substriatus (Gray).

2 valves St. XV. S.W. of Camp Ziegler, 30—40 fth.

1 valve St. XX. Eira Harbour, 25—30 fth.

Periostracum dark-brown. Maximal length 35 mm. Reported by Melvill & Standen and by Knipowitsch as var. *laevis*.

Crenella decussata (Montagu).

Melvill & Standen report this species from off Flora Cottage (Cape F.), 15 fathoms.

Dacrydium vitreum (Møller).

Mentioned by Messjatzev from St. 572.

Palliolum (Arctinula) groenlandicum (Sowerby).

2 specimens St. X. S.W. of Bell Island, c. 40 fth.

Max.diam. 28 mm. This species is reported from various localities nearly by all writers about the Mollusca of Franz Josef Land. Knipowitsch mentions var *major* Leche from St. 65.

Palliolum (Cyclopecten) imbrifer (Lovén).

Mentioned by Knipowitsch from St. 65 and 82.

Limatula hyperborea Jensen.

Reported by Knipowitsch as *L. subauriculata* from St. 82.

Astarte borealis (Chemnitz).

(Pl. I, fig. 1—3).

1 valve St. VIII. 10 nautical miles east of Victoria Island, 20 fth.

1 specimen St. X. S.W. of Bell Island, c. 40 fth.

1 specimen, 1 valve... St. XII, N. of Cape Flora, 12—13 fth.

3 valves..... St. XVII. Error of Label.

2 specimens, 6 valves St. XIX. Eira Harbour, 45 fth.

- 2 valves..... St. XX. Eira Harbour, 25—30 fth.
 1 valve St. XXIV. Gunther Bay, 25 fth.

In all 4 living specimens and 14 valves were collected. Most of the specimens belong to var. *placenta* Mörch with some more or less resembling var. *withami* Wood, but they have generally a somewhat larger diameter. Nearly all have a dark periostracum and distinct concentric ribs. One dead specimen from St. XX is of a form resembling var. *lactea* Brod. & Sow. (Dautzenberg & Fischer (1912), pl. XI, fig. 26—27). The anterior part of the valve is larger than the posterior part (fig. 1).

The measurements and ratios of the complete specimens are given below:

St.	L.	H.	D.	$\frac{H}{L}$	$\frac{D}{L}$
X	30.5	25.0	14.0	82	45.9
XII	15.0	13.5	7.0	90	46.7
XIX	34.0	29.0	14.7	85,3	43.2
XIX	36.0	29.5	14.0	82	38.9
XIX	29.5	23.5	11.5	79.7	39.0
XX	37.5	31.5	15.0	84	40.0

Astarte borealis is reported from Franz Josef Land by Melvill & Standen and Leschke (*semisulcata* Leach). Pollonera (1903) describes two new species of *Astarte*, viz. *Cagnii* from Cape Fligely and *Cavallii* from Teplitz Bay, both species are only forms of *A. borealis*.

Astarte Montagui (Dillwyn).

(Pl. I, fig. 4).

- 1 specimen, 1 valve... St. VIII. 10 nautical miles east of Victoria Island, 20 fth.
 2 specimens St. X. S.W. of Bell Island, c. 40 fth.
 8 » St. XII. N. of Cape Flora, 12—13 fth.
 3 » St. XV. S.W. of Camp Ziegler, 30—40 fth.
 1 Specimen, 8 valves... St. XVIII. 1—2 nautical miles off Cape Flora, 25—30 fth.
 2 specimens St. XIX. Eira Harbour, 45 fth.
 1 valve St. XXIV. Gunther Bay, 25 fth.

A. Montagui occurs in two form-groups, var. *striata*, more or less resembling *f. typica*, and var. *fabula*. The measurements of *v. striata* and *f. typica* are:

St.	L.	H.	D.	$\frac{H}{L}$	$\frac{D}{L}$
VIII	11.25	9.0	5.25	80.0	46.7
XII	15.0	12.0	6.5	80.0	43.4
	13.5	12.0	6.5	88.9	48.1
	12.5	10.25	6.0	82.0	48.0
	11.5	9.5	5.0	82.6	43.5
	11.25	10.0	6.0	88.9	53.3
	11.25	9.5	5.25	84.4	46.7
	11.0	10.0	5.75	90.9	52.3
	11.0	9.25	5.5	84.1	48.0
XV	12.5	10.0	5.0	80.0	40.0
	11.9	9.0	5.25	81.8	47.7
	9.75	8.0	4.25	82.0	43.6
XVIII	11.0	9.0	4.5	81.8	44.1
XIX	12.5	10.5	6.0	84.0	48.0

The above tabulated specimens have a straw-coloured periostracum, and ratios varying from 80—90.9 for $\frac{H}{L}$ and 40—53.3 for $\frac{D}{L}$.

The measurements of var. *fabula*, which has a more yellow-brown periostracum are:

St.	L.	H.	D.	$\frac{H}{L}$	$\frac{D}{L}$
X	20.0	15.25	8.0	76.2	40.0
	15.0	12.0	6.5	80.0	43.3
XVIII	15.25	12.5	6.0	87.7	39.3
	14.0	11.0	6.0	78.6	42.9
XIX	18.0	15.0	8.0	83.6	44.4

The ratios vary between 76.2 and 97.7 for $\frac{H}{L}$, 39.3 and 44.4 for $\frac{D}{L}$.

A. Montagui is also reported by Melvill & Standen from two localities.

Astarte elliptica (Brown).

(Pl. I, figs. 5—6.)

- 1 specimen, 3 valves... St. VIII. 10 nautical miles east of Victoria Island, 20 fth.
- 3 specimens St. X. S.W. of Bell Island, c. 40 fth.
- 4 » St. XII. N. of Cape Flora, 12—13 fth.
- 2 » St. XV. S.W. of Camp Ziegler, 30—40 fth.
- 6 valves St. XVIII. 1—2 nautical miles off Cape Flora, 25—30 fth.
- 5 specimens St. XX. Eira Harbour, 25—30 fth.
- 1 specimen, 1 valve... St. XXIV, Gunther Bay, 25 fth.

Most of the specimens are typical, but some have a more or less aberrant appearance. One specimen from St. X resembles *A. sulcata*. It has 10—12 broad and well separated concentric lines on the upper half of the shell and is rather inflated, $\frac{D}{L} = 43.8$ (fig. 5). Some specimens have few concentric lines which often fail on the posterior part. One of the specimens from St. XII looks like a hybrid between *borealis* and *elliptica*. The outer form and the concentric lines in the uppermost $\frac{1}{3}$ of the shell is as *elliptica*, but the irregular lines and the filthy appearance of the yellowish grey periostracum resembles *borealis*. The length is 23 mm (fig. 6). Another specimen from St. XVIII is similar, but fails concentric lines except on umbo, and the darker periostracum is not filthy.

The measurements of the complete specimens are:

St.	L.	H.	D.	$\frac{H}{L}$	$\frac{D}{L}$
VIII	23.5	17.0	9.5	72.3	40.4
X	24.0	18.0	10.5	75.0	43.8
	23.0	16.5	7.75	71.7	33.7
XII	23.0	18.0	8.0	78.3	34.8
	17.25	12.5	6.25	72.5	36.2
	17.0	13.8	6.5	81.2	38.2
	16.0	12.5	5.5	78.1	34.4
XV	29.5	21.5	10.5	72.0	35.6
	21.5	17.0	8.75	79.0	40.7
XX	26.5	19.5	10.0	73.6	37.7
	26.5	19.0	10.0	71.7	37.7
	25.5	18.0	10.0	70.6	39.2
	23.5	17.0	9.75	72.3	41.5
	15.0	11.5	5.75	76.7	38.3
XXIV	24.0	18.0	9.0	75.0	37.5

Melvill & Standen mention *A. sulcata* from Windy Gully on Northbrook I. I have had the specimen for inspection. It is *A. elliptica*, but somewhat more oblique than specimens from North Norway, more like specimens from Greenland. The dimensions are $30.5 \times 23 \times 12.5$ mm, $\frac{H}{L} = 75.4$, $\frac{D}{L} = 41.0$.

A. elliptica is recorded from Franz Josef Land by Melvill & Standen and Messjatzev.

Astarte crenata (Gray).

- 1 specimen St. X. S.W. of Bell Island, c. 40 fth.
 1 » St. XIX. Eira Harbour, 45 fth.

The specimen from St. XIX has a strongly eroded shell. It resembles fig. 5 c, pl. IV, of Jensen (1912), while the other specimen resembles fig. 5 f. The dimensions are:

St.	L.	H.	D.	$\frac{H}{L}$	$\frac{D}{L}$
X	25.5	23.0	12.0	90.2	47.1
XIX	28.5	(23.0)	12.0	(80.7)	42.1

A. crenata is recorded by Melvill & Standen, Knipowitsch, and Messjatzev who also mentions var. *acuticosta* (Jeffer.).

Thyasira flexuosa (Montagu).

Reported by Messjatzev from St. 571 and 572.

Axinopsis orbiculata G. O. Sars.

(Pl. I, fig. 7.)

Melvill & Standen record the find of *Cryptodon sericatus* Carp. from off East glacier, Cape Flora, 4 fathoms, one living specimen. Gunther Sound (Bay), 10 fathoms, dead. Through the courtesy of dr. J. W. Jackson, Manchester, I got a sample of these shells for inspection. The sample consisted of 3 living specimens, 2 dead, and one valve. The dimensions of the three living and the largest of the dead ones are:

L.	H.	Diam.	$\frac{H}{L}$	$\frac{D}{L}$
3.75 mm	3.75 mm	1.90 mm	100	50.7
3.65 »	3.55 »	1.72 »	97.3	47.1
2.80 »	2.75 »	1.40 »	98.2	50.0
4.9 »	4.9 »	3.0 »	100	61.2

Shell rather solid, the smallest specimen only being somewhat pellucid. Periostracum silken, yellowish white to greyish yellow, more brownish on the largest specimens, concentric lines fine but conspicuous and somewhat irregular. The living specimens have a brownish coating especially in front of umbo. Dead valves internal white with traces of faint radiating sculpture. *Cryptodon sericatus* Carpenter 1864 belongs to Gen. *Axinopsis* G. O. Sars, and is hitherto found on the American

West coast from the Aleutian Islands to Cataline Island, California. Two other northern species belong to the Genus. viz. the genotype *A. orbiculata* G. O. Sars from the northern Atlantic, and *A. viridis* Dall from the northern Pacific. These three species are closely related. Dall (1901) says that the two Pacific species are more solid shells and have the cardinals much better developed than the atlantic *A. orbiculata*. The difference between *A. viridis* and *A. sericata* is that the former is a more rotund form, the latter oblique and ovate. The dimensions in mm of the type specimens are:

	L.	H.	Diam.	$\frac{H}{L}$	$\frac{D}{L}$
<i>A. sericata</i>	4.0	4.5	2.6	112.5	65.0
<i>A. viridis</i>	6.2	6.0	3.3	96.8	53.2
<i>A. orbiculata</i>	5.0	4.8	2.25	96.0	45.0
(measured on figure)					

The accurate measurement of these small forms are rather difficult, and variations in ratios may often be caused by incorrect figures. The limits of normal variation for the respective species are not known.

The shells of the specimens from Franz Josef Land are stronger than those of the typical *orbiculata*, a character which perhaps is due to the habitat.

The dentition is very like that of *A. orbiculata*, and as the outer form seems to be variable, I can see no reason to introduce a Pacific species into the fauna of the islands. Until more material is obtained, I think it will be correct to retain the name *A. orbiculata* for the specimen in question.

***Serripes groenlandicus* (Chemnitz).**

- 1 specimen..... St. XII. N. of Cape Flora, 12—13 fth.
- 1 specimen, 1 valve... St. XVIII. 1—2 nautical miles off Cape Flora, 25—30 fth.
- 1 specimen..... St. XX. Eira Harbour, 45 fth.
- 5 valves St. XXIV. Gunther Bay, 25 fth.

The living specimens are small, max. length 19 mm, yellowish-green with brownish-red or violet colourmarks. Largest valve 60 mm, $\frac{H}{L}$ 84.2—86.6, $\frac{D}{L}$ 48.2—50.0. This species is also recorded by Melvill & Standen.

Cardium (Cerastoderma) ciliatum Fabricius.

Reported by Melvill & Standen as *C. islandicum* from a depth of 75 fathoms, but without locality.

Liocyma fluctuosa (Gould).

(Pl. I, fig. 8.)

- 1 specimen St. X. S.W. of Bell Island, c. 40 fth.
5 » St. XII. N. of Cape Flora, 12—13 fth.
1 valve ... St. XVIII. 1—2 nautical miles off Cape Flora, 25—30 fth.
1 specimen St. XX. Eira Harbour, 25—30 fth.

The 5 specimens from St. XII, with lengths from 11.7 to 14.3 mm, have the ratio $\frac{H}{L}$ varying from 75.5 to 78.6 and $\frac{D}{L}$ from 37.9 to 40.6. The two other specimens are a trifle elongated. Their lengths are 14.2 and 15.5 mm respectively, and the ratios $\frac{H}{L}$ 72.2 and 72.9 and $\frac{D}{L}$ 40.8 and 41.6.

L. fluctuosa is also reported by Melvill & Standen as abundant.

Macoma calcarea (Chemnitz).

(Pl. I, fig. 9.)

- 1 specimen St. X. S.W. of Bell Island, c. 40 fth.

This specimen has an oval form much resembling *moesta*. Dimensions $17.7 \times 12.6 \times 5.2$ mm, $\frac{H}{L}$ 71.2, $\frac{D}{L}$ 29.4.

M. calcarea is also reported by Melvill & Standen.

Macoma Lovéni (J. Steenstrup).

(Pl. I, fig. 10.)

- 1 specimen St. XX. Eira Harbour, 25—30 fth.

The single specimen found was yellowish-white with rather distinct concentric lines and with a brown concretion along the margins. Dimensions $10.3 \times 7.5 \times 4.6$ mm, $\frac{H}{L}$ 72.8, $\frac{D}{L}$ 44.7. The ratios varies after the measurements given by Jensen (1905) between 66 and 71.2 for $\frac{H}{L}$, and 38—43.3 for $\frac{D}{L}$.

M. Lovéni is known from Greenland, Spitzbergen, and the Kara Sea. The species is new to the fauna of Franz Josef Land.

Hiatella arctica (Linné).

1 specimen	St. III. Error of label.
5 specimens, 4 valves	St. VIII. 10 nautical miles east of Victoria Island, 20 fth.
3 » 1 »	St. X. S.W. of Bell Island, c. 40 fth.
3 » 5 »	St. XII. N. of Cape Flora, 12—13 fth.
3 valves.....	St. XV. S.W. of Camp Ziegler, 30—40 fth.
1 specimen	St. XVII. Error of label.
13 specimens, 6 valves	St. XVIII. 1—2 nautical miles off Cape Flora, 25—30 fth.
1 specimen, 4 valves	St. XIX. Eira Harbour, 45 fth.
2 specimens	St. XX. Eira Harbour, 25—30 fth.
14 specimens, 5 valves	St. XXIV. Gunther Bay, 25 fth.

The specimens vary considerably in outline and consistence. Some specimens have a posterior carina, a few with spines (*arctica*). Some are of the *pholadis*-form, long and less high, while others have a rather distorted appearance, short, much inflated, and high. Strong concentric incremental ribs are found on most of the specimens.

Measurements:

St.	L.	H.	D.	$\frac{H}{L}$	$\frac{D}{L}$
VIII	32	21	17	65.6	53.1
VIII (¹ / ₂)	22	c. 25	c. 22	113.6	100.0
X	33	19	15	57.6	45.5
XV (¹ / ₂)	28	16	20	57.1	71.4
XV (¹ / ₂)	35	16	c. 13	45.7	37.1
XX	40	20	13	50.0	32.5

This species is the most common and is reported by all expeditions.

Mya truncata (Linné).

2 valves	St. VIII. 10 nautical miles east of Victoria Island, 20 fth.
3 »	St. X. S.W. of Bell Island, c. 40 fth.
8 »	St. XII. N. of Cape Flora, 12—13 fth.
1 »	St. XV. S.W. of Camp Ziegler, 30—40 fth.
7 »	St. XVIII. 1—2 nautical miles off Cape Flora, 25—30 fth.
2 »	St. XX. Eira Harbour, 25—30 fth.
4 »	St. XXIV. Gunther Bay, 25 fth.

Most of the specimens are rather oblique. The shortest forms have the anterior part less developed than the longer ones, while the posterior parts are nearly of the same dimensions. Largest specimens measure 52 mm.

M. truncata has been found by most of the expeditions and must be rather common.

Calopodium (Kennerlia) glacialis (Leach).

Melvill & Standen report three finds in depths from 1 to 12 fathoms.

Thracia myopsis (Beck) Møller.

Melvill & Standen mention *T. payracea* var. *villosiuscula* (Macg.), which surely represents this species. Further they report a find of two valves of another *Thracia*, which seems to belong to an undescribed species.

Cuspidaria glacialis (G. O. Sars).

Knipowitsch reports this species from St. 82 and 83, 204 and 358 m.

Cuspidaria arctica (M. Sars).

Messjatzev has *C. arctica* from St. 96, 97?, 571, and 572 in depths between 261 and 380 m.

From the stations I and II taken near Hopen Island only two species were found.

Musculus discors laevigatus (Gray), 1 specimen, St. I.

Hiatella arctica (Linné), 2 specimens, St. I, 2 specimens, St. II.

All are of a more elongated form than most of the specimens from Franz Josef Land. Max. dimensions: 41 × 23 × 18 mm.

A few fossil Mollusca were also collected in sand (gravel) at Camp Ziegler, Alger Island, some 20—25 metres above sea-level (St. XIV). The following species were found:

<i>Astarte borealis</i>	common.
<i>Serripes groenlandicus</i>	one valve, 78 mm.
<i>Hiatella arctica</i>	two valves.
<i>Mya truncata</i>	common.
<i>Buccinum</i> sp.....	one specimen.

The composition of the Pelecypod fauna of Franz Josef Land.

Hitherto in all 34 species of Pelecypods are recorded from the area of Franz Josef Land. It is, however, probable that about 10 other species will be found in this regions by further investigations e. g. species as *Yoldia hyperborea*, *Portlandia arctica*, *Leda minuta*, *Diplodonta Torelli*, *Montacuta Maltzani*, *Macoma moesta* and *Torelli*, *Cyrtodaria kurriana*, *Lyonsia arenosa*. Most of these species are rare and their occurrence may be sparse and scattered.

It is of some interest to find out the distribution of these 34 species recorded from the area. In the following list the distribution of the various species is tabulated. The terms Arctic, Boreal, and Sub-Tropic regions are used in the broadest sense. Most of the finds of these species in the Sub-tropic regions, either Atlantic or Pacific, are made in deep water with conditions similar to those in Boreal or even Low-Arctic waters.

As temperature in most cases is the limiting factor for the distribution of marine animals, a thorough investigation of the temperature intervals in which they can live, reproduce, and have their optimum, must be made. Further, maps of the hydrographical conditions of the bottom, from sea shore to ocean depths must be constructed taking into consideration the changes which take place during the year. Only on such a basis the biologist may be able to solve many questions fundamental both to zoogeography and many other biological branches. Some work has been done, but a lot of work remains for the future.

As a matter of fact we can ascertain that all species living in those Arctic regions are able to thrive in water with negative temperatures. But if they reproduce every year, is another question. The observations show that the hydrographical conditions are rather varying from year to year. One year may therefore be favourable for some species, while other years are better for other species.

The table shows that over 50 per cent. of the inhabitants of the waters of Franz Josef Land live in the Pacific Ocean, and that about 25 per cent. are true Circum-Arctic. Only 14.7 per cent. are exclusively restricted to the Arctic region, while about 50 per cent. may live even in Sub-tropic regions. All, but *P. persei*, are found in the western part of the Atlantic, at least in the Greenland seas.

	Circum-Arctic	Pacific	Occurring in the	
			Boreal region	Sub-Tropic region
<i>Nucula tenuis</i>	×	×	×	×
<i>Leda pernula</i>	-	^	×	(?)
<i>Portlandia intermedia</i>	-	×	-	-
— <i>lenticula</i>	-	-	×	-
— <i>persei</i>	-	-	-	-
— <i>fraterna</i>	-	-	×	(×)
— <i>frigida</i>	-	-	×	×
<i>Bathyarca</i> (?) <i>glacialis</i>	-	-	×	×
— <i>pectunculoides</i>	-	-	×	×
<i>Musculus niger</i>	×	×	×	×
— <i>corrugatus</i>	^	×	×	-
— <i>discors</i>	^	×	×	×
<i>Crenella decussata</i>	-	×	×	×
<i>Dacrydium vitreum</i>	-	-	×	^
<i>Palliolium groenlandicum</i>	-	-	×	×
— <i>imbrifer</i>	-	-	×	(?)
<i>Limatula hyperborea</i>	-	-	-	-
<i>Astarte borealis</i>	×	×	×	.
— <i>Montagui</i>	×	×	×	×
— <i>elliptica</i>	-	×	×	×
— <i>crenata</i>	(?)	×	^	-
<i>Thyasira flexuosa</i>	-	×	×	×
<i>Axinopsis orbiculata</i>	-	-	×	-
<i>Serripes groenlandicus</i>	×	×	×	-
<i>Cardium ciliatum</i>	-	×	×	-
<i>Lioecyca fluctuosa</i>	-	×	×	-
<i>Macoma calcarea</i>	×	×	×	×
— <i>Lovéni</i>	-	-	-	-
<i>Hiatella arctica</i>	-	×	×	×
<i>Mya truncata</i>	-	×	×	-
<i>Calopodium glacialis</i>	-	×	-	-
<i>Thracia myopsis</i>	-	-	×	-
<i>Cuspidaria glacialis</i>	-	×	×	(×)
— <i>arctica</i>	-	-	×	-
Species	8 (9)	20	29	14 (18)
Per cent. of total	23.5 (26.5)	58.8	85.3	41.2 (53)

Further investigations surely will alter this picture. I should think the exclusive Arctic species to be about 25 per cent., and those reaching the Sub-Tropic regions between 30 and 40 per cent., while the figures for true Circum-Arctic and Pacific species will remain nearly constant.

The list of species and our knowledge of the fauna of Franz Josef Land is, however, too incomplete to allow a more thorough discussion of the faunal affinities.

Literature.

- Cagni, Umberto. Scandagli eseguiti dal Comte Cagni durante La Campagna della Stella Polare. — Osservazioni scientifiche eseguite durante La Spedizione Polare di S. A. R. Luigi Amedeo di Savoia, Milano 1903.
- Dall, W. H. Synopsis of the Lucinacea and of the American species. — Proceedings of the United States National Museum Vol. XXIII, Washington 1901.
- Dautzenberg, Ph. et Fischer, H. Mollusques provenant des campagnes de l'Hirondelle et de la Princesse-Alice dans les Mers du Nord. — Résultats des Campagnes Scientifiques Fasc. XXXVII, Monaco 1912.
- Dushetshkina, O. Deep-sea observations of the expedition on the "Malygu'n" 1932. (Russian with resumé). — Transactions of the Arctic Institute Vol. XXXIV. Leningrad 1935.
- Horn, Gunnar. Franz Josef Land. — Skrifter om Svalbard og Ishavet Nr. 29, Oslo 1930.
- Jensen, Ad. S. Studier over nordiske Mollusker III Tellina (Macoma). — Videnskabelige meddelelser fra den Naturhistoriske Forening. København 1905.
- Lamellibranchiata, Part I. — The Danish Ingolf-Expedition Vol. II, Part 5, Copenhagen 1912.
- Knipowitsch, N. Explorations zoologiques sur le bateau casse-glace "Ermark" en été de 1901. Aperçu préliminaire des collections zoologiques. — Annuaire du Musée Zoologique de L'Académie Impériale des Sciences de St. Petersburg, T. VI, 1901.
- Leschke, M. Verzeichnis der von Dr Ernst Hentschel im Nördlichen Eismeer (Franz Joseph-Land) und bei Tromsø gesammelten Mollusken. — Mitteilungen aus dem Naturhistorischen (Zoologischen) Museum in Hamburg Jahrg. XXXII, Hamburg 1915.
- Melvill, J. C. and Standen, R. Report on the Mollusca of the "Jackson—Harmsworth" Expedition to Franz-Josef Land (1896—97), and of the "Andrew Coats" Cruise (1898) to Kolguev, etc. — Memoirs and Proceedings of the Manchester Literary & Philosophical Society, Vol. XLIV, No. 4, Manchester 1900.
- Messjatzev I. I. Mollusken des Barentsmeeres. I Theil. (Russian). — Transactions of the Oceanographical Institute. Vol. I, No. 1. Moskva 1931.
- Pollonera, Carlo. Molluschi. — Osservazioni Scientifiche eseguite durante La Spedizione Polare di S. A. R. Luigi Amedeo di Savoia, Milano 1903.
- Sokolow, A. Dynamic chart of Barents sea (Russian with resumé). — Transactions of the Oceanographical Institute Vol. II : 2. Moskva 1932.

Plate I.

- Fig. 1. *Astarte borealis* (Chemnitz). St. XX. Length 37.5 mm.
- » 2. *Astarte borealis* (Chemnitz). St. XIX. Length 35 mm resembling specimens from Greenland.
 - » 3. *Astarte borealis* (Chemnitz). Length 36 mm. Greenland.
 - » 4. *Astarte Montagui fabula* (Reeve). St. XIX. Length 18 mm.
 - » 5. *Astarte elliptica* (Brown). St. X, with few and broad concentric lines. Length 24 mm.
 - » 6. *Astarte elliptica* (Brown). St. XII, with filthy yellowish-grey periostracum. Length 23 mm.
 - » 7. *Axinopsis orbiculata* G. O. Sars. Jackson—Harmsworth expedition.
 - » 8. *Liocyma fluctuosa* (Gould). St. XII. Length 12.6 mm.
 - » 9. *Macoma calcarea* (Chemnitz). St. X. Length 17.7 mm.
 - » 10. *Macoma Loveni* (J. Steenstrup). St. XX. Length 10.3 mm.



1



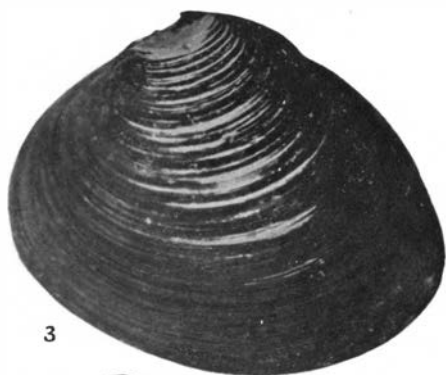
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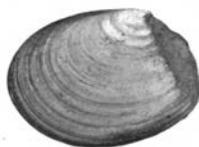
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10

NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER

Observatoriegaten 1, Oslo

MEDDELELSER:

- Nf. 1. PETTERSEN, K., *Isforholdene i Nordishavet i 1881 og 1882*. Optrykk av avis-artikler. Med en innledn. av A. Hoel. — Særtr. av Norsk Geogr. Tidsskr., b. 1, h. 4. 1926.
- ” 2. HOEL, A., *Om ordningen av de territoriale krav på Svalbard*. — Særtr. av Norsk Geogr. Tidsskr., b. 2, h. 1. 1928.
- ” 3. HOEL, A., *Suverenitetsspørsmålene i polartraktene*. — Særtr. av Nordmands-Forbundet, årg. 21, h. 4 & 5. 1928.
- ” 4. BROCH, O. J., E. FJELD og A. HØYGAARD, *På ski over den sydlige del av Spitsbergen*. — Særtr. av Norsk Geogr. Tidsskr., b. 2, h. 3—4. 1928.
- ” 5. TANDBERG, ROLF S., *Med hundespenn på eftersøkning efter „Italia“-folkene*. — Særtr. av Norsk Geogr. Tidsskr. b. 2, h. 3—4. 1928.
- ” 6. KJÆR, R., *Farvannsbeskrivelse over kysten av Bjørnøya*. 1929.
- ” 7. NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER, *Jan Mayen. En oversikt over øens natur, historie og bygning*. — Særtr. av Norsk Geogr. Tidsskr., b. 2, h. 7. 1929.
- ” 8. I. LID, JOHANNES, *Mariskardet på Svalbard*. II. ISACHSEN, FRIDTJOV, *Tidligere utforskning av området mellem Isfjorden og Wijdebay på Svalbard*. — Særtr. av Norsk Geogr. Tidsskr., b. 2, h. 7. 1929.
- ” 9. LYNGE, B., *Moskusoksen i Øst-Grønland*. — Særtr. av Norsk Geogr. Tidsskr., b. 3, h. 1. 1930.
- ” 10. NORGES SVALBARD- OG ISHAVS-UNDERSØKELSER, *Dagbok ført av Adolf Brandal under en overvintring på Øst-Grønland 1908—1909*. 1930.
- ” 11. ORVIN, A. K., *Ekspedisjonen til Øst-Grønland med „Veslekari“ sommeren 1929*. — Særtr. av Norsk Geogr. Tidsskr., b. 3, h. 2—3. 1930.
- ” 12. ISACHSEN, G., *I Norske Undersøkelser ved Sydpollandet 1929—31. II. „Norvegia“-ekspedisjonen 1930—31*. — Særtr. av Norsk Geogr. Tidsskr., b. 3, h. 5—8. 1931.
- ” 13. *Norges Svalbard- og Ishavs-undersøkelers ekspedisjoner sommeren 1930*. I. ORVIN, A. K., *Ekspedisjonen til Jan Mayen og Øst-Grønland*. II. KJÆR, R., *Ekspedisjonen til Svalbard-farvannene*. III. FREBOLD, H., *Ekspedisjonen til Spitsbergen*. IV. HORN, G., *Ekspedisjonen til Frans Josefs Land*. — Særtr. av Norsk Geogr. Tidsskr., b. 3, h. 5—8. 1931.
- ” 14. I. HØEG, O. A., *The Fossil Wood from the Tertiary at Myggbukta, East Greenland*. II. ORVIN, A. K., *A Fossil River Bed in East Greenland*. — Særtr. av Norsk Geol. Tidsskr., b. 12. 1931.
- ” 15. VOGT, T., *Landets senkning i nutiden på Spitsbergen og Øst-Grønland*. — Særtr. av Norsk Geol. Tidsskr., b. 12. 1931.
- ” 16. HØEG, O. A., *Blütenbiologische Beobachtungen aus Spitzbergen*. 1932.
- ” 17. HØEG, O. A., *Notes on Some Arctic Fossil Wood, With a Redescription of Cupressinoxylon Polyommatum, Cramer*. 1932.

- Nr. 18. ISACHSEN, G. OG F. ISACHSEN, *Norske fangstmenns og fiskeres ferder til Grønland 1922—1931*. — Særtr. av Norsk Geogr. Tidsskr., b. 4, h. 1—3. 1932.
- „ 19. ISACHSEN, G. OG F. ISACHSEN, *Hvor langt mot nord kom de norrøne grøn-
lendinger på sine fangstferder i ubygdene*. — Særtr. av Norsk Geogr. Tidsskr.,
b. 4, h. 1—3. 1932.
- „ 20. VOGT, TH., *Norges Svalbard- og Ishavs-undersøkelsers ekspedisjon til Syd-
østgrønland med „Heimen“ sommeren 1931*. — Særtr. av Norsk Geogr. Tidsskr.,
b. 4, h. 5. 1933.
- „ 21. BRISTOWE, W. S., *The Spiders of Bear Island*. — Repr. from Norsk
Entomol. Tidsskr., b. 3, h. 3. 1933.
- „ 22. ISACHSEN, F., *Verdien av den norske klappmyssfangst langs Sydøst-
Grønland*. 1933.
- „ 23. LUNCKE, B., *Norges Svalbard- og Ishavs-undersøkelsers luftkartlegning i
Eirik Raudes Land 1932*. — Særtr. av Norsk Geogr. Tidsskr., b. 4, h. 6. 1933.
- „ 24. HORN, G., *Norges Svalbard- og Ishavs-undersøkelsers ekspedisjon til
Sydøstgrønland med „Veslemari“ sommeren 1932*. — Særtr. av Norsk
Geogr. Tidsskr., b. 4, h. 7. 1933.
- „ 25. ORVIN, A. K., *Norges Svalbard- og Ishavs-undersøkelsers ekspedisjoner til
Nordøst-Grønland i årene 1931—1933*. — *Isfjord fyr og radiostasjon,
Svalbard*. Særtr. av Norsk Geogr. Tidsskr., b. 5, h. 2. 1934.
- „ 26. GRIEG, J. A., *Some Echinoderms from Franz Josef Land, Victoriaøya and
Hopen. Collected on the Norwegian Scientific Expedition 1930*. 1935.
- „ 27. MAGNUSSON, A. H., *The Lichen-Genus Acarospora in Greenland and Spits-
bergen*. — Repr. from Nyt Magazin for Naturvidensk. B. 75. 1935.
- „ 28. BAASHUUS-JESSEN, J., *Arctic Nervous Diseases*. Repr. from Skandinavisk
Veterinær-Tidsskrift, No. 6, 1935
- „ 29. I. KOLSRUD, O., *Til Østgrønlands historie*. II. OSTERMANN, H., *De første
efterretninger om østgrønlandingerne 1752*. — Særtr. av Norsk Geogr.
Tidsskr., b. 5, h. 7. 1935.
- „ 30. TORNØE, J. KR., *Hvitserk og Blåserk*. — Særtr. av Norsk Geogr. Tidsskr.,
b. 5, h. 7. 1935.
- „ 31. HEINTZ, A., *Holonema-Reste aus dem Devon Spitzbergens*. — Sonderabdr.
aus Norsk Geol. Tidsskr., b. 15, 1935.
- „ 32. ORVIN, A. K., *Norges Svalbard- og Ishavs-undersøkelsers ekspedisjoner i
årene 1934 og 1935*. — Særtr. av Norsk Geogr. Tidsskr., b. 5. 1935.
- „ 33. OSTERMANN, H., *Dagbøker av nordmenn på Grønland før 1814*. 1935.
- „ 34. LUNCKE, B., *Luftkartlegningen på Svalbard 1936*. — Særtr. av Norsk Geogr.
Tidsskr., b. 6. 1936.
- „ 35. HOLTEDAHL, O., *On Fault Lines Indicated by the Submarine Relief in the
Shelf Area West of Spitsbergen*. — Særtr. av Norsk Geogr. Tidsskr., b. 6,
h. 4. 1936.
- „ 36. BAASHUUS-JESSEN, J., *Periodiske vekslinger i småviltbestanden*. — Særtr.
av Norges Jeger- & Fiskerforb. Tidsskr. h. 2 og 3, 1937.
- „ 37. ORVIN, A. K., *Norges Svalbard- og Ishavs-undersøkelsers ekspedisjoner
til Øst-Grønland og Svalbard i året 1936*. — Særtr. av Norsk Geogr. Tidsskr.,
b. 6, h. 7. 1937.
- „ 38. GIÆVER, JOHN, *Kaptein Ragnvald Knudsens ishavsferder*. Sammen-arbeidet
efter hans dagbøker, rapporter m. v. 1937.
- „ 39. OSTERMANN, H., *Grønlandske distriktsbeskrivelser forfattet av nordmenn
før 1814*. 1937.
- „ 40. OMANG, S. O. F., *Über einige Hieracium-Arten aus Grönland*. 1937.
- „ 41. GIÆVER, JOHN, *Norges Svalbard- og Ishavs-undersøkelsers ekspedisjoner
til Øst-Grønland sommeren 1937*. — Særtr. av Norsk Geogr. Tidsskr., b. 6,
h. 7. 1937.
- „ 42. SIEDLECKI, STANISLAW, *Crossing West Spitsbergen from south to north*. —
Særtr. av Norsk Geogr. Tidsskr., b. 7, h. 2. 1938.
- „ 43. SOOT-RYEN, T., *Some Pelecypods from Franz Josef Land, Victoriaøya and
Hopen. Collected on the Norwegian Scientific Expedition 1930*. 1939.
- „ 44. LYNGE, B., *A small Contribution to the Lichen-Flora of the Eastern
Svalbard Islands. Lichens collected by Mr. Olaf Hanssen in 1930*. 1939.