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K. W. Petersen

**On some
Medusae from the North Atlantic**

**Papers from
The "Dana" Oceanographical Collection,
Nr. 48**

**Instituut voor Zeewetenschappelijk onderzoek
Institute for Marine Scientific Research
Prinses Elisabethlaan 69
8401 Bredene - Belgium - Tel. 059 / 80 37 15**

Reprinted from

Vidensk. Medd. fra Dansk naturh. Foren., bd. 119, 1957.

ON SOME MEDUSAE FROM THE NORTH ATLANTIC

(PAPERS FROM
THE "DANA" OCEANOGRAPHICAL COLLECTION, NR. 48)

By K. W. PETERSEN
(Zoological Museum, Copenhagen)

THE material dealt with in the present paper was collected by the research-vessel "Dana" belonging to the Danish Institute for Fisheries and Marine Research. My best thanks are due to the Director of this institution, Å. VEDEL TÅNING, D. Sc., for permitting me to work up this material.

I am very indebted to P. L. KRAMP, D. Sc., Zoological Museum, Copenhagen, for his most valuable help. Further, I am glad to acknowledge a grant from the foundation "Grev Moltkes Legat" which enabled me to cover the expenses of the work.

Mrs. A. Volsøe has kindly gone through the English text.

Sarsia princeps (Haeckel 1879).

Material:

- Dana st. 4228. 64°49' N. 37°59' W. 17-7-1931. S200, 15 m.w. 1 specimen, 7 mm high.
— st. 6703. 61°19' N. 41°30' W. 2-7-1947. S200, 100-50-25 m.w. 1 specimen, 12 mm high.
— st. 6704. 62°00' N. 41°07' W. 2-7-1947. S200, 100-50-25 m.w. 2 specimens, 4 and 17 mm high. S200, 200-150-125 m.w. 2 specimens, 10 and 12 mm high.
— st. 7236. 62°00' N. 41°30' W. 30-6-1950. S200, 100-50-25 m.w. 8 specimens, 4-11 mm high. S200, 200-150-125 m.w. 1 specimen, 11 mm high.
— st. 9784. 59°36',5 N. 43°44' W. 13-8-1955. S200, 200-150-125 m.w. 4 specimens, 6-9 mm high.

These localities are situated on the east coast of Greenland and off Cape Farewell, Greenland.

Sarsia princeps is of common occurrence along the coast of West-Greenland, but till now it has not been recorded from East-Greenland.

A re-examination of the specimens from d'Aunays Bay, East Greenland, recorded by KRAMP (1933) as *Sarsia tubulosa* shows, however, that these specimens have the characters typical of young *Sarsia princeps*. The size of the specimens indicates that the species is indigenous on the east coast, but it cannot be very common there, since it was only taken in a few of the hauls in this area, and only a small number of individuals were captured in each haul.

The specimen from st. 6703 is abnormal; in this specimen one tentacular bulb is large, two are medium-sized, and the bulb opposite to the large one is very small. All the bulbs are, however, provided with an ocellus, and both bulbs and tentacles have the structure typical of *Sarsia princeps*.

Sarsia tubulosa (M. Sars 1835).

Material:

- Dana st. 6694. 52°24' N. 42°24' W. 27-6-1947. S200, 100-50-25 m.w. 1 specimen, 6 mm high.
 — st. 6695. 52°48' N. 41°29' W. 28-6-1947. S200, 200-150-125 m.w. 3 specimens, 7-9 mm high.
 — st. 9290. 59°15' N. 43°02' W. 22-8-1954. S200, 100-50-25 m.w. 1 specimen, 15 mm high.

St. 9290 is off Cape Farewell, Greenland; st. 6694 and st. 6695 are in the Atlantic about 1000 km from the nearest coast, New Foundland or South Greenland. It was very surprising to find this neritic species in these off-shore localities; as will be shown below (p. 28), these specimens most probably originate from an offshoot of the Irminger Current.

Bougainwillia principis (Steenstrup 1850).

Material:

- Dana st. 9290. 59°15' N. 43°02' W. 22-8-1954. S200, 200-150-125 m.w. 8 specimens, 3-4 mm high.
 — st. 9669. 62°00' N. 10°20' W. 1-7-1955. S200, 200-150-125 m.w. 14 specimens, 6-10 mm high.
 — st. 9794. 54°05' N. 35°19' W. 15-8-1955. S200, 500-450-400-350 m.w. 1 specimen, 3 mm high. S200, 700-650-600-550 m.w. 1 specimen, 3 mm high.

These localities are situated west of the Faeroes, at Cape Farewell, Greenland and in the North Atlantic S.E. of Cape Farewell.

Since this species does not occur off North America, the specimens from st. 9794 must originate either from West Greenland or from the Irminger

Sea. The small size of the specimens makes it improbable that they can have been carried away from West Greenland via the Labrador Current and the North Atlantic Drift; it seems more probable that they were carried from Iceland to the southwest.

Halitholus cirratus Hartlaub 1914.

Material:

- Dana st. 9172. 62°06' N. 40°31' W. 5-7-1954. S200, 200-150-125 m.w. 2 specimens, 3 and 4 mm high.
 — st. 9292. 58°45' N. 42°14' W. 22-8-1954. S200, 200-150-125 m.w. 2 specimens, 5 and 6 mm high.
 — st. 9679. 62°04' N. 32°20' W. 5-7-1955. S200, 100-50-25 m.w. 10 specimens, c. 4-c. 6 mm high.

These localities are situated off South-East Greenland. *Halitholus cirratus* has not previously been recorded from East Greenland, but its arctic circumpolar distribution makes the find of this medusa in the waters of the East Greenland Current quite natural.

Catablema vesicarium (A. Agassiz 1862).

Material:

- Dana st. 9784. 59°36',5 N. 43°44' W. 13-8-1955. S200, 200-150-125 m.w. 1 specimen, 8 mm high.

Leuckartiara brevicornis (Murbach and Shearer 1902).

Material:

- Dana st. 9669. 62°00' N. 10°20' W. 1-7-1955. S200, 100-50-25 m.w. 2 specimens, 26 and 28 mm high.

Leuckartiara nobilis Hartlaub 1914.

Material:

- Dana st. 6691. 51°00' N. 44°20' W. 27-6-1947. S200, 200 m.w. 1 specimen, c. 11 mm high.
 — st. 9156. 62°00' N. 13°05' W. 30-6-1954. S200, 200-150-125 m.w. 1 specimen, 26 mm high.
 — st. 9669. 62°00' N. 10°20' W. 1-7-1955. S200, 100-50-25 m.w. 1 specimen, c. 21 mm high.
 — st. 9677. 62°01' N. 28°00' W. 5-7-1955. S200, 200-150-125 m.w. 1 specimen, c. 20 mm high.

The localities are situated to the south of Iceland, between Iceland and Greenland and in the Atlantic about 1000 km from both New Foundland and South Greenland.

This species has previously been recorded from the area west of Scotland, Rockall, and to the south of Iceland; further, FROST (1937) records it from a single locality at New Foundland, and KRAMP (1947) found it in two localities in the Atlantic midway between New Foundland and the English Channel. As *Leuckartiara nobilis* in this latter locality occurred together with southern species such as *Pelagia noctiluca*, *Rhopalonema velatum* and *Liriope tetraphylla*, KRAMP (1947 p. 62) suggests that *L. nobilis* may be an inhabitant of the American coastal waters, although it has never been found there, and though a large medusa like the present species could hardly escape notice if it occurred regularly along the American east coast.

The present record of *L. nobilis* at st. 6691 together with the occurrence of *Sarsia tubulosa* and *Halopsis ocellata* at st. 6690, 6694 and 6695, and the find of *Bougainwillia principis*, which does not occur off America, in this area in 1955, all in samples not containing any southern elements give another explanation, viz. that neritic Medusae are swiftly carried southwards by an offshoot of the Irminger Current; the medusae in this area cannot have been carried away by the Labrador Current, since *L. nobilis* is not found in the Davis Strait, and because the small size of *Sarsia tubulosa* and *Halopsis ocellata* speaks against this long transport.

The find of *L. nobilis* in a sample containing southern species as recorded by KRAMP (1947) is without doubt due to the mixing of the water masses flowing down from the north with the Gulf Stream water over the Grand Banks. The specimens of *L. nobilis* recorded from New Foundland by FROST (1937) were undoubtedly carried to the coast from the area over the Grand Banks by the coastal gyral on the left-hand side of the Gulf Stream (cf. p. 38).

Sarsia princeps has previously been recorded from this offshore area and from New Foundland, but this occurrence is probably due to a southward transport of this arctic species by the Labrador Current.

Neoturris pileata (O. F. M. 1775).

Material:

- Dana st. 9669. 62°00' N. 10°20' W. 1-7-1955. S200, 100-50-25 m.w. 15 specimens, 14-32 mm high. S200, 200-150-125 m.w. 9 specimens, 21-33 mm high.
- st. 9671. 62°03' N. 16°00' W. 2-7-1955. S200, 100-50-25 m.w. 1 specimen, c. 10 mm high.

Annatiara affinis (Hartlaub 1914).

Material:

Dana st. 9806. 50°55' N. 14°00' W. 21-8-1955. S200, 600-400 m.w. 1 specimen.

This species has previously been recorded from the area S.W. of the British Isles. The present specimen is 17 mm wide, 12 mm high; the tentacles have been lost, but the scars from the bulbs are clearly seen, indicating the presence of 32 large tentacles and an equal number of rudiments. The velum cannot be seen.

Pandeidae, gen. et spec. indeterminatum.

Material:

Dana st. 9290. 59°15' N. 43°02' W. 22-8-1954. S200, 100-50-25 m.w. S200, 200-150-125 m.w.

— st. 9683. 62°00' N. 39°00' W. 7-7-1955. S200, 100-50-25 m.w.

Calicopsys gara n.sp.

(Text-fig. 1).

Material:

Dana st. 6683. 50°53' N. 34°25' W. 23-6-1947. S200, 100-50-25 m.w. 2 specimens, 9 and 11 mm high.

The type-specimen, 11 mm high, is kept in the Zoological Museum, Copenhagen.

Diagnosis: *Calicopsys* with four to eight centripetal canals; with gonads in eight adradial rows of transverse folds, 16 in each row; with about 40 marginal tentacles.

Description of type-specimen: The umbrella is 11 mm high, 12 mm wide, with evenly rounded apex; jelly fairly thick. The bell is laterally compressed along two interradii. The manubrium is large, about $\frac{2}{3}$ bell cavity long, half as wide as long. The four short oral lips are simple and smooth. The gonads are developed in eight adradial rows of transverse folds, 16 folds in each row; a few of the folds have developed into irregular projecting lobes, an abnormality also known in *Calicopsys papillata* and in *C. typa*. The perradial edges of the stomach form longitudinal ridges which in their uppermost parts connect with the radial canals to form short funnels (= 'mesenteries') in which the four straight, fairly wide radial canals leave the stomach. The four centripetal canals are placed in the interradii; they are as wide as the radial canals, and all of them

join the base of the stomach. The bell margin is smooth, without protuberances, and the basal parts of the tentacles are not sunk into furrows in the jelly. The specimen has about 40 slender tentacles c. 30 mm long and five shorter, young tentacles; the basal part of all the tentacles are adnate to the exumbrella for about one mm above the ring canal. All the

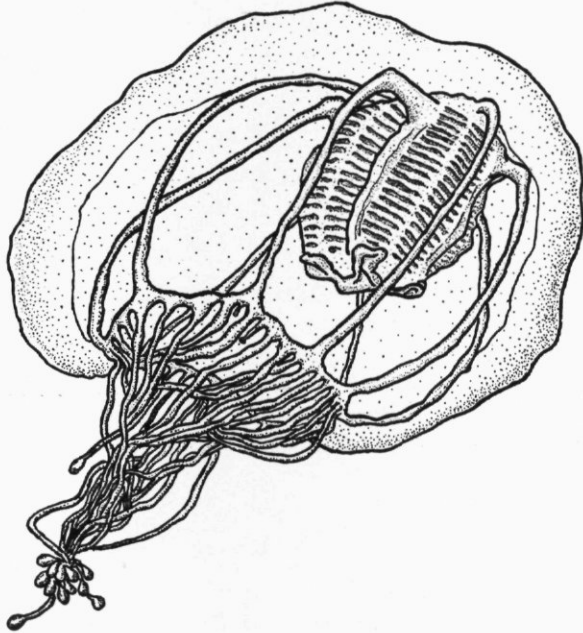


Fig. 1. *Calycopsis gara* n.sp.

tentacles terminate in a large, hollow dilatation provided with nematocysts; the distal part of this dilatation is evenly rounded, without the tenon-like prolongation found in *Calycopsis papillata* (KRAMP 1955 p.252).

The second specimen obtained is 9 mm high and 10 mm wide; the bell is laterally compressed along two interradia. This specimen has 40 large and 6 shorter, young tentacles. Each adradial row of gonads has 16 transverse folds. This specimen differs, however, from the type-specimen in having one interradial centripetal canal per quadrant in two quadrants, but one interradial and one adradial centripetal canal per quadrant in the two other quadrants; the two adradial centripetal canals, which end blindly near the base of the stomach, are in both quadrants placed to left of the interradial canals. The four interradial centripetal canals join the base of the stomach.

Colour in 4% formalin: stomach with gonads a faded orange; canals and tentacles whitish, terminal knobs of tentacles white.

Nematocysts: *Desmonemes*.

A great variation is found within the species of *Calycopsis*, so it is only after much consideration that I decided to describe a new species for the present two specimens. It is, however, impossible to refer them to any of the species previously described. Mature specimens of *Calycopsis borchgrevinki* (Browne) and *C. bigelowi* Vanhöffen, which are considerably larger than the present specimens, have four centripetal canals but only 8–16 tentacles. *C. simulans* (Bigelow) and *C. papillata* Bigelow, which may have at most 8 centripetal canals, have only 12 tentacles, and *C. nematophora* Bigelow with 12 centripetal canals has c. 10 large and a number of small, wart-like tentacles. The present specimens with 4 and 6 centripetal canals and more than 40 tentacles cannot be referred to any of these species.

Calycopsis typha Fewkes has when fully grown (about 35 mm high) 12–20 centripetal canals and 16–30 tentacles; as the development of the tentacles is closely correlated with the development of the centripetal canals, it is excluded that a specimen, 11 mm high with 4–6 centripetal canals and more than 40 tentacles, can belong to that species; further, the present specimens lack the deep apical depression characteristic of *C. typha*.

Calycopsis chuni Vanhöffen and *C. valdiviae* Hartlaub can be disregarded, as these very large species with numerous centripetal canals obtain at most 24 tentacles.

Calycopsis krampi n.sp.¹⁾

(Text-fig. 2–3).

Material:

Dana st. 9806. 50°55' N. 14°00' W. 21-8-1955. S200, 200–150–125 m.w. 1 specimen, 4 mm high.

The type-specimen is kept in the Zoological Museum, Copenhagen.

Diagnosis: *Calycopsis* with four interradial centripetal canals; with four interradial gonads with deep interradial longitudinal fold and a few transversal folds; with four marginal tentacles; with prominent adaxial projection at the base of each tentacle.

¹⁾ Named in honour of P. L. KRAMP, D.Sc., Copenhagen, in grateful recognition of the great help Dr. Kramp has given me.

Description: Umbrella 4 mm high, 3 mm wide, with evenly rounded apex. The jelly is very thick, also along the umbrella margin, where it is continued some way below the ring canal. The manubrium is large, about $\frac{3}{4}$ bell cavity long, nearly as wide as long. The mouth rim forms

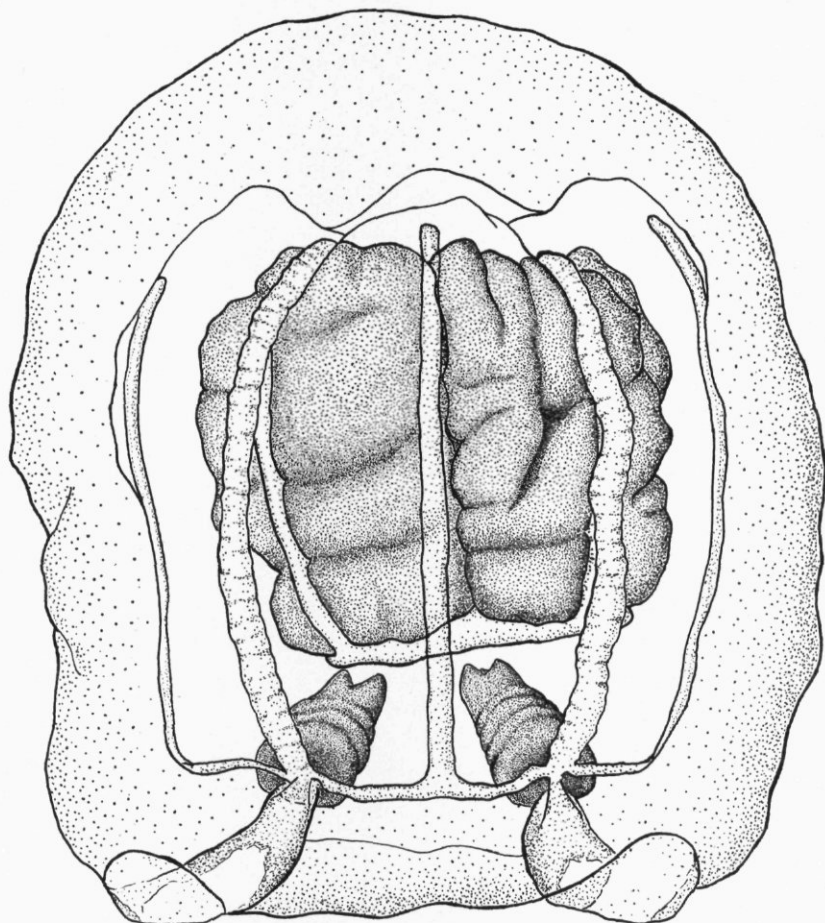


Fig. 2. *Calycopsis krampi* n.sp.

four perradial small and smooth lips. The four interradial gonads cover the surface of the manubrium right from its base to the lips; each gonad has a very deep interradial longitudinal fold and three to four irregular transversal folds; the gonads seem to be nearly mature. The perradial surfaces of the stomach wall form four prominent longitudinal ridges which separate the gonads; these ridges connect in their uppermost parts

with the radial canals to form very short funnels (= 'mesenteries'). The radial canals and the ring canal are fairly wide; the walls of the radial canals are transversally wrinkled owing to contraction of the bell. The specimen has four interradial centripetal canals which end blindly in some distance from the base of the stomach; the centripetal canals are a little narrower than the radial canals. The bell margin is smooth without any protuberances. On the margin are found the remnants of four large per-

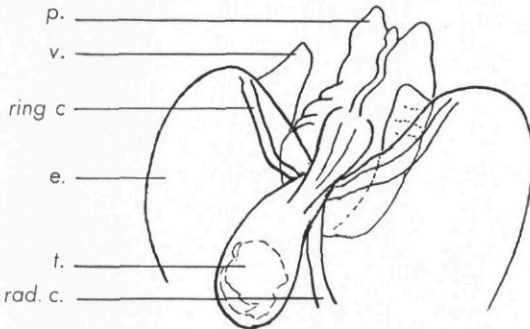


Fig. 3. *Calycopsis krampi* n.sp. Aboral view of adaxial projection. e = exumbrella; p = adaxial projection; rad.c. = radial canal; ring c. = ring-canal; t. = remnants of basal part of tentacle; v. = velum.

radial tentacles; only the basal parts of the tentacles, adnate to the exumbrella for some distance, are left; there are no traces of more tentacles to be developed. At the places where the radial canals join the ring canal four prominent adaxial projections are found, one in each perradius. The projection forms a direct adaxial continuation of the basal part of the tentacle attached to the exumbrella; the projection is about half the diameter of the bell opening long, at the base nearly half as broad as long, tapering a little outwards, drawn out into two 'papillae' at the tip. In cross-section the projection is nearly circular, the aboral surface is somewhat flattened and provided with a narrow longitudinal ridge. In the preserved specimen the projections point obliquely into the bell cavity with the moderately broad velum bent up over them, so that in the natural position the projections seem to point adaxial obliquely downwards.

Colour in 4% formalin: manubrium with gonads and the adaxial projections are whitish-yellow, the remnants of the tentacles are whitish. The walls of the radial canals are whitish, the walls of the centripetal canals and the ring canal more hyaline. The ectoderm of the subumbrella is milky.

This species differs by the structure of the gonads from all species of *Calycopsis* except *Calycopsis simplex* Kramp & Damas. The gonads are quite the same structure in these two species, but the two species differ in other essential respects. *C. simplex* has 8 marginal tentacles, and the jelly of the bell margin forms eight abaxial, conical gelatinous protuberances to which the marginal tentacles are adnate. *C. krampi* has four marginal tentacles; the bell margin is smooth without the gelatinous protuberances found in *C. simplex*; the peculiar adaxial projections from the tentacle-bases found in *C. krampi* are completely absent in *C. simplex*.

Tiaranna rotunda (Q. & G. 1827).

Material:

Dana st. 6674. 52°20' N. 27°30' W. 20-6-1947. E300, 1000 m.w. 1 specimen, diam. 21 mm.

This abyssal medusa, which is here recorded from the North Atlantic midway between New Foundland and the English Channel, has previously been recorded from 14 scattered localities in the Atlantic and in the antarctic part of the Indian Ocean. In the North Atlantic this abyssal species seems to be able to cross the Greenland-Iceland Ridge and the Wyville Thomson Ridge which otherwise forms a barrier for the deepsea medusae.

Chromatonema rubrum Fewkes 1882.

(Text-fig. 4).

Material:

Dana st. 6674. 52°20' N. 27°30' W. 20-6-1947. S200, 1000 (-2000) m.w. 1 specimen, c. 12 mm wide.

— st. 6699. 56°02',5 N. 38°43' W. 29/30-6-1947. S200, 1500 m.w. 1 specimen, 14 mm high, 16 mm wide.

— st. 9806. 50°55' N. 14°00' W. 21-8-1955. S200, 600-400 m.w. 1 specimen, 3 mm wide.

These localities between the Davis Strait and the English Channel are within the known area of distribution.

The specimen from st. 9806 S.W. of Ireland seems to be by far the smallest specimen of this species recorded. The jelly is fairly thin. The diameter of the bell is 3 mm; the height cannot be measured as the specimen was flattened in the plankton sample. The diameter of the stomach is about 1.5 mm. The perradial cross along which the manubrium is fixed to the subumbrella has wavy outlines. Gonads have not yet appeared,

but the proximal half of the radial canals give off about 8 short lateral diverticulæ to each side. The adradial walls in these diverticulæ are a little thickened, indicating that the gonads are beginning to develop there. The specimen has 12 marginal tentacles of equal size; between each pair of tentacles generally 3, between a few pairs of tentacles 2, 'cordyli'. One of the tentacles has 'picked up' a cordylus during its development, so that the distal part of the tentacle is distinctly club-shaped.

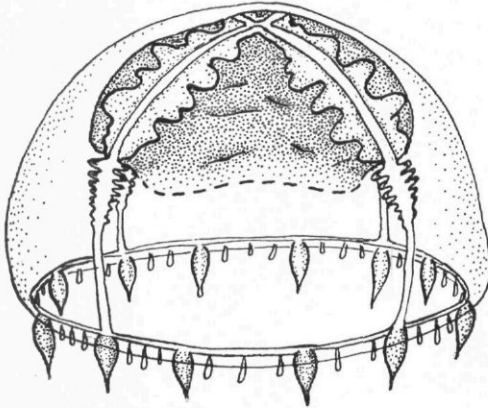


Fig. 4. *Chromatonema rubrum* Fewkes. Dana st. 9806. Diam. 3 mm.

RANSON (1936) and RUSSELL (1953) regard the gonads as pouches from the stomach; KRAMP (1919, 1920) considers, on the other hand, the gonadial pouches to be the proximal part of the radial canals. The development of the lateral diverticulæ from the radial canals in the present specimen supports Kramp's point of view.

Laodicea undulata (Forbes & Goodsir 1851).

Material:

- Dana st. 9156. 62°00' N. 13°05' W. 30-6-1954. S200, 100-50-25 m.w. 33 specimens, diam. 9-36 mm. S200, 200-150-125 m.w. 5 specimens, diam. 26-34 mm.
- st. 9158. 62°00' N. 18°45' W. 1-7-1954. S200, 200-150-125 m.w. 4 specimens, diam. 25-39 mm.
- st. 9290. 59°15' N. 43°02' W. 22-8-1954. S200, 100-50-25 m.w. 1 specimen, diam. 33 mm. S200, 200-150-125 m.w. 1 specimen, diam. 25 mm.
- st. 9669. 62°00' N. 10°20' W. 1-7-1955. S200, 100-50-25 m.w. 170 specimens, diam. 6-35 mm. S200, 200-150-125 m.w. 41 specimens, diam. 9-32 mm.

St. 9156, 9158 and st. 9669 are situated to the south of Iceland in an area where *Laodicea* is abundant. St. 9290 is at Cape Farewell, Greenland. This medusa was not previously recorded from Greenland; the size of the specimens does not allow any conclusion as to whether the species is indigenous there or whether the two specimens were carried from Iceland by the Irminger Current.

Staurophora mertensi (Brandt 1838).

Material:

Dana st. 9156. 62°00' N. 13°05' W. 30-6-1954. S200, 200-150-125 m.w. 1 specimen, diam. 40 mm.

Halopsis ocellata A. Agassiz 1863.

The list of material is given in *tab. I*. The localities are situated from the Faeroes to the east coast of Greenland and in the Atlantic about 1000 km to the south of Cape Farewell, Greenland.

Further, *Halopsis* is recorded in the Journal of the "DANA" from the stations listed below. From these stations no material was preserved; for st. 4224-4233 *Halopsis* is given in the journal as "*Medusa sp.*, 5-8 cm diam., 14-16 radial canals" etc., together with good drawings showing a typical *Halopsis* with well-developed gonads; from st. 4665 and onwards the Medusa is listed as "*Halopsis ocellata*". We can safely use these records, since no other medusa in the North Atlantic can be mistaken for *Halopsis*.

Dana st. 4224, 65°31' N, 31°59' W. - st. 4225, 65°17' N, 33°05' W. - st. 4230, 63°27' N, 39°38' W. - st. 4233, 63°13' N, 37°35' W. - st. 4665, 64°39' N, 38°07' W. - st. 4666, 64°12' N, 39°15' W. - st. 6193, 65°28' N, 30°52' W. - st. 6195, 65°25' N, 34°20' W. - st. 6196, 64°55' N, 35°32' W. - st. 6198, 65°10' N, 32°02' W. - st. 6915, 62°06' N, 41°10' W. - st. 6921, 60°40' N, 42°01' W. - st. 6922, 60°39' N, 41°53' W.

Halopsis ocellata is here recorded from East Greenland for the first time. The localities are situated from Angmagssalik to Cape Farewell; the species seems to be abundant along this coast where it was collected in a great number of the hauls, but the size of the specimens and the records all the way from Iceland to Greenland indicate that the species is not indigenous off East Greenland.

Halopsis was previously recorded from N.W. Europe, the south coast of Iceland, West Greenland south of the Island of Disko and from New

Table I.

Dana st.	Locality	Date	Number of specimens	Size (mm.)
4223*.....	65°33' N. 30°50' W.	16-7-31	2	21-39
4228**.....	64°49' N. 37°59' W.	17-7-31	5	20-30
6690 II.....	50°00' N. 43°29' W.	26-6-47	1	16
6694 II.....	52°24' N. 42°24' W.	27-6-47	2	25-30
6695 II.....	52°48' N. 41°29' W.	28-6-47	2	23-32
6703 I.....	61°19' N. 41°30' W.	2-7-47	3	7-25
6704 I.....	62°00' N. 41°07' W.	2-7-47	4	14-28
— II.....	—	—	2	15-26
6705 II.....	61°55' N. 40°47' W.	2-7-47	2	26-40
6706 I.....	61°55' N. 39°55' W.	2-7-47	1	20
— II.....	—	—	3	17-34
9156 I.....	62°00' N. 13°05' W.	30-6-54	1	38
9157 I.....	62°00' N. 16°00' W.	1-7-54	2	24-45
9158 I.....	62°00' N. 18°45' W.	1-7-54	2	22-23
— II.....	—	—	13	12-36
9168 II.....	62°00' N. 37°20' W.	4-7-54	1	18
9172 II.....	62°06' N. 40°31' W.	5-7-54	3	14-20
9290 I.....	59°15' N. 43°02' W.	22-8-54	2	25-37
— II.....	—	—	1	22
9669 II.....	62°00' N. 10°20' W.	1-7-55	1	?
9675 II.....	62°00' N. 25°10' W.	4-7-55	?	?
9677 II.....	62°01' N. 28°00' W.	5-7-55	1	17
9679 I.....	62°04' N. 32°20' W.	5-7-55	17	15-33
9784 II.....	59°36' N. 43°44' W.	13-8-55	2	15-30
9790 I.....	58°00' N. 41°03' W.	14-8-55	1	30

* = 65 m.w. ** = 250 m.w.

I = 100-50-25 m.w. II = 200-150-125 m. w.

England. Recently found by KRAMP (1957) at the Falkland Islands in the antiboreal region. It is a north-boreal species not penetrating into the arctic, presumably of neritic origin, derived from littoral hydroids. It is only found in the Gulf Stream and Irminger Current water and in the Atlantic water washing the south-west coast of Greenland. In accordance herewith *Halopsis* is not found on the north coast of Iceland, and it does not occur at Baffin Land, Labrador or New Foundland; it is only to the south of Grand Manan that this medusa is found on the American coast. Some connection between the north-western and the American populations can, however, be expected to exist since no morphological differentiation takes place.

As discussed p. 28 the specimens from st. 6690-6694-6695 were most probably carried to the southwest by an offshoot of the Irminger Current; over the Grand Banks where the water coming from the north mix with the Gulf Stream water, some of the medusae coming from the north may be caught by the counterclockwise gyral of slope- and coastal water on the left hand side of the Gulf Stream and carried south along the New England coast by this gyral. The life-time of *Halopsis* is long enough to allow this transport; the specimen from st. 6690, which is more than midway, is only 16 mm wide, and mature specimens of *Halopsis* are generally about 60-70 mm wide, so though the transport in the coastal gyral is probably slow, some specimens may be able to reach Grand Manan before becoming mature.

There is no evidence, and probably no possibility, of an exchange of specimens between the two populations in the opposite direction by the Gulf Stream.

Tiaropsis multicirrata (M. Sars 1835).

Material:

Dana st. 9686. 62°00' N. 41°10' W. 7-7-1955. S200, 200-150-125 m.w. 1 specimen, diam. 17 mm.

This station is very close to the ice belt off the coast of East Greenland, from where this species has not previously been recorded.

Tima flavilabris Eschscholtz 1829.

Material:

Dana st. 6681. 50°09' N. 32°19' W. 23-6-1947. S200, 100 m.w. 1 specimen, c. 45 mm wide.

— st. 6683. 50°53' N. 34°25' W. 23-6-1947. S200, 200 m.w. Fragments of 1 large and 2 small specimens. S200, 100-50-25 m.w. 1 specimen, c. 11 mm wide.

Description of the specimen from st. 6681: Umbrella of preserved specimen flat, about 45 mm wide; jelly fairly thick; velum narrow. The peduncle is conical, 13 mm long, the broad base is about half the bell diameter wide. The stomach is small, square, attached to the peduncle along the edges of a perradial cross, the aboral surface of the stomach forming four flat, triangular pouches between stomach and peduncle. The four perradial lips are large and pointed with much crenulated margins. The radial canals and the ring canal are narrow; the radial canals are slightly widened the first 2 mm above the stomach. Gonads are developed on the lateral sides of the radial canals leaving a narrow median line free

of gonads; the gonads reach from c. 1 mm above the ring canal to about 3 mm above the stomach; they are not fully developed, the subumbrellar parts are slightly wavy, the peduncular parts straight.

The specimen described is somewhat damaged; one quadrant is torn off, but is present in the sample; all details are, however, fairly well preserved. Only in one quadrant has it been possible to count the exact number of tentacles which is 15; in two other quadrants there are about 18 tentacles per quadrant; the total number thus was about 70. All the tentacles are of equal size. The tentacular bulbs are carrot-shaped with an adaxial muscular band. Between the adjacent marginal tentacles there are three marginal warts and four marginal vesicles. The marginal vesicles alternate with the warts; in *Tima bairdi* the marginal vesicles are placed on swellings close to the velum between the marginal warts; in *T. flavilabris* the vesicles are also placed on such swellings between the warts, but these swellings are much more weakly developed than in *T. bairdi*.

This specimen agrees in every respect with Tima flavilabris as described and figured by ESCHSCHOLTZ (1829).

One of the young specimens caught at st. 6683 is 11 mm wide; the bell is hemispherical with fairly thick jelly. The peduncle is small, about 1 mm long, 1.5 mm wide. The stomach is small, the lips very torn. The slightly waved gonads are only visible on the subumbrellar parts of the radial canals. The number of tentacles cannot be counted as the bell margin is torn, but from the position of the tentacles left the total number may be estimated at about 25-30.

Four species of *Tima* have been described from the Atlantic and the Mediterranean:

I. *Tima lucullana* (Delle Chiaie 1822).

Synonyms: *Dianaea lucullana* Delle Chiaie 1822 tab. 74; *Tima lucullana* Mayer 1910, in parte; *Tima flavilabris* Stiasny 1908; *Tima flavilabris* Neppi & Stiasny 1913; non *Geryonia pellucida* Will 1844; non *Irene pellucida* Haeckel 1879.

The *Dianaea lucullana* from Naples figured by DELLE CHIAIE 1822 table LXXIV is a *Tima* with about 40 tentacles with 7 marginal warts between each pair of tentacles.

In his "Das System der Medusen" HAECKEL quotes *Dianaea lucullana* as a synonym of his *Irene pellucida*. *Irene pellucida* Haeckel is, however, no *Tima* but *Eirene viridula* (Pér. & Les.).

MAYER (1910) described as *Tima lucullana* a medusa from Naples which he himself examined. Mayer's specimen has about 60 tentacles and 7

marginal warts between each pair of tentacles. A comparison of Mayer's description and figure with Delle Chiaie's original figure shows that the medusa Mayer described is identical with Delle Chiaie's *Dianaea lucullana*. In Mayer's description the number of marginal vesicles only must be wrong since this number is quoted from Haeckel's description of *Irene pellucida*. The synonyms given by Mayer are *Tima lucullana* except *Irene pellucida* Haeckel 1879 and *Geryonia pellucida* Will 1844 which both are *Eirene viridula* (Pér. & Les.).

STIASNY (1908) and NEPPI & STIASNY (1913) describe as *Tima flavilabris* some specimens of a *Tima* from Trieste which belong to the same species as Mayer's *Tima lucullana* from Naples.

Diagnosis: *Tima* with 40–60 marginal tentacles; with 7 marginal warts between each pair of tentacles.

II. *Tima flavilabris* Eschscholtz 1829.

Synonyms: *Tima flavilabris* Eschscholtz 1829; *Tima flavilabris* Mayer 1910; non *Tima flavilabris* Stiasny 1908; non *Tima flavilabris* Neppi and Stiasny 1913.

Tima flavilabris was described and figured by ESCHSCHOLTZ (1829) on a single specimen taken to the north-east of the Azores. ESCHSCHOLTZ's specimen had about 80 tentacles and 3 marginal warts between each pair of tentacles. ESCHSCHOLTZ's figure shows that his specimen was not sexually mature as the gonads were only slightly waded.

Since the specimens recorded by Stiasny and Neppi & Stiasny as *T. flavilabris* belong to *T. lucullana* (Delle Chiaie), the present record of *Tima flavilabris* is the first find of this species since it was described.

Diagnosis: *Tima* with more than 80 marginal tentacles; with 3 marginal warts and 4 marginal vesicles between each pair of tentacles.

III. *Tima formosa* L. Agassiz 1862.

In the original description of this species nothing is said about the tentacles being of unequal size in the full-grown specimens as stated by MAYER (1910).—Distribution: New England coast.

Diagnosis: *Tima* with 32–39 marginal tentacles; with 3 marginal warts and 4 marginal vesicles between each pair of tentacles.

IV. *Tima bairdi* (Johnston 1833).

It was previously supposed that the marginal vesicles in this species were placed on the adaxial side of some of the marginal warts. Actually

the vesicles are placed between the warts close to the velum on small swellings which do not represent marginal warts.

Diagnosis: *Tima* with 16 marginal tentacles; with 6-7 marginal warts and 6-8 marginal vesicles between each pair of tentacles.

There are no structural characters by which these four species of *Tima* can be separated. In all species the structures of the bell margin are identical, and also the structure of the peduncle, stomach, gonads etc. is the same in all the species. Only the difference in number of tentacles and marginal warts and vesicles may separate the four forms. *T. lucullana* and *T. bairdi* have 6-8 marginal warts between each pair of tentacles, but these two species are easily separated by the number of tentacles.

T. formosa and *T. flavilabris* both have 3 marginal warts and 4 marginal vesicles between each pair of tentacles. MAYER (1910) states that mature specimens of *T. formosa* with a bell diameter of 100 mm have 32 tentacles, and BIGELOW (1913) mentions that the greatest number of tentacles which he has seen in full-grown *T. formosa* is 39.— Eschscholtz's specimen of *T. flavilabris* was about 50 mm wide and had c. 80 tentacles; the specimen from st. 6681 with a bell diameter of 45 mm has about 70 tentacles.

Since some confusion has existed as to the identity of *T. flavilabris*, *T. formosa* and *T. lucullana* it is desirable to get a type-specimen of *Tima flavilabris* in order to define this species clearly. The specimen from st. 6681 was collected in the North Atlantic Drift as Eschscholtz's specimen, and has nearly the same number of tentacles and nearly the same diameter as this specimen. The specimen from Dana st. 6681 is therefore selected as a NEOTYPE of *Tima flavilabris* ESCHSCHOLTZ 1829. The *neotype* is kept in the Zoological Museum of the University, Copenhagen, in a glass with two labels, the one marked "*Neotype*", the other bearing the name of the species, locality and date of capture etc.

Haliscera bigelowi Kramp 1947.

Material:

Dana st. 6668. 56°30' N. 32°00' W. 18-6-1947. E300, 1000 m.w.

14 very damaged specimens from this station are referred to this species with some reservation.

Aglantha digitale (O.F.M. 1776).

This medusa was found in all the samples examined. Since it is so very abundant in the North Atlantic, a list of material is not given.

Aegina citrea Eschscholtz 1829.

Material:

- Dana st. 6674. 52°20' N. 27°30' W. 20-6-1947. S200, 2000 m.w. 1 specimen, diam. 12 mm.
 — st. 9806. 50°55' N. 37°59' W. 14-8-1955. S200, 1000-800 m.w. 1 specimen, diam. 5 mm.

St. 6674 is midway between New Foundland and the English Channel; st. 9806 is situated to the south-west of Ireland. Both localities are near the northern limit of distribution of this species.

Aeginopsis laurentii Brandt 1838.

Material:

- Dana st. 6704. 62°00' N. 41°07' W. 2-7-1947. S200, 100-50-25 m.w. 1 specimen, diam. 14 mm. S200, 200-150-125 m.w. 3 specimens, diam. 9-16 mm.
 — st. 7235. 62°00' N. 41°10' W. 30-6-1950. S200, 100-50-25 m.w. 2 specimens, diam. 11 mm.
 — st. 7236. 62°00' N. 41°30' W. 30-6-1950. S200, 200-150-125 m.w. 1 specimen, diam. 15 mm.

All localities are on the east coast of Greenland, from where this species has previously been recorded.

Solmaris corona (Keferstein & Ehlers 1861).

Material:

- Dana st. 6683. 50°59' N. 34°25' W. 23-6-1947. S200, 100-50-25 m.w. 2 specimens, diam. 7-10 mm.
 — st. 6688. 50°34' N. 41°39' W. 26-6-1947. S200, 200-150 m.w. 1 specimen, diam. 11 mm.

Cunina globosa Eschscholtz 1829.

Material:

- Dana st. 9804. 51°00' N. 18°00' W. 20-8-1955. S200, 100-50-25 m.w. 2 specimens, diam. 20-26 mm.
 — st. 9806. 50°55' N. 14°00' W. 21-8-1955. S200, 1000-800 m.w. 1 specimen, diam. 17 mm.

These specimens were captured to the west of the English Channel in warm water of *Lusitanian* origin. *Cunina globosa* has previously been

recorded from the tropical Pacific and from Cape of Good Hope (KRAMP 1957).

From the Mediterranean another species of *Cunina*, *C. lativentris* Gegenbaur is recorded, which is said to differ from *C. globosa* in the shape of the gastric pouches which in *C. globosa* are quadrate, in *C. lativentris* narrow at the base, broader near the outer ends. Further, *C. globosa* has 3 statocysts on each marginal lappet where *C. lativentris* has 4.

KRAMP (1957) supposes that *Cunina lativentris* Gegenbaur should be merged into *C. globosa* Eschscholtz. The present find in *Lusitanian* water of 3 specimens which cannot be identified with any other species than *C. globosa* strongly supports this supposition.

Solmissus incisa (Fewkes 1886).

Material:

Dana st. 9806. 50°55' N. 14°00' W. 21-8-1955. S200, 1000-800 m.w.

Pelagia noctiluca (Forskål 1775).

Material:

Dana st. 9301. 52°00' N. 32°20' W. 25-8-1954. S200, 100-50-25 m.w. 14 specimens, diam. 26-102 mm.

— st. 9806. 50°55' N. 14°00' W. 21-8-1955. S200, 600-400 m.w. 1 specimen, diam. 34 mm. S200, 1000-800 m.w. 1 specimen, diam. 12 mm.

This holopelagic medusa is frequently met with west of the British Isles.

Cyanea capillata (L.).

Material:

Dana st. 6705. 61°55' N. 40°47' W. 2-7-1947. S200, 100-50-25 m.w. 1 specimen, diam. 9 mm.

This species has previously been recorded as indigenous on the east coast of Greenland.

Atolla vanhoeffeni Russell 1957.

Material:

Dana st. 6674. 52°20' N. 27°30' W. 20-6-1947. S200, 600 m.w. 7 specimens, diam. 10-13 mm.

These specimens were kindly identified by Dr. Russell in Plymouth who recently described *A. vanhoeffeni* as a new species (RUSSELL 1957).

Table II.

Dana st.	Locality	<i>Halicreas minimum</i>	<i>Botrynema brucei</i>	<i>Colobonema sericeum</i>	<i>Pantachogon haeckeli</i>	<i>Crossota rufobrunnea</i>	<i>Aeginura grimaldii</i>	<i>Periphylla periphylla</i>	<i>Atolla wyvillei</i>
6668	56°30' N. 32°00' W.	..	..	..	..	..	..	×	..
6671	54°29' N. 29°42' W.	..	..	..	..	..	..	×	×
6674	52°20' N. 27°30' W.	×	×	×	×	×	×	×	×
6683	50°53' N. 34°25' W.	..	..	..	..	..	..	×	×
6691	51°00' N. 44°20' W.	..	..	..	..	..	..	×	×
6695	52°48' N. 41°24' W.	..	..	..	..	..	..	×	..
6699	56°02' N. 38°43' W.	×	×	..	×	×	×	×	×
9790	58°00' N. 41°03' W.	..	..	..	..	..	..	×	..
9792	56°00' N. 37°59' W.	..	..	..	..	..	..	×	..

Tab. II contains the records of the most common bathypelagic medusae. Since the localities where these medusae were collected are within the well-known area of distribution, these species are not mentioned separately.

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