

FISHERIES RESEARCH BOARD OF CANADA

Translation Series No. 2072

A study of the cephalopod fauna of the North Sea

by G. Grimpe

Original title: Zur Kenntnis der Cephalopodenfauna der Nordsee

From: Aus der Biologischen Anstalt auf Helgoland und dem  
Zoologischen Institut der Universität Leipzig. (from  
the Biological Station on Heligoland and the Zoological  
Institute of the University of Leipzig), 16(3) : 21-27  
1925

Translated by the Translation Bureau (WPL)  
Foreign Languages Division  
Department of the Secretary of State of Canada

Fisheries Research Board of Canada  
Biological Station  
St. John's, Nfld.

1972

21 pages typescript

DEPARTMENT OF THE SECRETARY OF STATE  
TRANSLATION BUREAUFOREIGN LANGUAGES  
DIVISIONSECRETARIAT D'ÉTAT  
BUREAU DES TRADUCTIONSDIVISION DES LANGUES  
ÉTRANGÈRES

TRANSLATED FROM - TRADUCTION DE German	INTO - EN English
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AUTHOR - AUTEUR

Crispe, C.

TITLE IN ENGLISH - TITRE ANGLAIS

A Study of the Cephalopod Fauna of the North Sea

Title in foreign language (transliterate foreign characters).  
Zur Kenntnis der Cephalopodenfauna der NordseeREFERENCE IN FOREIGN LANGUAGE (NAME OF BOOK OR PUBLICATION) IN FULL. TRANSLITERATE FOREIGN CHARACTERS.  
RÉFÉRENCE EN LANGUE ÉTRANGÈRE (NOM DU LIVRE OU PUBLICATION), AU COMPLET. TRANSCRIRE EN CARACTÈRES PHONÉTIQUES.Aus der Biologischen Anstalt auf Helgoland und dem Zoologischen  
Institut der Universität Leipzig

REFERENCE IN ENGLISH - RÉFÉRENCE EN ANGLAIS

From the Biological Station on Heligoland and the Zoological  
Institute of the University of Leipzig

PUBLISHER - ÉDITEUR	DATE OF PUBLICATION DATE DE PUBLICATION			PAGE NUMBERS IN ORIGINAL NUMÉROS DES PAGES DANS L'ORIGINAL  20 - 27
	YEAR ANNÉE	VOLUME	ISSUE NO. NUMÉRO	
PLACE OF PUBLICATION LIEU DE PUBLICATION  Germany	1925	XVI	3	NUMBER OF TYPED PAGES NOMBRE DE PAGES DACTYLOGRAPHIÉES  19 + 2 tables

REQUESTING DEPARTMENT  
MINISTÈRE-CLIENT

Environment

TRANSLATION BUREAU NO. 0228 G  
NOTRE DOSSIER NOBRANCH OR DIVISION  
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DATE OF REQUEST  
DATE DE LA DEMANDE

Jan 17, 1972



CLIENT'S NO. N° DU CLIENT  769-18-14	DEPARTMENT MINISTÈRE  Environment Fisheries Research Board	DIVISION/BRANCH DIVISION/DIRECTION  Biological Station	CITY VILLE  St. John's
BUREAU NO. N° DU BUREAU  0228 G	LANGUAGE LANGUE  German	TRANSLATOR (INITIALS) TRADUCTEUR (INITIALES)  WPL	29 Feb 72

From the Biological Station on Heligoland and the Zoological  
Institute of the University of Leipzig

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Volume XVI, Number 3

A Study of the Cephalopod

Fauna of the North Sea

by G. Grimpe, Leipzig

(1925)

With 1 Plate and 34 Figures in the text

7. Rossia (Allorossia) glaucopsis Lov.

Fig. 8; Plate - Fig. 6

*Rossia glaucopsis* Loven 1845, p. 135; 1848, p. 121/122; et auctorum:  
*palpebrata* Owen 1835, p. XCII, tab. B-C (vide Pfeffer 1908, p. 37); et auctorum;  
*palpebrata* Ferr. typ.? Peters 1842, p. 329 C;  
*palpebrata* Herzenstein 1883, p. 714 (russe); (Russian)  
 Appellöf 1892, p. 7, 9, tab. I, fig. 7;  
 Friele & Grieg 1901, p. 121;  
*psyllinera* Jeffreys 1869, p. 134;  
*sublevia* Verrill 1878, p. 299; 1880, p. 291, tab. XV, fig. 3; 1881, p. 354, 419, tab. XXX, fig. 2, XXX, fig. 3, XLVI, fig. 4, XLVII, fig. 2, 4; 1882, p. 390, tab. XXXIV, fig. 2, 6, XXXVII, fig. 2; et auctorum;  
*hyatti* Verrill 1878, p. 298; 1880, p. 291, tab. XV, fig. 1/2; 1881, p. 351, tab. XXVII, fig. 8/9, XXX, fig. 1, XXXI, fig. 12, XLVI, fig. 5; 1892, p. 377, tab. XXXV, fig. 2, 5/8, XXXVI, fig. 3, 8, XXXVII, fig. 2; et auctorum;  
 (Franklinia) *glaucopsis* Norman 1890, p. 470-471;  
*glaucopsis* Pfeffer 1908, p. 37/40, fig. 30-37;  
 Russell 1909, p. 454; 1922, p. 23/24;  
 Grimpe 1921, p. 289;  
 Nordgard 1922, p. 10/11.

This very northern species is severely limited towards the South and is therefore missing in the following parts:

- 1) off the Dutch coast,    2) off the Belgian coast,
- 3) <sup>in the</sup> western Baltic Sea,    4) <sup>in the</sup> German Bight, and
- 5) off the Danish West coast. Yet we have definite proof of this species from several positions in the North Sea (cf. map in Fig. 8 on page 25):

1) off the East English coast, but only off its northern (Scottish) part:

Jeffreys 1869, p. 134 ("N of Shetlands"); Norman 1890, p. 470/471 ("off N of Shetland, "Outer Haaf"); Joubin 1902, p. 133 ("Shetlands"); Russell 1909, p. 454 ("near Shetlands", "Kinnaird Deep" (?), "60°23'N, 0°14'W"); 1922, p. 24 ("59°27'N, 1°33'E"; "58°30'N, 2°30'W" [spawn]).

2) off the Swedish coast, from the Skagerrak and Kattegat: Lönnberg 1891, p. 13/14 ("Bohuslän", "Koster", "Gullmaren", "Kristineberg", "Väderbarne", "Styrsö"); Aurivillius 1898B, p. 47 ("Kosterfjord", "Väderöfjord").

This species has thus become known so far only from the most northwesterly and northeasterly part of the whole region. But, as the results of the "Poseidon" show, it does exist in the entire central and northern North Sea. Since we are dealing with a decidedly northern form, it would be appropriate at this point to look at the distribution area of Rossia glaucopis a little closer. First, it should be mentioned that Pfeffer (1908, p.40) and also Naef (1916 B, p.18) reject Jatta's remark that this species exists in the Mediterranean, too. The specimen he called "R.palpebrosa", (1896, p.139, Plate XV, Fig. 11/21) is a poorly preserved young R.macrosona. Neither R.glaucopis nor R.palpebrosa, "synonymous" to the former, are Mediterranean. I would also be inclined to doubt whether the statement made by E.A. Smith (1889, p.420; and Nichols 1900, p.494) that "R. sublevis Verrill" (perhaps in this case = R. glaucopis?) is found SW of Ireland some 450 m deep, is actually correct. In all likelihood this is another case of it having been confused with R. macrosona, or, even more likely, with the more southerly R. caroli Joubin (closely related to R.glaucopis), which is frequently encountered SW of Ireland (see below, p. 23 seq.). Furthermore, while Massy (1909, p.20) could not produce any new proof of this species in her thorough study of Irish Cephalopoda, she could confirm R. caroli, to which the unidentified spawn ("Rossia sp.", Massy, 1909, p. 21) should probably be assigned, too.

I also have my doubts if the specimen determined by Hoyle (1886, p.117, as "R. sublevis") and placed off Patagonia ("off Cape Virgins")

in fact belongs to R. glaucopis. Would this not be another confusion with Semirossia Patagonica E.A. Smith (Proc.Zool. London 1881, p.22, Plate III, Fig. 3; also Hoyle 1886, p. 119, Plate XV, Figs. 10/18; (?) = Semir. tenera Verrill /1880/ 1881, p. 103, Plate III, Fig. 5, Plate VII, Figs. 2/3, as Pfeffer 1908, p.46 thinks?) or with another Antarctic species (subgenus Austrossia Berry)? However, it could be that R. glaucopis is bipolar, rather like Gonatus fabricii Lichtenstein. /22

When we disregard these questionable or erroneous determinations, we see that Rossia glaucopis is a purely northern species and a cold-water form which only rarely and at very few places transgresses the 60th parallel N in a southerly direction. It is not surprising in view of the foregoing that this form advances farther South on the American side of the Atlantic, as the water temperature is known to be lower there than along the same geographical latitude on the European side of that ocean (cf. Murray & Hjort 1912). In its northward expansion, R. glaucopis seems to have no limitation at all. Besides Bathypolypus arcticus Prosch (81°14'N, according to Knipowitch 1901, p.538), it is that cephalopod which advances farthest North (80°3'N, according to Appellöff 1892, p. 7, and Friele & Grieg 1901, p. 124). Because of our scanty knowledge of North Siberian and North Canadian waters, we have not been able yet to ascertain whether this species is distributed around the pole, like the closely related Semirossa tenera Verrill. But the possibility should not be completely dismissed that one or the other of the new species from Northern Pacific regions described

Distribution of *Rossia glaucopsis* Lov.

NW of main island of Spitsbergen	80°30'N 8°28' E	470 m	<u>Appellöf</u> 1892, p. 7/9, Fig. 7; <u>Friele &amp; Grieg</u> 1901, p.124 as " <u>Rossia palpebrosa</u> " (Vöringen Expedition).
Liefde Bay, N Spitsbergen	79°47'N 14°28' E	140 m	{ <u>Lönnberg</u> 1899, p. 191 (all the specimens listed by <u>Krause</u> 1892, p. 2/3, for E Spitsbergen probably belong to <u>R. mölleri</u> ).
N of Hopen Island	77°25'N 27°30' E	160 m	
off Spitsbergen	- -	-	<u>Knipowitch</u> 1901 (after <u>Grieg</u> 1907, p.516, 540).
Between Bear Island & Spitsbergen	75°31'N 17°50' E	210 m	{ <u>Appellöf</u> 1892, p. 7; <u>Friele &amp; Grieg</u> 1901, p. 124 as " <u>Rossia glaucopsis</u> ": Eggs from 72°53'N, 21°51'E (northernmost discovery site of spawn) (Vöringen Expedition)
Between North Cape and Bear Island	72°53'N 21°51' E	400 m	
Between Hammerfest and Bear Island	72°27'N 20°51' E	340 m	
ENE of North Cape	72°27'N 35° 1' E	250 m	
N of Jan Mayen Island	ca. 71°N 8°W	130 m	{ <u>Becher</u> 1882/83, p. 81 (spawn, too)
S of Jan Mayen Island	ca. 70°30'N 8°W	200 m	
Kara Sea*	ca. 71°N 48° E	-	<u>Posselt</u> 1898, p.271/272, as " <u>Rossia palpebrosa</u> "
Off Hammerfest	ca. 70°30'N 23° E	-	<u>Lovén</u> 1845, p. 135 (type).
Off E Finmark } N Norway	ca. 70°N 30° E	110	{ <u>G.O. Sars</u> 1878, p.337/338, Plate XXXII Figs. 6, 12/13 (eggs mentioned, too) / <u>Lovén</u> 1847, p. 135/
Off W Finmark } N Norway	ca. 70°N 20° E	to	
Off Lofoten Is }	ca. 68°N 15° E	360 m	
Off W Greenland, Davies Strait*(**)	from 68-60°N 60-75°W	-	<u>Posselt</u> 1898, p.271/272, 274/276, as " <u>Rossia palpebrosa</u> , <u>sublevis</u> , and <u>glaucopsis</u> "; <u>Steenstrup</u> 1900, p.296, Figs.18, 18' (spawn).
Elwin Bay, Prince Regents Inlet	- -	-	<u>Owens palpebrosa</u> type of <u>Ross</u> , 1832 (after <u>Grieg</u> 1909, p.36)
E Greenland (ice limit)	77°31'N 18°21'W	275 m	<u>Grieg</u> 1907, p. 539/540 (Belgica Expedition)
"Entrance to Stordalen (Havnsfjord)"	- -	8 m	{ <u>Grieg</u> 1909, p.35, Plate, Figs. 9a, b as " <u>R.palpebrosa</u> ". (Fram Expedition). From Gaasefjord also spawn (?).
"Gaasefjord" (Greenland?)	- -	6-40 m	

(Table continued)

Murman coast**	ca. 68°N 25°E	-	<u>Herzenstein</u> 1885, p. 714 (because Russian?)	
Barents Sea**	ca. 68°N 35°E	-	<u>Friele</u> (after <u>Grieg</u> 1907, p.540); <u>Joubin</u> 1902, p.130/133 as " <u>Rossia glaucopis</u> "	
Off Iceland*	ca. 65°N 35°W	-	{ <u>Joubin</u> 1902, p. 128/130 as " <u>Rossia sublevis</u> ", p. 133 as " <u>Rossia glaucopis</u> "	
Iceland, S coast*	ca. 63°N 35°W	-		
Iceland, W coast ("Vestfirthir")	- -	-	<u>Bartharson</u> 1920, p.112, 113, 122 as " <u>Rossia glaucopis</u> " and " <u>Rossia palpebroza</u> "	
Off W Norway (incl. Trondheimfjord)	from 66-62°N 14-5°E	-	<u>G.O. Sars</u> 1878, p. 337 (loc. cit.); <u>Lönnberg</u> 1891, p.13; <u>Steenstrup</u> 1900, p.296, Fig. 4 (p.292); Fig. 17, 19 (spawn); <u>Nordgard</u> 1922, p.10	
Faeroe Channel	ca. 61° 30' N 5° W	620 m	{ <u>Hoyle</u> (after <u>Pfeffer</u> 1908, p.40); <u>Jeffreys</u> 1869, p. 134 (as " <u>Rossia papillifera</u> " from the "Porcupine"); <u>Russell</u> 1909, p. 454; 1921, p.23/24 from the "Goldseeker". - <u>Hoyle</u> stated "Faeroe Channel"; <u>Jeffreys</u> gave "61°10'N, 2°21'W"; the other positions are quoted from <u>Russell</u> (1922, p.24). For <u>Russell's</u> sites in the North Sea see p. 21.	
NW of Shetland Islands	61°39'N 4°45'W	160		
N of Shetland Islands	61°10'N 2°21'W	to		
Faeroe Channel	61°49'N 5°36'W	525 m		
" (13.6.08)	60°57'N 5°47'W	324 m		
" (10.8.07)	60°28'N 3°15'W	237 m		
" (28.8.06)	60°26'N 4°2'W	270 m		
etc.				
Kinnaird Deeps (20.7.07)	- -	200 m	<u>Russell</u> 1922, p. 24.	
SW Norway	Bergensfjord	- -	-	
	Sognefjord, Kraskøskallen		180-270 m	
	Baardshaug, Selbjørnsfjord	ca. 61°N 5° E	220 m	{ <u>Grieg</u> 1897, p. 23.
	Hjeltsfjord		100-120 m	
	Moldefjord, Tresfjord, Søkken	- -	-	<u>Arndt</u> 1913, p. 21/22 as " <u>R. palpebroza</u> " (probably <u>R. glaucopis</u> )
Hardangerfjord	- -	200-600 m	<u>Grieg</u> 1914, p. 94 ("Djølsvik, Djupevik, Straumestein")	
S Norway (Oslofjord)	{ 59°N 10°30' E	-	{ <u>G.O. Sars</u> 1878, p. 338 (after M.Sars)	
" *	{ 58°N 5° E	-		
E and S of Newfoundland**	{ ca. 50°N 65/75°E and more southward	-	{ <u>Verrill</u> 1880, p. 291 (as " <u>Rossia sublevis</u> " and " <u>Rossia hyatti</u> ")	

Regarding the other discovery sites, refer to p. 21 (previous proofs from the North Sea).

\* Translator's note: Several of the geographical names and/or positions in this table are inaccurate (marked \*); a few very much so (marked \*\* - placing these squids on dry land, e.g. Kazakhstan!)

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by Berry (Bull. Bur. Fish., Vol. XXX, 1912, p. 290, Plates XLI, XLII, XLIII, Figs. 1/4, XLIV, Figs. 1, 5) and Sasaki (Ann. Zool. Jap., Vol. VIII, 1914, p. 598) may be identical with R. glaucopsis. I think this is particularly likely in the case of R. (Allorossia) mollicella Sasaki (Proc. U.S. Nat. Mus., Vol. LVII, 1920, p.189/190, Plate XXV, Fig. 1). Yet for the time being, this question will have to remain unanswered until further diagnoses and better pictures are in hand.

(Distribution of *Rossia glaucopsis* Lov. - see pp. 4a, 4b.)

Observations to the specimens at hand

1. SW edge of the Norwegian Trough,  $57^{\circ}40\frac{1}{2}'N$ ,  $5^{\circ}17'E$ ,  $\frac{1}{2}$  nm N to  $57^{\circ}41'N$ ,  $5^{\circ}18'E$ ; 103 m; mud; 4:15 PM. - Poseidon, 12 July 1904. Log No. 34; shrimp trawl. - In the material of the Biological Station (B.A.) - One poorly preserved female (?) specimen of about 12 mm ventral mantle length. Log extract: "(unreadable, probably: Sepiola) and Sepiola eggs".
2. SW of Cape Lindesnes (between West Bank and Jubilee Bank),  $57^{\circ}32\frac{1}{2}'N$ ,  $6^{\circ}35'E$ , 1 nm WNW to  $57^{\circ}32\frac{1}{2}'N$ ,  $6^{\circ}33'E$ ; 148 m; mud; 9:25 - 9:45 PM. - Poseidon, 13 July 1904, Log No. 49; shrimp trawl. - In the material of the B.A. - One well-preserved mature male of 38 mm ventral mantels length. Log extract: "Sepiola (large)".
3. Between Fladengrund (Flat Depression) and Ling Bank,  $58^{\circ}2'N$ ,  $1^{\circ}38'E$ ,  $\frac{1}{2}$  nm NNW to  $58^{\circ}2\frac{1}{2}'N$ ,  $1^{\circ}37'E$ ; 93 m; grey sandy mud;

after 8 PM. - Poseidon, 4 March 1905, Log No. 32; Heligoland trawl; - In the material of the B.A. - One well-preserved almost mature male of 31 mm ventral mantle length. Log extract: "One Sepiola".

4. NNW by N of the Shetland Islands (edge of Faeroe Channel), 61°18'N, 1°12'W,  $\frac{1}{2}$  nm SW by  $W\frac{1}{2}W$ ; 197 m; coarse sand with silt and small stones; 6:30 - 6:45 PM. - Poseidon, 6 March 1905, Log No. 56, Heligoland trawl. - In the material of the B.A. - One well-preserved mature female of 29 mm ventral mantle length. Log extract: "2 Sepiola" (only 1 left).

5. Between Bressa Shoal and Shetlands (40 nm SE from the harbour entrance of Lerwick), 59°54'N, 0°10'E,  $\frac{1}{2}$  nm SSE by E to 59°53 $\frac{1}{2}$ 'N, 0°11'E; 117 m; grey sand; 5:30 - 5:45 PM. - Poseidon, 9 March 1905, Log No. 68; Heligoland trawl. - In the material of the B.A. - One well-preserved mature female of 34 mm ventral mantle length. Lot extract: "Sepiola".

Note: In view of the similar position, season, etc., it is very likely that the specimen entered in the log as "Sepiola", but which I could not examine, also belongs to this species.

6. Between Ling Bank and Viking Bank, 59°26'N, 2°55'E,  $\frac{1}{2}$  nm SW to 59°25 $\frac{1}{2}$ 'N, 2°54 $\frac{1}{2}$ 'E; 128/125 m; 10:40 to 11:00 AM. - Poseidon, 10 March 1905, Log No. 77; Heligoland trawl. - On the other hand, I now have again:

7. Due W of Bressa Shoal (latitude Haugesund - North Orkneys),  
59°23'N, 0°28'E; 132 m. - Poseidon, 23 June 1914, Log No. 21;  
herring trawl. - In the material of the B.A. - One mature  
female of 36 mm ventral mantle length. Log extract: "One  
Rossia glaucopsis Lovén, female, with spermatophores attached  
above the eye" (Hagmeier).

Note: Apparently this specimen was surprised by the net when  
in the act of copulation; this would perhaps explain the strange  
attachment of the spermatophores above the eye (cf. Racovitza  
1894, p. 532, 1894B, p. 723; Hoyle 1888, p. 768, and this paper,  
p.00).

8. W edge of West Bank (N between Great and Small Fisher Bank),  
57°29'N, 5°27'E; 86 m; sand with small stones; 7:10 - 7:30 PM.  
- Poseidon, 22 April 1920, Log No. 140; prawn trawl. - In the  
material of the B.A. - One adolescent female of 25 mm ventral  
mantle length. Other measurements: fin 8 mm wide, 12 mm at the  
base.

Moreover, eggs from this species were found at several locations  
and at different times. As has already been made known by G.O. Sars  
(1878, p.338, Plate XXXII, Figs. 12/13), Becher (1882, p.81), Appellöf  
(1892, p.7; 1892B, p. 11/12), Grieg (1907, p. 539, 588; 1914, p. 94),  
Aurivillius (1898B, p. 47), and Russell (1909, p. 454), eggs of the  
Rossia species are preferably deposited in sponges (species Pheronema,  
Thenea, Chalina, and Mycale) (cf. p. 26). What the above authors have

determined for R. glaucopis, others have proven for R. macrosoma (Lönnerberg 1891, p. 17), R. mülleri (e.g. Becher, loc. cit., and Krause 1892, p.372, though falsely identified as R. glaucopis), and R. caroli (Massy 1909, p. 21; cf. above, p.21). Like Lönnerberg, I have also been able to ascertain this behaviour for R. macrosoma, although it does not seem to be the rule with that species; at least Steenstrup's (1849, 1850, 1900) and Jatta's (1896, p.139) observations state nothing on the subject. However, the latter has proven similar behaviour in Sepia orbiguyana (not "elegans", as he says; cf. Naef, 1916B, p. 18) (loc. cit., p. 164, Plate VIII, Fig.8), and Viallanes (1891, p. 114/115) has done the same for another Sepia species. The eggs described by Appellöf (1892B, p. 12) hardly belong to Rossia.

I have seen R. glaucopis spawn from the following positions of "Poseidon" voyages:

1. E of the Shetlands (approx. 60 nm E of Lerwick), 60°3'N, 0°1'E; 132 m; sand; 9 - 9:15 PM. - Poseidon, 19 June 1914; Log No. 14; herring trawl. - In the material of the B.A. - Two eggs with well-developed embryos (preserved in alcohol - glacial acetic acid). Log extract: "Embryos of Rossia glaucopis, in sponge" (Hagmeier).
2. Due W of Bressa Shoal, 59°23'N, 0°28'E; 130/132 m; - Poseidon, 23 June 1914, Log No. 21; herring trawl. - In the material of the B.A. - One smallish portion of spawn (about 9 eggs) with rests of sponge (of the species Mycale lingua Bwbk., as Prof. Hentschel of Hamburg kindly informed me).

Note: The embryos are mostly half-developed, i.e. the yolk supply has been used up about halfway. Some have hatched, or have been artificially removed from the capsule, without the yolk sac. Ventral mantle length of an embryo: 6.0 mm (cf. Russell 1909, p. 454, who gives 6 - 7 mm length). By virtue of having two definite rows of suction cups on their arms, embryos of R. glaucopis can be distinguished even at an early stage from those of R. macrosoma (cf. Steenstrup 1900, p. 296, Figs. 16/19). Log extract: "Small cephalopods in the sponges, R. glaucopis" (Hagmeier).

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3. N-Fladengrund, 58°8'N, 0°45'E; 152 m. - Poseidon, 24 June 1914, Log No. 25; herring trawl. - In the material of the B.A. - A large portion of spawn with embryos in various stages of development (Plate-Fig.6).

Note: Diameter of eggs, inclusive capsules: 7 mm. - The most advanced embryos, already without a yolk sac, can be easily identified under the magnifying glass as belonging to R. glaucopis. Since it is unlikely that eggs of R. glaucopis and R. macrosoma were deposited in one and the same sponge, I assume that the barely developed or only half-developed embryos belong to the former as well. Another important difference between the deposits of the two species is that the somewhat larger eggs of R. macrosoma in the material available to me were always considerably darker (brownish-purple; see Jatta 1896, Plate VIII, Fig. 4) than those

of glaucopis (whitish-yellow) (cf. p. 26; also Russell 1922, p.23, and Massy 1909, p.21; the spawn she mentioned probably belongs to the closest R. glaucopis relative, R. caroli, certainly not to R. macrosoma. The sponge is given as Pheronema grayi).

However, it is quite conceivable that the colour of the sponge or of the sea floor has an effect on the colouration of the eggs.

- It should also be mentioned that the arms of R. glaucopis embryos are substantially longer than those of R. macrosoma embryos; the suction cups on the arms are almost twice as big on the former, too. - This catch is not recorded in the log.

4. SW edge of the Norwegian Trough, 57°51.8'N, 5°23'E to 57°50'N, 5°32'E;  
114/125 m; - ; 11:00 AM to 3:00 PM. - Poseidon, 22 April 1920,  
Log No. 130; large trawl with double cod end. - In the material  
of the B.A. - A fairly large portion of spawn with embryos.

Note: Copy of my report: "Definite<sup>ly</sup> identifiable as R. glaucopis on account of the partly well advanced embryos, on whose arms there are two rows of suction cups up to the tips. It is strange that just-cleaved eggs and still quite young embryos with big bean-shaped yolk sacs were found right next to almost completely developed animals; some of the eggs even appeared to be unfertilized." These approx. 80 eggs are perfectly preserved in mercuric chloride.

Ventral mantle length of the biggest embryo: 6.8 mm

Total length of the same one (without tentacles) 14.0 mm.

Following the observations of the material I have at hand, I want to deal briefly with the reasons why R. glaucopis and R. macrosoma, too, with which I will deal afterwards - have been described under so many different synonyms and have been mixed up so often. Pfeffer, in 1908, was the first to bring order into the confusion. Probably rightly, he has recognized the existence of only three northern Rossia species, namely: R. mülleri Stp., R. glaucopis Lov., and R. macrosoma Ch. - Pfeffer assumes as main reason for the uncertainty in identifying that the manner of preservation obliterates the typical arrangement of the suction cups; two rows can easily appear to be four rows and vice versa. To distinguish between species, criteria were frequently used which appear totally unsuitable for that, such as size of fin, length of tentacles, or shape of mantle (refer here especially to: Grieg 1909, p. 35/36). Of course, all these also depend on the type of preservation; moreover, they can vary considerably from one specimen to another. As well taken as Pfeffer's points may be, they alone, in my view, cannot be blamed for all the confusion. Rather, I would be inclined to think that, apart from the above reasons, several others are also responsible. First, it should be emphasized that the Rossia species, usually distributed over a very wide region, can certainly be subdivided into a number of local varieties, which can surely be distinguished by some small characteristics. Steenstrup has convincingly shown this to be so in 1900 (p. 292 seq, Figs. 1/6). Yet these forms gradually merge into each other, so that sharp border lines cannot be drawn. Despite Pfeffer's clarification,

I was at first tempted to assign one of my glaucopis specimens (No. 2) to "R. sublevis"; I refrained from doing so, because all other individuals, even those from almost the same location and season, clearly exhibited the characteristics of the typical species. It should also be mentioned that the spawn of the East Atlantic glaucopis form differs from that of its West Atlantic counterpart, inasmuch as the young hatching in Greelandic waters are said to be only half as large as those along the Norwegian coast (according to Steenstrup 1900, p. 296, Figs. 18, 19). Much the same holds for R. macrosoma. Ball (cf. p. 25) has designated a separate species (R. oweni) for the North European individuals of this form originally only known from the Mediterranean. This is probably not justified; however, I cannot deny that all northern macrosoma-specimens I have seen, taken as a whole, left a somewhat different impression on me than the smaller Mediterranean specimens, of which I also had a rather large number available. Even if this may only be an intuitive feeling, I can say that others had the same impression I had. I need only remind you of Steenstrup and the case of his Loligo breviceps (see below); but examples could also be cited for Rossia, the very Steenstrup 1900, among others.

8. Rossia macrosoma Ch.

Fig. 8

- Sepioida macrosoma Delle Chiaje 1829, tab. LXXI, et auctorum;  
Rossia oweni 1855, p. XCVI-XCVII;  
Rossia macrosoma Orbiguy 1839, p. 215, tab. IV, fig. 13/24; et auctorum;  
    oweni Ball 1842, p. 192, et auctorum;  
    jacobi Ball 1842, p. 193, et auctorum;  
    panzeri Tarabion-Torzetti 1869, p. 46, tab. VII, fig. 7 (3);  
    megapota Verriani 1881, p. 319, tab. XXXVIII, fig. 1, XLVI, fig. 6 (for Pfeiffer 1908, p. 43);  
    macrosoma Pfeiffer 1908, p. 43, fig. 38/43;  
    -- Naef 1916 B, p. 16; 1921, p. 388;  
    -- Grimpe 1921, p. 299;  
    -- Nordgard 1922, p. 710.

R. macrosoma is most interesting because of its unusual geographical distribution and bathymetric limitation. We will come back to these later, but we want to mention at this point already that this widely distributed species was first described from the Mediterranean. Since we have accepted Pfeffer's opinion that the West European Rossias with four rows of suction cups arranged on their arms belong to one and the same species, namely R. macrosoma, we can state that

it is distributed from the Mediterranean and the Atlantic coast up to Scandinavia. But it does not advance through the English Channel to the North, but goes around the outer English coast. This form has therefore about the same distribution pattern in the North Sea as its arctic relative R. glaucopsis, i.e. it is only found in the northern and central part of that Sea. Thus it is missing in the following regions: 1) off the Dutch coast, 2) off the Belgian coast, 3) in the western Baltic Sea, 4) in the German Bight, and 5) off the western Danish coast. On the other hand, reliable proof is recorded from the following areas (cf. map, Fig. 8):

1. English NE coast, etc: Jeffreys 1869 (after Tesch 1908, p. 19; "Aberdeen"); Hoyle 1888, p. 768 ("Granton", due NW of Edinburgh); Norman 1890, p. 469/470 ("Minch", channel between Scotland and the Hebrides);

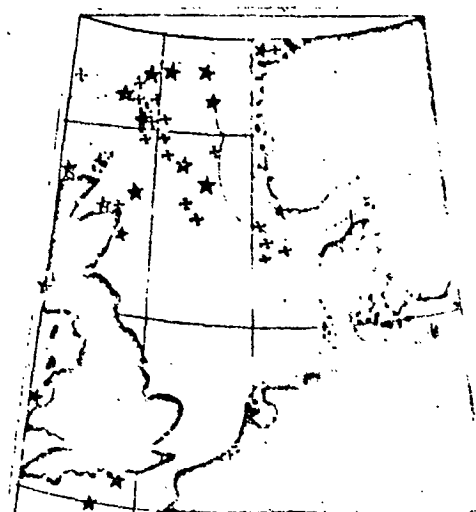


Fig. 8

Distribution of Rossia species

Stars : R. macrosoma  
Crosses: R. glaucopsis

"Butt Lewis", N tip of 'Rossshire, the northern Hebride island' (sic), after Hoyle); Joubin 1902, p. 118/120 ("Scotland"); Russell 1909, p. 446 ("North Scotland"); 1922, p. 21/22 ("Dunbeath Head", 57°52'N, 2°54'W, etc.).

2. Swedish coast, Skagerrak and Kattegat: Lovén 1845, p. 121 (as R. oweni, "Bohuslän"); Steenstrup 1849, p. 956; 1850, p. 192 (as R. oweni, "N coast of Sealand"; also eggs); 1884 in Collin, p. 145/146 ("Limfjord"); 1900, p. 295/296, Fig. 16 ("Kattegat", also eggs); Posselt 1889, p. 141/142 (as R. oweni, "Hornback", "Eastern Kattegat" /Tistlarne NNE  $\frac{1}{2}$ E, 24 nm, 51 m/"); eggs from: "Klaser", "Gilleleje /Southern Kattegat/"; Lönnberg 1891, p. 17 (as R. oweni, "Kosterrånnen", "Gullmaren", "Strömstad", "Halsö" - all Bohuslän coast; eggs from "Kosterrånnen", "Sucholmarne", "Väderöarne").
3. "North Sea" without further description of discovery site: Pfeffer 1908, p. 43; also gives a summary of all occurrences recorded until 1906; more recent proofs: Massy 1909, p. 19 ("Ireland"); Naef 1916B, p. 16 ("Naples" - sic). Norwegian finds were compiled by Nordgard 1922, p. 7 seq.

In view of the finds made so far, one would think this species exists only along the coast. But the voyages of the "Poseidon" have shown that its distribution extends right across the northern North Sea from Pentland Firth towards the Skagerrak, in the same manner as R. glaucopis.

Observations to the specimens at hand

1. NW of the Viking Bank, 61°1'N, 2°17'E, 7 nm NE $\frac{1}{4}$ N and 2.5 nm N by W $\frac{3}{4}$ W to 61°10'N, 2°20 $\frac{1}{2}$ 'E; 130 - 150 - 190 - 215 m; -; 4:35 - 8:00 AM. -

Poseidon, 22 June 1905, Log No. 36; large trawl 90'. - In the material of the B.A. - Log extract: "One big Sepiola, preserved", one mature female of 46 mm ventral mantle length. Other measurements: length of fin at the base: 26 mm, width of fin: 20 mm, length of arms: I. 40 mm, II. 49 mm, III. 55 mm, IV. 48 mm; tentacle: 64 mm.

Note: This specimen had already been identified correctly by Wülker. Spermatophores were found at the Döring fold.

2. NNE of the Shetlands (200 m edge of the Faeroe Channel), 61°29'N, 0°13'E, 10 nm N $\frac{3}{4}$ W to 61°30'N, 0°8'W; 190 m; fine grey sand; 4:00 - 8:00 AM. - Poseidon, 23 June 1905, Log No. 48; large trawl 90'. - In the material of the B.A. - Log extract: "Sepiola". One mature male specimen of 37.8 mm ventral mantle length. Other measurements: length of fin at the base: 22.5 mm; width of fin: 15.5 mm; length of arms: I. 42.5 mm, II. 45 mm, III. 50 mm, IV. 45 mm; tentacle: 47 mm (much contracted).

/26

Note: This specimen had also been correctly identified by Wülker earlier.

3. NNW of the Viking Bank, 61°10'N, 2°20 $\frac{1}{2}$ 'E, 1 nm S by E $\frac{3}{4}$ E to 61°09'N, 2°21'E; 215 - 182 m; -; 9:45 - 10:05 AM. - Poseidon, 22 June 1905, Log No. 37; Heligoland trawl, 600 m rope. - In the material of the B.A. - Log extract: "Several Sepiola". One mature female of 44 mm ventral mantle length. Other measurements: length of fin at the base: 20.5 mm; width of fin 14.5 mm; width of head between the eyes: 32 mm, length of arms: I. 28 mm, II. 39 mm, III. 41 mm, IV. 36 mm; tentacle: 90 mm (far extended).

Note: In contrast to the above, this specimen is rather poorly preserved. This may explain the somewhat astonishing measurements, especially in comparison to No. 1. The body of No. 3 is conspicuously stretched, and the tentacles are very elongated.

The arms, however, seem to have suffered little from preservation. If we recalculate the ventral mantle length of No. 3 according to the ratio of the length of arms and fins to the length of the ventral mantle of No. 1, we obtain approx. 34 mm.

4. Same location. - Poseidon, 22 June 1905, Log No. 37. - In the material of the B.A. - One female of 19.5 mm ventral mantle length. Other measurements: length of fin at the base: 9.3 mm, width of fin: 7.0 mm, width of head above eyes: 15.2 mm; length of arms: I. 15.0 mm, II. 18.5 mm, III. 20.5 mm, IV. 18.0 mm; tentacle: 35.0 mm (much extended). - Better preserved than No. 3.
  
5. NW of the Ling Bank, 58°35'N, 2°12'E, 1 nm N by W to 58°36'N, 2°11'E; 99 m; -; 8:50 - 9:10 AM. - Poseidon, 20 June 1905, Log No. 16; Heligoland trawl. - In the material of the B.A. - Journal extract: "Sepiola". - One male of approx. 38 mm ventral mantle length. - Very poorly preserved.
  
6. NW of the Shetlands (edge of Faeroe Channel), 61°21½'N, 1°24'W, ½ nm SSW to 61°20½'N, 1°24'W; 278 m; 11:00 - 11:12 PM. - Poseidon, 23 June 1905, Log No. 60; Heligoland trawl. - In the material of the B.A. - Log extract: "Sepiola (Rossia?)". - One female of approx. 40 mm ventral mantle length.  

Note: This specimen, too, is only poorly preserved, so that exact dimensions cannot be given. But there can be no doubt about the accuracy of the determination of Nos. 5 and 6; certainly they are not R. glaucopis.
  
7. Moray Firth outer shelf (halfway between Fladengrund and Orkneys), 58°31½'N, 1°18'W, 1 nm SSW to 58°30½'N, 1°18'W; 113 m; fine grey sand with mud; 9:10 - 9:35 AM. - Poseidon, 28 June 1905, Log No. 91;

Heligoland trawl. - In the material of the B.A. - Log extract:  
"Sepiola". - One female of 41 mm ventral mantle length.

Note: This well-preserved specimen exhibits on the left side of the funnel and halfway under the eye a packet of spermatophores which protrudes with half of its length from the mantle cavity. Since egg deposition had apparently not begun yet, we assume that this specimen was caught by the net during copulation. Unfortunately, the corresponding male is missing.

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Apart from these finds of mature animals, we also have spawn of this species from the following locations of the "Poseidon":

1. SE of Bressa Shoal, 59°05'N, 1°04'(E), 6 nm W to 59°02'N, 0°45'E;  
121 - 110 m; muddy floor; 5:15 - 8:20 PM. - Poseidon, 20 June 1905, Log No. 23; large trawl 90'. - In the material of the B.A. - Log extract: "Spawn of cephalopods in sponge" - One fairly large portion of spawn in the sponge Mycale lingua BWbck.

Notes: We can easily determine that this grey to brownish-purple deposit can only be one of R. macrosoma by the fact that on the (perfectly preserved) embryos the number of sucker rows on the distal 5/6 of all arms is 4 (cf. Nordgard 1922, Figs. 1/4). The diameter of an egg is 7.8 mm, only slightly less than that of an Sepia officinalis egg in size. Usually, several eggs are deposited close together, firmly glued and matted to each other, so that the areas of mutual contact flatten to polyhedra (also refer to the excellent Figs. 16, 16' in Steenstrup 1900). It should also be mentioned that each egg bears a short conical process, such as is commonly known in the eggs of Sepia officinalis and of Sepiolidae (refer also to Jatta 1896, Plate VIII, Fig. 4). This process is not a stem; it is formed on encapsulating the egg, and can perhaps best be compared with the projection that remains after

sealing an electric incandescent bulb. - Steenstrup (loc. cit., Fig. 16) has already reported on how the individual eggs are attached to each other and to the sponge; they put up considerable resistance to being separated. They are just as matted in the mesh of the sponge tissue, which tears every time when attempting to remove an egg from it by force. So far it has been recorded only once, by Lönnberg (1891, p. 17) that R. macrosoma, too - at least occasionally - deposits its eggs in sponges (and in the same species that R. glaucopis uses). Steenstrup mentions (1900, p. 295) that he has found <sup>them</sup> ✓ in great packets on empty shells of Cyprina islandica, and Jatta (1896, p. 139) and Lo Bianco (1909, p. 654) write that R. macrosoma eggs were usually found deposited on branches of coral (Isidella elongata Esp.) brought up from fairly great depths, and on occasion also on the pane of the aquarium. Nordgard (1922, p. 11) writes: "fixed to things on hard bottom" (sic: quoted in English). The spawn portion, which will be discussed below, was also deposited in a vacant Cyprina shell. - The eggs mentioned by Appellöf (1892/93, p. 12), however, hardly belong to R. macrosoma, but those shown by Nordgard (1922, p. 8) do.

Most of the embryos are completely developed, some have just hatched. In the youngest ones the yolk sac is visible only as a small roundish bag deep between the arms (cf. Steenstrup 1900, Fig. 16", 16'", 16''"). The embryo is positioned highly curved in the egg and is strikingly large. A specimen just hatched has a total length of approx. 12 mm; approx. 6 mm of that make up the mantle. The arms are thus relatively short (as opposed to the embryos of R. glaucopis).

2. Moray Firth (halfway between Banff and Wick), 58°N, 2°30'W, 4 nm NW to 58°3'N, 2°36'W; 75 to 47 m; rough floor; 3:45 - 5:15 PM. - Poseidon, 16 Sept. 1909, Log No. 41; large trawl. - In the North Sea Museum on Heligoland. - One large portion<sup>of</sup> spawn, consisting

of about 40 to 50 eggs, deposited onto an empty bivalve shell.

Note: These eggs are conspicuously far behind in their development, so that we cannot determine the species to which they belong by organization characteristics. But I do not hesitate to assign them to R. macrosoma, because of their dark colour, their pronounced polyhedral contact surfaces, and the manner of their mutual matting. The diameter of one egg is 9 mm, i.e. more than 1 mm larger than in the spawn dealt with above. But that is not astonishing, as experience with all cephalopod eggs shows that they are bigger soon after being laid than later.

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It is worth special mentioning that, apart from the above finds of spawn, the only R. macrosoma available in the material of the Biological Station dates from June 1905. It is puzzling why this species was not caught again in later years.

I should mention as an appendix that I also had the third European Rossia species, R. mülleri Stp., available from the B.A. material, It was a fully mature female specimen of 33 mm ventral mantle length which had been caught in August 1913 near Jan Mayen (i.e. approx. at 70° N, 8° W). This site is far outside our region where that species certainly does not exist.