5 b

Medusæ, Siphonophora, and Ctenophora

BY

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Medusæ are mentioned as occurring at Iceland already in 1772 by E. Olafsen & B. Povelsen in a short note (p. 715): "The three species of Medusæ are called Marglytta, because they are shining in the dark in the sea; the small blue and violet-red are called merchant-caps" ["Kiöbmands-Huuer"]. It is undoubtedly the same three species which were observed by N. Mohr and mentioned by him (1786 p. 122—123) under the names of *Medusa aurita*, *Medusa capillata*, and *Medusa cruciata*, the last mentioned being identified with Olafsen's "merchant-caps", with the addition that in the northern part of the country it is called "blue-pouch" ["Bla-Pose"], which gave Faber (1829) occasion to suppose that it was the same medusa as that described by him as *Melitea hyacinthina* (probably = *Periphylla hyacinthina*); this seems, however, very improbable, because *Periphylla hyacinthina* is an oceanic deep-sea medusa, only occasionally appearing in the neighbourhood of the coast, and it is not likely that the Icelandic fishermen in the eighteenth century should have a proper name for such a stray visitor. It is more probable that the "merchant-cap" is *Staurophora mertensii*, which is a conspicuous medusa frequently occurring in the coastal water together with *Cyanea* and *Aurelia*. Mohr gives a somewhat detailed description of a fourth species which he found washed ashore in Eyjafjörður; he gave it no name, but it was found again by Faber in the same locality and also at Eyrarbakki on the south coast and described by him (1829 p. 195) as *Ephyra caudata;* it will probably never be possible to identify this animal.

In a book which, on account of its title, (Naturgeschichte der Fische Islands 1829), is rather unknown among the students of medusæ, Fr. Faber describes 15 species of jellyfish, 9 of which were new species;

unfortunately, only few of them can be identified. The following are beyond doubt: *Ephyra capillata* (*Cyanea cap.*), *Cyanea aurita* (*Aurelia*), *Beroë cucumis*, *Beroë ovum* (*Mertensia*), and *Berenice cruciata* (*Stauro-phora mertensii*); *Beroë fragum* is probably *Neoturris pileata*; *Melitea hyacinthina* is generally considered identical with *Periphylla hyacinthina* Haeckel, and possibly *Phorcynia galerita* is the same species. The following are quite indefinable: *Berenice globosa*, *Phorcynia uniformis*, *Phorcynia simpla*, *Ephyra caudata*, *Beroë bulla*, and *Beroë quadricostata*; *Callirhöe campanula* Fabr. is likewise undefinable, and it was found at the Faroes, not at Iceland. The descriptions are frequently accompanied by interesting remarks on regional and seasonal occurrences and of the habits and swimming movements of the animals.

The medusa now called *Hybocodon prolifer* Ag. was seen by J. Steenstrup (1842). E. Haeckel examined the medusæ in the Zoological Museum of Copenhagen, and in his monograph (1879—1880) the following species are recorded from Iceland (no precise localities are given): *Sarsia tubulosa*, *Margelis principis*, *Periphylla hyacinthina*, and *Aurelia aurita*; moreover *Nemopsis heteronema* which, however, was wrongly identified (should be *Margelis principis*). Small additions to the fauna are given by P. T. Cleve (1900), B. Sæmundsson (1899 and 1902), and in the International Plankton Bulletins (1904—05). In two papers (1904 and 1909) O. Paulsen has given valuable accounts of the occurrence of several species; the following cannot be identified with certainty: 1904: *Tiara* (p. 28), *Eucope* (p. 29); 1909: *Tiara pileata* (p. 35), *Margelis* sp. (p. 40), *Phialidium* (p. 38). In Cl. Hartlaub's work on the Anthomedusæ in "Nordisches Plankton" original records from Iceland are given for *Bougainvillia superciliaris* and *B. principis*. The Ctenophores are dealt with by Th. Mortensen (1912), and the Siphonophores by Moser (1920). In two papers by P. L. Kramp (1919 and 1926) a considerable number of species of Anthomedusæ and Leptomedusæ are recorded from Iceland for the first time, and details are given of the occurrence of all species known from Iceland; a few localities at Iceland are also mentioned by Kramp & Damas (1925). Finally, a complete list of the Hydromedusæ known from Iceland (without detailed records of localities) is given by M. E. Thiel (1932 a and b); this list is altogether derived from the literature, and it comprises 32 species of which, however, the following have only been found in the deep-sea areas far from land: *Ptychogena lactea*, *Ptychogastria polaris*, *Homoeonema platygonon*, *Pantachogon haeckeli*, and *Aeginopsis laurentii*; these species are not included in the present paper which only deals with the coastal waters at depths of less than about 300 m. Thiel (1932 b p. 125) also records *Sarsia eximia* Allman

as occurring at Iceland, as likewise stated by Hartlaub (1907 p. 8); but this is due to a mistake; this species is included in the list of Icelandic medusæ, because the corresponding hydroid, *Syncoryne eximia*, is recorded from Iceland by Sæmundsson (1902 p. 50), but as demonstrated by me (Kramp 1938 p. 4) the specimens in question belong to *Coryne pusilla*.

The following list comprises 39 species: 15 Anthomedusæ, 11 Leptomedusæ, 1 Trachymedusa, 3 Siphonophores, 6 Scyphomedusæ, and 3 Ctenophores. *Bougainvillia ramosa*, *Podocoryne carnea*, *Obelia geniculata*, and *Obelia dichotoma* are included because the corresponding hydroids are known from Iceland. Only four species are recorded from Iceland for the first time: the Siphonophore *Chelophyes appendiculata*, the Lucernarians *Haliclystus octoradiatus* and *Halimocyathus lagena*, and the Scyphomedusa *Cyanea lamarcki*. The localities are arranged in sections as follows: *N.W.*: Látrabjarg—Horn. *N.*: Horn—Langanes. *E.*: Langanes—Eystrahorn. *S.*: Eystrahorn—Selvogstangi. *W.*: Selvogstangi—Látrabjarg.

I. Synopsis of the Species.

A. Anthomedusæ.

1. *Sarsia tubulosa* (M. Sars).

Sarsia tubulosa + mirabilis + pulchella + decipiens + densa + litorea Hartlaub 1907 p. 19 ff., figs. 10–39; Sarsia tubulosa Kramp 1926 p. 8, textfigs. 6–16, Pl. I figs. 5—7.

Iceland records:

Sarsia tubulosa Haeckel 1879 p. 16.
Sarsia tubulosa Paulsen 1904 p. 28.
Sarsia densa Hartlaub 1907 p. 26.
? Sarsia sp. Paulsen 1909 p. 38, 41.
Sarsia tubulosa Kramp 1926 p. 8.

Occurrence at Iceland: *N.W.*: Patreksfjörður; Önundarfjörður (Paulsen); off Önundarfjörður, 66° 10′ N. 23° 56′ W.; Ísafjörður; Borðeyri in Lónafjörður (Jökulfirðir); west of Horn (Paulsen).—*N.*: Off Rifstangi, 66° 35′ N. 16° 10′ W.—*E.*: Off Papey, 64° 37′ N. 13° 55′ W., numerous specimens (journals of the "Dana").—*S.*: Near Eystrahorn, 64° 22′ N. 14° 22′ W. (journals of the "Dana").—*W.*: West of Skagi, 64° 06′ N. 23° 14′ W.; Reykjavík; Stykkishólmur (Hvammsfjörður).

At the coasts of Iceland this medusa occurs from June to August. The corresponding hydroid, *Coryne sarsii*, is recorded from Reykjavík (see Kramp 1938 p. 5).

Distribution: *Sarsia tubulosa* in the wider sense (comprising

a number of varieties sometimes regarded as distinct species) has its main occurrence in the boreal regions, though penetrating somewhat into the Arctic; it is a well-marked neritic medusa, widely distributed along the coasts on both sides of the Atlantic, from northern France to the Barents Sea in the east and from Newport to Umanak Fjord in the west, and also at corresponding latitudes in the Pacific. In the boreal regions it mainly occurs in early spring.

2. *Steenstrupia nutans* (M. Sars).

Steenstrupia galanthus Haeckel 1879 p. 31; Corymorpha nutans Hartlaub 1907 p. 76, figs. 74—75; Steenstrupia nutans Kramp 1926 p. 28, figs. 23—28.

Iceland records:

Steenstrupia galanthus Cleve 1900 p. 97.
Steenstrupia nutans Sæmundsson 1902 p. 52.
Corymorpha nutans Paulsen 1909 p. 35.
Steenstrupia nutans Kramp 1926 p. 28.

Occurrence at Iceland: *S.:* Selvogsbanki, 63° 30′ N. 21° 03′ W., 63° 22′ N. 21° 17′ W., very abundant; common at the surface off the south coast (Paulsen).—*W.:* South of Reykjanes, 63° 45′ N. 22° 37′ W.; west of Skagi, 64° 06′ N. 23° 14′ W.; Reykjavík, in great abundance (Sæmundsson).

The medusa occurs in July and August; the corresponding hydroid, *Corymorpha nutans,* has been found in several localities in Faxaflói and Breiðifjörður (see Kramp 1938 p. 7).

Distribution: Common at the European coasts from France to Lofoten at the west coast of Norway; also known from the Mediterranean.

3. *Hybocodon prolifer* L. Agassiz.

Hybocodon prolifer L. Agassiz 1862 p. 234, Pl. 25; Haeckel 1879 p. 33; Amphicodon fritillaria + globosus + amphipleurus Haeckel 1879 p. 36—37, Pl. I figs. 7—9; Hybocodon prolifer Hartlaub 1907 p. 96, figs. 94—97; Kramp 1926 p. 33, textfigs. 29—34, Pl. I fig. 9.

Iceland records:

Steenstrup 1842 p. 20—23, Pl. I figs. 43—46.
Auliscus pulcher Sæmundsson 1899 p. 425, Pl. IV.
Amphicodon prolifer Paulsen 1909 p. 39, 41.
Hybocodon islandicus Paulsen 1909 p. 39.
Hybocodon prolifer Kramp 1926 p. 33.

Occurrence at Iceland: *N.W.:* Off Patreksfjörður, 65° 44′ N. 24° 26′ W.; off Önundarfjörður, 66° 10′ N. 23° 56′ W., very abundant; Dýrafjörður; Skútilsfjörður; Ísafjörður; mouth of Hrafnsfjörður (Jökul-

firðir); Hesteyrarfjörður (Jökulfirðir); 66° 30′ N. 23° 00′ W.; 66° 41′ N. 23° 09′ W.—*N.*: Western part of the north coast (Paulsen); 66° 17′ N. 21° 14′ W.; Skjálfandi, 66° 14′ N. 17° 28′ W.; Axarfjörður.—*E.*: Near Langanes, 66° 17′ N. 14° 27′ W.; Hvalsbaksbanki, 64° 26′ N. 13° 05′ W.—*W.*: Reykjavík (Steenstrup and Sæmundsson, see below); near Snæfellsnes, 64° 44′ N. 23° 41′ W., 64° 47′ N. 24° 02′ W.; south of Látrabjarg, 65° 26′ N. 24° 31′ W.

The medusa has been found at the coasts of Iceland from May to August. The hydroid, *Tubularia prolifer*, has only been found at Reykjavík (see Kramp 1938 p. 7).

Distribution: Northern-boreal; the medusa is common at the coasts on both sides of North America and at the European coasts from northern France to the Malangsbank off the northern part of the west coast of Norway.

Remarks: Steenstrup (1842) described and figured this medusa, which he found swimming in the sea in the neighbourhood of Reykjavík; he supposed it to be the medusa of a small hydroid, found in about the same locality, which he described under the name of *Coryne fritillaria*, but this hydroid has never been identified. Twenty years later L. Agassiz (1862) described a very similar medusa from the American coast and its corresponding hydroid and named both of them *Hybocodon prolifer;* this is the name now generally used also for the medusa occurring at the European coasts. The same species, hydroid as well as medusa, was found near Reykjavík by Sæmundsson (1899) and described by him under the name of *Auliscus pulcher.*

4. *Bougainvillia superciliaris* L. Agassiz.

Hippocrene superciliaris L. Agassiz 1849 p. 273, Pl. 1—3; Bougainvillia superciliaris L. Agassiz 1862 p. 344; Hartlaub 1911 p. 171, figs. 153—155; Kramp 1926 p. 44.

Iceland records:

Hippocrene superciliaris Paulsen 1909 p. 38, 39.
Bougainvillia superciliaris Hartlaub 1911 p. 171.
Bougainvillia superciliaris Kramp 1926 p. 44.

Occurrence at Iceland: *N.W.*: Patreksfjörður; Dýrafjörður; off Dýrafjörður, 66° 03′ N. 24° 05′ W.; Önundarfjörður; 66° 30′ N. 23° 00′ W.; near Horn, 66° 30′ N. 22° 28′ W.—*N.*: Off Skagatá, 66° 17′ N. 20° 16′ W.; western part of the north coast (Paulsen).—*W.*: West coast of Iceland (Paulsen).

Distribution: Mainly arctic, penetrating southwards along the American coast to Cape Cod and along the coasts of Europe to Scotland and the North Sea. In the southern regions it is only found in early spring.

5. *Bougainvillia principis* (Steenstrup).

Margelis principis Steenstrup 1850 p. 35; Haeckel 1879 p. 88, Pl. 6 figs. 14—16; Bougainvillia principis Hartlaub 1911 p. 177, fig. 158; Kramp 1926 p. 48.

Iceland records:

Margelis principis Haeckel 1879 p. 88.
Nemopsis heteronema Haeckel 1879 p. 93.
Bougainvillia principis Hartlaub 1911 p. 177.
Bougainvillia principis Kramp 1926 p. 48.

Occurrence at Iceland: *N.W.*: 65° 45′ N. 26° 05′ W.; 66° 10′ N. 23° 56′ W.—*N.*: Near Horn, 66° 29′ N. 22° 26′ W.; 66° 23′ N. 21° 21′ W.; Skjálfandi, 66° 14′ N. 17° 28′ W.; Axarfjörður; near Rifstangi, 66° 38′ N. 16° 18′ W.; 66° 46′5 N. 14° 57′ W.—*E.*: Near Langanes, 66° 17′ N. 14° 27′ W.; 64° 35′ N. 11° 45′ W.—*S.*: South of Mýrdalsjökull; 63° 40′5 N. 20° 40′ W.; south of Eyrarbakki, 63° 30′ N. 21° 03′ W.—*W.*: West of Skagi, 64° 06′ N. 23° 14′ W.; south of Snæfellsnes; 64° 45′ N. 23° 09′ W.; 64° 44′ N. 23° 29′ W.; 64° 44′ N. 23° 41′ W.; 64° 47′ N. 24° 02′ W.

This is a common medusa at the Icelandic coasts; it has been found from the beginning of June to the middle of August.

Distribution: Northern-boreal in the eastern part of the North Atlantic area; abundant at the coasts of Iceland and Norway, more sparingly occurring at the British Isles and in the North Sea.

Remarks: Haeckel's thorough description of this species was based on specimens in the Zoological Museum of Copenhagen, some of which were from Iceland; he also described another medusa, *Nemopsis heteronema*, from the west coast of Norway, to which he erroneously referred two specimens collected by Steenstrup at the coast of Iceland, probably near Reykjavík; these specimens really belong to *B. principis*, so that *Nemopsis heteronema* does not belong to the fauna of Iceland.

6. *Bougainvillia ramosa* van Beneden.

Bougainvillia ramosa Hartlaub 1911 p. 183, figs. 162—167.

Occurrence at Iceland: The free medusa has not yet been observed at the coasts of Iceland, but the hydroid with fully developed medusa buds is recorded from Mýrahugur on the south coast (Kramp 1938 p. 10).

7. *Lizzia blondina* Forbes.

Cubogaster gemmascens + Dysmophosa minima + Lizzia claparedi + Lizzia blondina Haeckel 1879 p. 76—82, Pl. VI figs. 7—11; Lizzia blondina Hartlaub 1911 p. 145, figs. 131—135; Kramp 1926 p. 52.

Iceland record:

Lizzia blondina Kramp 1926 p. 52.

Occurrence at Iceland: *N.*: Near Horn, 66° 36′ N. 21° 57′ W., in July.

Distribution: Southern-boreal, abundant at the British Isles and in the Danish waters, less common at the southern part of the west coast of Norway and around the Shetland Islands and the Faroes; also found in the Mediterranean.

8. *Podocoryne carnea* M. Sars.

Dysmorphosa carnea Haeckel 1879 p. 77; Podocoryne carnea Hartlaub 1911 p. 213, figs. 187—190.

Occurrence at Iceland: The free medusa has not yet been found at the coasts of Iceland, but the hydroid, *Hydractinia carnea*, is recorded from several localities, especially at the southern and western coasts, but also at the north and east coast (see Kramp 1938 p. 9).

Distribution: Mainly boreal.

9. *Podocoryne areolata* Alder.

Cytæandra areolata Haeckel 1879 p. 79; Lymnoria borealis Mayer 1900 p. 6, Pl. V figs. 16—18; Limnorea norvegica Broch 1905 p. 5; Podocoryne areolata Kramp & Damas 1925 p. 268, figs. 15—17.

Iceland record:

Cyteandra areolata Paulsen 1909 p. 35.

Occurrence at Iceland: *S.*: Off the south coast of Iceland, 63° 32′ N. 21° 30′ W., in July, at the surface.

Distribution: East coast of North America; fairly common at the coasts of Great Britain and Norway as far north as the Romsdalsbank.

10. *Rathkea octopunctata* (M. Sars).

Margellium octopunctatum + M. gratum + Rathkea blumenbachii = R. octopunctata Haeckel 1879 p. 95—97; Rathkea octopunctata Mayer 1910 p. 177, Pl. 20 fig. 11; R. blumenbachii Hartlaub 1911 p. 229, figs. 196—199; R. octopunctata Kramp 1926 p. 58.

Iceland record:

Rathkea octopunctata Kramp 1926 p. 58.

Occurrence at Iceland: *N.W.*: Dýrafjörður; Skútilsfjörður; Ísafjörður; Hrafnsfjörður (Jökulfirðir); mouth of Hrafnsfjörður; Hesteyrarfjörður (Jökulfirðir).—*N.*: Ingólfsfjörður.—*E.*: Near Langanes, 66° 17′ N. 14° 27′ W.; Mjóifjörður.

Abundant in the fjords on the north-west and north coasts in June and July, when budding as well as sexually mature specimens are found; at the colder east coast the development is somewhat delayed, numerous budding individuals being found in Mjóifjörður in August.

Distribution: Mainly northern-boreal, though also found in the Mediterranean and in the Black Sea; very abundant at the North European coasts, penetrating into the Arctic (Barents Sea, the White Sea), and along the east coast of North America; west coast of Greenland as far north as Jakobshavn. Also found in the northern Pacific.

11. *Halitholus pauper* Hartlaub.

Halitholus pauper Hartlaub 1914 p. 272, figs. 223—224; Kramp 1926 p. 71, Pl. II figs. 1—3.

Iceland record:

Halitholus pauper Kramp 1926 p. 71.

Occurrence at Iceland: *N.W.*: Dýrafjörður; Hesteyrarfjörður (Jökulfirðir): in May—June.

Distribution: An arctic species, only known from Iceland and from the west coast of Greenland and from Kamchatka.

12. *Leuckartiara octona* (Fleming).

Tiara octona = pileata auctorum, partim; Leuckartiara octona Hartlaub 1914 p. 285, figs. 238—252; Kramp 1926 p. 76, Pl. II figs. 5—7.

Iceland record:

Leuckartiara octona Kramp 1926 p. 76.

Occurrence at Iceland: *S.*: South of Mýrdalsjökull; 63° 49′5 N. 20° 40′ W.; 63° 20′ N. 20° 49′ W.

The medusa of this species which has a predominantly southern distribution, has only been found at the south coast, in July and August; the corresponding hydroid *Perigonimus repens*, is known with certainty from a number of localities at the west coast (see Kramp 1938 p. 11).

Distribution: Abundant at the coasts of Europe from the Mediterranean to Lofoten; also common at the east coast of North America and recorded from several scattered localities in the Pacific.

Remarks: This species has frequently been confounded with other species of *Pandeidæ*, especially with *Neoturris pileata*.

13. *Leuckartiara breviconis* (Murbach & Shearer).

Turris breviconis Murbach & Shearer 1902 p. 170, Pl. 18 figs. 1—2; Leuckartiara brevicornis Hartlaub 1914 p. 304, figs. 254—256; L. breviconis Kramp 1926 p. 80, Pl. II fig. 8.

Iceland record:

Leuckartiara breviconis Kramp 1926 p. 80.

Occurrence at Iceland: *E.*: 64° 35′ N. 11° 45′ W.—*S.*: Breiðdalsgrunn, 64° 17′ N. 13° 00′ W.; Papagrunn, 64° 21′ N. 13° 46′ W.;

Mýrabugur; off Portland; inside the Vestmannaeyjar; 63° 29′ N. 21° 25′ W. —*W.*: 9 miles south of Krisuvíkurberg; west of Skagi, 64° 06′ N. 23° 14′ W.

The locality off the southern part of the east coast is in an area where the influence of the warm currents, derived from the Gulf Stream, is still remarkable; the occurrence at Iceland of this species seems to be restricted to the comparatively warm tracts along the southern parts of the coast. It has been found in July and August.

Distribution: Around the coasts of Scotland and the Shetland Islands, southern part of the west coast of Norway; also found in one locality at the southernmost part of the west coast of Greenland, and in Alaska.

14. *Catablema vesicarium* (A. Agassiz).

Catablema vesicarium — campanula — eurystoma Haeckel 1879 p. 63—64; Catablema vesicarium Hartlaub 1914 p. 315, figs. 263—267; Kramp 1926 p. 87, Pl. II figs. 10—11.

Iceland records:

Catablema eurystoma Paulsen 1909 p. 41.
Catablema vesicarium Kramp & Damas 1925 p. 281.
Catablema vesicarium Kramp 1926 p. 87.

Occurrence at Iceland: *N.W.*: Patreksfjörður.—*N.*: 66° 17′ N. 20° 16′ W.; Skjálfandi, 66° 14′ N. 17° 28′ W.; Axarfjörður; 66° 45′ N. 15° 36′ W.—*E.*: South of Langanes, 66° 17′ N. 14° 27′ W.; off the east coast (Paulsen).

This arctic medusa has only been found at the coldest parts of the Icelandic coasts, in June - August.

Distribution: This species is common in the Barents Sea and the White Sea, around Spitzbergen, along the west coast of Greenland, and off the east coast of North America from Labrador to Cape Cod; also found at Angmagssalik in East Greenland and in the Bering Sea.

15. *Neoturris pileata* (Forskål).

Tiara pileata auctorum, partim; Turris digitalis Haeckel 1879 p. 61, Pl. IV figs. 2—3; Mayer 1910 p. 129; Neoturris pileata Hartlaub 1914 p. 326, figs. 273—281; Kramp 1926 p. 92, Pl. II figs. 13—14.

Iceland records:

? Beroë fragum Faber 1829 p. 202.
Neoturris pileata Kramp & Damas 1925 p. 273.
Neoturris pileata Kramp 1926 p. 92.

Occurrence at Iceland: *N.W.*: 66° 28′ N. 25° 18′ W.; Djúpálsrif, 66° 49′ N. 24° 59′ W., 66° 53′ N. 24° 42′ W., many specimens,

all very large.—*S.*: South of Mýrdalsjökull; Portland; near Vestmannaeyjar; 63° 50′5 N. 20° 40′ W.—*W.*: South of Snæfellsnes, 64° 44′ N. 23° 29′ W., 64° 47′ N. 24° 03′ W.; Ólafsvík on north side of Snæfellsnes, fairly common in August (Faber).

This large medusa, which has a predominantly southern distribution, is fairly common at the southern and western coasts of Iceland, where it has been found from June to August; it seems to be indigenous at the south coast. Off the north-west coast it may occur in fairly great numbers in August, but only very large specimens have been found there.

Distribution: Mediterranean and north-western Europe; common in the North Sea area and at the west coast of Norway as far north as the Trondheim Fjord; also common in the area between Scotland and Iceland in the waters of the Gulf Stream and the Irminger Current.

Remarks: In his list of obsolete names of medusæ, Haeckel (1880 p. 653) indicates the possibility that the medusa described by Faber (1829) under the name of *Medusa (Beroë) fragum* nov. might be identical with "*Tiara pileata*" in the sense in which this latter name was employed by Haeckel. Among the medusæ occurring at Iceland I can hardly think of any other species than the one which now, after Hartlaub's thorough revision of the group, is generally called *Neoturris pileata*, which may agree with the description given by Faber, and it seems to me highly probable that his "*Beroë fragum*" should really be referred to *Neoturris pileata* (Forskål).

B. Leptomedusæ.

16. *Laodicea undulata* (Forbes & Goodsir).

Laodice cruciata auctorum, partim; Laodicea calcarata L. Agassiz 1862 p. 350; Laodicea cruciata Mayer 1910 p. 201, Pl. 21 figs. 4—5, Pl. 22 figs. 2—6, Pl. 23 figs. 1—3, textfigs. 104—105; Laodicea undulata Kramp 1919 p. 16, Pl. II figs. 1—8; Kramp 1932 p. 554, figs. 16—18.

Iceland record:

Laodicea undulata Kramp 1919 p. 16.

Occurrence at Iceland: *N.W.*: 65° 45′ N. 25° 05′ W.; Djúpálsrif, 66° 49′ N. 24° 59′ W., 66° 53° N. 24° 42′ W.—*E.*: 64° 35′ N. 11° 45′ W.—*S.*: 64° 15′ N. 12° 40′ W.; near Eystrahorn, 64° 25′ N. 14° 18′ W.; Mýrabugur, 64° 04′ N. 15° 48′ W.; another locality in Mýrabugur; south of Mýrdalsjökull; 63° 40′5 N. 20° 40′ W.; Selvogsbanki, 63° 22′ N. 21° 17′ W.—*W.*: West of Skagi, 64° 06′ N. 23° 14′ W.

This predominantly southern species mainly occurs at the south coast, including an off-shore locality in the south-east, where the influence of the Gulf Stream is still remarkable: by the Irminger Current it may some-

times be carried northwards off the west and north-west coast, but in this area it has only been found rather far from land, in July and August. At the south coast middle-sized as well as very large specimens are met with; the specimens from Djúpálsrif in the north-west, where the species was fairly common in August 1927, were all very large, some of them attaining the considerable size of 50 mm or more in diameter, twice the usual size of this medusa in the North Atlantic.

Distribution: Widely distributed in the tropical and temperate parts of the Atlantic Ocean and in the Mediterranean; along the west coast of Norway it penetrates as far north as Tromsö.

17. *Staurophora mertensii* Brandt.

Staurostoma laciniata + arctica — Staurophora mertensii Haeckel 1879 p. 130, 131, 149; Staurophora mertensii Mayer 1910 p. 291, Pl. 20 figs. 4—9, textfig. 158; Kramp 1919 p. 39, Pl. I fig. 9, Pl. II figs. 9—10, Pl. III fig. 7; Kramp 1933 p. 559, figs. 22—23.

Iceland records:

? Kiöbmands-Hune Olafsen & Povelsen 1772 p. 715.
? Medusa cruciata Mohr 1786 p. 123.
Berenice cruciata Faber 1829 p. 191.
Thaumantias sp. Paulsen 1904 p. 28—29.
Staurostoma arctica Paulsen 1909 p. 35, 38—41.
Staurophora mertensii Kramp 1919 p. 39.

Occurrence at Iceland: *N.W.*: Dýrafjörður; Isafjarðardjúp, 66° 15′ N. 23° 30′ W.; west of Horn, abt. 66° 30′ N. 22° 35′ W.—*N.*: Off the north coast in August (Paulsen); between Skjálfandi and Langanes in July (Paulsen); 66° 17′ N. 21° 14′ W. (Paulsen); 66° 13′ N. 20° 29′ W. (Paulsen); 66° 15′ N. 18° 58′ W. (Paulsen); Skjálfandi, 66° 14′ N. 17° 28′ W.; Axarfjörður; near Grjótnes on Melrakkasljetta.—*E.*: East coast in August (Paulsen); near Glettinganes, 65° 31′5 N. 13° 32′ W.—*S.*: Mýrabugur, 63° 51′ N. 16° 29′ W.; near Portland (Paulsen); Vestmannaeyjar at the end of July 1821 (Faber); western part of the south coast, at the surface (Paulsen).—*W.*: West of Skagi, 64° 06′ N. 23° 14′ W.; Breiðifjörður, 65° 15′ N. 23° 30′ W.; neritic at the west coast (Paulsen); not uncommon in the western fjords especially in Breiðifjörður, in August 1820, at the beach (Faber).—Moreover recorded from numerous localities in the journals of the "Thor" and the "Dana".

This species is generally distributed round Iceland, though particularly abundant at the western and northern parts of the coast; found in June—August.

Distribution: In the coastal waters of the northern Atlantic and Pacific, particularly abundant in the arctic regions, but penetrating somewhat into the boreal; very common at the northern part of the west coast

of Norway, but rare south of Bergen; sometimes, but not regularly met with at the Faroes and in the North Sea.

Remarks: This may possibly be the "Kiöbmands-Hue" ("merchant-cap") mentioned by Olafsen & Povelsen (1772) and recorded from Eyjafjörður on the north coast of Iceland by Mohr (1786), but it cannot be determined with certainty; the Icelandic name is no more used by the fishermen.

I have not the slightest doubt that the medusa described by Faber (1829) under the name of "*Medusa (Berenice) cruciata* Linné", and up to now considered an obsolete species, should be referred to *St. mertensii:* "Der Körper ist weiss, und hat die Farbe des Wassers, so dass er darin nur durch sein milchweisses Kreuz sichtbar wird. Er ist stets geringer und dünner als bei Med. aurita; die obere Fläche der Scheibe ist nicht gewölbt. Der Umkreis scheint erstlich tellerrund, wenn der Rand (limbus) aber ganz ausgefaltet wird, ist dieser ein wenig gelappt, und der Körper halbviereckig.[1]) Kein Mund oder Appendices werden bemerkt. Ein breites milchweisses durchscheinendes characteristisches Kreuz steht senkrecht auf der untern Fläche der Scheibe, zwei Diametern in einem Zirkel gleich, und geht durch die ganze Scheibe. Das Kreuz ist schleimig und leicht abgerieben." Anybody who has seen *Staurophora mertensii* alive in the sea will easily recognise it from this description.

18. *Melicertum octocostatum* (M. Sars).

Melicertum campanula L. Agassiz 1862 p. 349; Melicertidium octocostatum Haeckel 1879 p. 138; Melicertum octocostatum Kramp 1919 p. 52, Pl. I fig. 10, Pl. III fig. 8; Kramp 1933 p. 502, figs. 25—26.

Iceland records:

Melicertidium octocostatum Paulsen 1909 p. 40.
Melicertum octocostatum Kramp 1919 p. 52.

Occurrence at Iceland: *N.:* North coast in August (Paulsen); off Melrakkasljetta, 66° 33′ N. 16° 13′ W.; north of Pistilfjörður (between Rifstangi and Langanes); 66° 46′5 N. 14° 57′ W.; 66° 25′ N. 14° 51′ W.; near Langanes, 66° 17′ N. 14° 27′ W.— *E.:* South of Langanes, 66° 10′ N. 14° 29′ W.—*S.:* Portland; Vestmannaeyjar; 9 miles off Krisuvik. —Found in July and August.

Distribution: East coast of North America north of Cape Cod; northwestern Europe from the English Channel to the Murman Coast.

[1]) Compare the figures by L. Agassiz 1849 Pl. 7.

19. *Halopsis ocellata* A. Agassiz.

Halopsis ocellata A. Agassiz 1865 p. 99, figs. 143—150; Kramp 1919 p. 65, Pl. IV figs. 1—5, textfigs. 6—9; Kramp 1933 p. 567, figs. 31—32.

Iceland records:

Stomobrachium norvegicum Paulsen 1909 p. 35.
Halopsis ocellata Kramp 1919 p. 65.

Occurrence at Iceland: *N.W.*: 65° 45′ N. 26° 05′ W.; Djúpálsrif, 66° 49′ N. 24° 59′ W., 66° 53′ N. 24° 42′ W.—*E.*: 64° 35′ N. 11° 45′ W.; Hvalsbaksbanki, 64° 26′ N. 13° 05′ W.- *S.*: Papagrunn, 64° 21′ N. 13° 46′ W.; 64° 15′ N. 12° 40′ W.; Mýrabugur, 64° 04′ N. 15° 48′ W.; south of Mýrdalsjökull; Vestmannaeyjar; 63° 40′5 N. 20° 40′ W.; 62° 43′ N. 20° 42′ W.; Selvogsbanki, 63° 22′ N. 21° 17′ W.; south of Eyrarbakki, 63° 18′ N. 21° 30′ W.—*W.*: South of Reykjanes, 63° 43′5 N. 22° 22′ W.

This large medusa is fairly common at the south coast of Iceland in July and August; the two localities off the southern part of the east coast are in an area, where the influence of the Gulf Stream is still remarkable. By the Irminger Current it may sometimes be carried northwards off the west and north-west coast as far as Djúpálsrif.

Distribution: Gulf of Maine on the east coast of North America; west coast of Greenland; west of the British Isles and along the west coast of Norway as far north as Tromsö.

20. *Tiaropsis multicirrata* (M. Sars).

Tiaropsis diademata L. Agassiz 1849 p. 209, Pl. 6 figs. 1—18, Pl. 8 fig. 11; Thaumantias eschscholtzii Haeckel 1879 p. 129, Pl. 8 fig. 4; Tiaropsis multicirrata Kramp 1919 p. 77, Pl. IV figs. 6—10, textfigs. 11—14; Kramp 1933 p. 572, fig. 36.

Iceland record:

Tiaropsis multicirrata Kramp 1919 p. 77.

Occurrence at Iceland: *N.W.*: Patreksfjörður; off Patreksfjörður, 65° 44′ N. 24° 26′ W.; several localities in Dýrafjörður; Önundarfjörður; Ísafjörður; Skútilsfjörður; Jökulfirðir: mouth of Hrafnsfjörður, Veiðileysufjörður, Hesteyrarfjörður; 66° 30′ N. 23° 00′ W.; 66° 31′ N. 22° 59′ W. *N.*: Ingólfsfjörður; off Skagatá, 66° 17′ N. 20° 16′ W.; off Skjálfandi, 66° 14′ N. 17° 23′ W.; Axarfjörður.—*E.*: South of Langanes, 66° 17′ N. 14° 27′ W.—Moreover recorded, though with some doubt, in the journals of the "Dana" from a number of localities at the west and north coast.

Particularly abundant in the north-western fjords; found in June—August.

Distribution: Common at the coasts of north-western Europe

from the English Channel to the Barents Sea and Iceland; west coast of Greenland; east coast of North America, common north of Cape Cod, more rarely found further south as far as Woods Hole; northern Pacific.

21. *Obelia nigra* Browne.

Obelia nigra Browne 1900 p. 721.

Iceland record:

Obelia nigra Kramp 1919 p. 89.

Occurrence at Iceland: *N.W.:* Dýrafjörður; mouth of Hrafnsfjörður; Veiðileysufjörður; Hesteyrarfjörður (Jökulfirðir).—*N.:* Ingólfsfjörður.—*E.:* South of Langanes, 66° 17′ N. 14° 27′ W.—The medusa was found in June and July. Some of the specimens mentioned below as *Obelia* sp. may be young specimens of *O. nigra.*

Obelia nigra is probably the medusa of *Laomedea longissima* which is very common at the southern and western coasts of Iceland, more sparingly occurring at the north and east coast (see Kramp 1938 p. 21).

Distribution: *Laomedea longissima* is a cosmopolitan hydroid.

22—23. *Obelia geniculata* (Linné) + *Obelia dichotoma* (Linné).

Iceland record:

Obelia spp. Kramp 1919 p. 90.

Apart from the adult individuals of *Obelia nigra,* the pelagic medusæ of the genus *Obelia* cannot be identified. Besides *L. longissima,* mentioned above, two species of *Laomedea,* producing *Obelia*-medusæ, occur at the coasts of Iceland: *L. geniculata* which is abundant on the southern and western coasts, less common on the north and east coast (see Kramp 1938 p. 18), and *L. dichotoma* which has only been found at the south and west coast (Kramp 1938 p. 20). The corresponding medusæ must occur in the same areas, and the specimens from the following localities may belong to one or the other of these two species, though some of them may have been young specimens of *O. nigra* (see above).

Occurrence at Iceland of *Obelia* spp.: *N.W.:* Dýrafjörður; Skútilsfjörður; Hesteyrarfjörður (Jökulfirðir); 66° 30′ N. 23° 00′ W.—*W.:* Near Snæfellsnes.—Found in May and June.

Distribution: Both species of hydroids are almost cosmopolitan.

24. *Phialidium hemisphæricum* (Linné).

Thaumantias hemisphærica Forbes 1848 p. 49, Pl. VIII fig. 2; Haeckel 1879 p. 128; Phialidium variabile partim Haeckel 1879 p. 186; Phialidium hemisphæricum Mayer 1910 p. 266, figs. 142—144; Kramp 1919 p. 91, Pl. IV fig. 14, Pl. V fig. 3, textfigs. 16—17; Kramp 1933 p. 579, figs. 42—44.

Iceland record:

Phialidium hemisphæricum Kramp 1919 p. 91.

Occurrence at Iceland: *E.*: 64° 35′ N. 11° 45′ W.—*S.*: Papagrunn, 64° 21′ N. 13° 46′ W.; 64° 02′ N. 14° 41′ W., very abundant; Mýrabugur, 64° 04′ N. 15° 48′ W.; another locality in Mýrabugur; south of Mýrdalsjökull; Selvogsbanki, 63° 22′ N. 21° 17′ W.

The medusa has been found in July and August; the corresponding hydroid, *Campanularia johnstoni*, is recorded from some few localities at the south and west coast (see Kramp 1938 p. 16).

Distribution: Widely distributed, though predominantly southern; very common at the coasts of the British Isles and in the North Sea area; also found at the Faroes and along the west coast of Norway as far north as Lofoten. At the south coast of Iceland the individuals grow to a considerably larger size than elsewhere.

25. *Phialidium islandicum* Kramp.

Phialidium islandicum Kramp 1919 p. 95, Pl. IV figs. 11—13, Pl. V figs. 1—2; Kramp 1933 p. 582, fig. 48.

Iceland record:

Phialidium islandicum Kramp 1919 p. 95.

Occurrence at Iceland: *N.W.*: 65° 45′ N. 26° 05′ W., numerous very large specimens.—*N.*: 66° 23′ N. 21° 21′ W.—*E.*: 64° 35′ N. 11° 45′ W. —*S.*: Papagrunn, 64° 21′ N. 13° 46′ W.; Mýrabugur; 63° 18′ N. 21° 30′ W.— *W.*: West of Skagi, 64° 06′ N. 23° 14′ W.—Found in July and August.

Distribution: Only known from Iceland and between the Shetland Islands and the west coast of Norway.

26. *Eutonina indicans* (Romanes).

Eutimalphes indicans Haeckel 1879 p. 195; Eutonina socialis Hartlaub 1897 p. 506, Pl. 22 figs. 1, 3, 4, 6, 7; Eutonina indicans Kramp 1919 p. 98; Kramp 1933 p. 585, fig. 54.

Iceland record:

Eutonina indicans Kramp 1919 p. 98.

Occurrence at Iceland: *N.W.*: Patreksfjörður; Ísafjörður.— *W.*: South of Snæfellsnes, 64° 44′ N. 23° 41′ W.

Distribution: Abundant in the Kattegat and the North Sea; west coast of Norway as far north as Aalesund; northern Pacific.

C. Trachymedusæ.

Several species of Trachymedusæ occur in deep water outside the continental shelf around Iceland, especially off the south coast, but the coastal waters are only inhabited by one species, *Aglantha digitale.*

27. *Aglantha digitale* (O. Fr. Müller).

Aglantha digitalis Haeckel 1879 p. 272, Pl. 16 figs. 5—6; A. digitale Mayer 1910 p. 402, Pl. 49 fig. 2; Broch 1929 p. 512, figs. 22—23.

Iceland records:

Aglantha digitalis Paulsen 1904 p. 27- 29.
Aglantha digitalis Bulletin Planctonique 1904 and 1905.
Aglantha digitale Paulsen 1909 p. 35—40.

Occurrence at Iceland: This oceanic medusa is generally distributed and very common in the waters round Iceland; it is a holoplanktonic medusa without a fixed hydroid stage and it occurs at all seasons.

Distribution: Arctic, circumpolar, penetrating far into the boreal areas; in the temperate areas it *mainly* occurs in the deeper strata; in the cold areas it likewise has its main occurrence in deeper water, but may also be met with in considerable number in the upper strata.

D. Siphonophora.

28. *Chelophyes appendiculata* (Eschscholtz).[1])

Diphyes bipartita Vanhöffen 1906 b p. 18, figs. 19—22; Diphyes appendiculata Bigelow 1911 p. 248, Pl. 7 figs. 5—6, Pl. 8 figs. 7—8, Pl. 9 fig. 6, Pl. 10 fig. 6, Pl. 11 fig. 1; Bigelow 1918 p. 420; Diphyes siboldii Moser 1925 p. 231, Pl. 11, Pl. 12, Pl. 13 figs. 3—4, textfigs. 38—39; Chelophyes appendiculata Totton 1932 p. 354, figs. 25—26; Bigelow & Sears 1937 p. 41.

Occurrence at Iceland: S.: Stokksnesgrunn, 63° 42′ N. 14° 19′ W., May 1934.

Only one specimen was found, a superior nectophore, which agrees in every detail with the description and figures by Bigelow (1911) and shows all the characteristic features pointed out by him.

Distribution: Warmer parts of all the oceans. At the east coast

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[1]) This widely distributed Siphonophore has been described under several different names: *Diphyes appendiculata* Eschscholtz 1829, *bipartita* Costa 1836, *siboldii* Kölliker 1852, *acuminata* Leuckart 1853, *gracilis* Gegenbaur 1854, *elongata* Haeckel 1888; for full synonymy see Moser 1925. In this and some previous papers Moser adopted the name of *D. siboldii* Costa, but Bigelow (1918 and 1937) gives reasons for retaining the name of *appendiculata* Eschscholtz. Totton (1932) made this species the genotype of a new genus *Chelophyes.*

of North America it has been found as far north as Martha's Vineyard. Römer (1903 p. 175) designates it (under the name of *D. bipartita*) as the most common Siphonophore in the Atlantic Ocean and the Mediterranean and further records it from the north coast of Ireland, the boundary area of the Gulf Stream and the Irminger Sea (60° 02′ N. 22° 07′ W.), and from East-Spitzbergen; Moser, however, maintains that this species belongs entirely to the warmer seas, all records from north of the Bay of Biscay being due to wrong identifications. It is very interesting, therefore, that an unmistakable specimen has been found at Iceland. This indicates that the species, at least occasionally, may be carried by the Gulf Stream into the northern parts of the Atlantic, and it is quite probable that it may even reach as far away as Spitzbergen, where two superior nectophores were found in 1889, a year when, as stated by Römer, the Gulf Stream had a particularly great extension towards the north; the specimens in question were identified by Römer and by Chun as belonging to this species.

Chelophyes appendiculata is the only species of Calycophora observed at Iceland. Strangely enough the common and widely distributed *Dimophyes arctica* (Chun) has never been recorded from Iceland, and in the collections of the Zoological Museum of Copenhagen no specimens are at hand from the Icelandic coastal waters, nor have I found it in the plankton samples in the Marine-biological Laboratory. It occurs at Spitzbergen and in the Greenland waters, off the east coast as well as off the west coast, and it is distributed without interruption throughout the Atlantic from its northernmost parts to the Antarctic, though it seems to be lacking along the east coast of America. In the warm and temperate regions its occurrence is restricted to the deep strata, but in colder areas it occurs in the surface water as well. It might, therefore, be expected to occur at the coasts of Iceland.

Also the two species *Galetta australis* (Quoy & Gaimard) (= *Diphyes biloba* Sars) and *Lensia conoidea* (Keferstein & Ehlers) (= *Diphyes truncata* Sars), might be expected to occur at Iceland; both of them are frequently carried to the west coast of Norway by the Gulf Stream, and they have been found in the deep-sea areas south and west of Iceland.

29. *Physophora hydrostatica* Forskål.

Physophora borealis M. Sars 1877 p. 32, Pl. V—VI figs. 1—8; Ph. hydrostatica Vanhöffen 1906 b p. 31, figs. 48—51; Bigelow 1911 p. 293, Pl. 16.

Iceland records:

? Physophora Paulsen 1904 p. 27—29.
? Physophora Paulsen 1909 p. 35, 38.
Physophora hydrostatica Moser 1920 p. 189.

Some of the specimens recorded by Paulsen as *Physophora* may have belonged to the following species; these records will be dealt with below together with the records in the journals of the "Dana".

Occurrence at Iceland: *N.W.:* Djúpálsrif, 66° 53′ N. 24′ 42′ W.—*S.:* 63° 42′ N. 14° 19′ W.; 64° 02′ N. 14° 41′ W.; south of Mýrdalsjökull (Moser); Vestmannaeyjar; 63° 31′ N. 20° 52′ W.; 63° 08′ N. 21° 03′ W. (Moser); 63° 11′ N. 21° 16′ W.; 63° 33′ N. 21° 23′ W. (Moser).—*W.:* Faxaflói, 64° 08′ N. 22° 46′ W.; 64° 24′ N. 23° 20′ W.; near Snæfellsnes, 64° 47′ N. 24° 02′ W.—The specimens not recorded by Moser are identified by me.

Distribution: Almost cosmopolitan, though rarely met with in arctic waters; in the northern Atlantic it is especially common in the Gulf Stream area, and by the various branches of the Gulf Stream it is carried along the west coast of Norway at least as far as North Cape, and along the south coast of Iceland into the Danmark Strait, where it has been found in several localities in the deep-sea area.

30. *Cupulita cara* (A. Agassiz).

Nanomia cara A. Agassiz 1865 p. 200, figs. 331—350; Cupulita cara Vanhöffen 1906 b p. 27, figs. 40—44; Stephanomia bijuga Bigelow 1911 p. 284, Pl. 19 figs. 5—11, Pl. 20 figs. 1—3.

Iceland record:

Cupulita cara Moser 1920 p. 188.

Occurrence at Iceland: *N.W.:* 65° 45′ N. 26° 05′ W.; 65° 50′ N. 26° 53′ W. (Moser); Djúpálsrif, 66° 53′ N. 24° 42′ W.—*S.:* 63° 15′ N. 17° 35′ W.; Selvogsbanki, 63° 22′ N. 21° 17′ W.—*W.:* Faxaflói, 64° 31′ N. 23° 36′ W.; 64° 45′ N. 23° 09′ W.

Distribution: The southern form, *C. bijuga*, occurs in the tropical parts of the Pacific and Atlantic Oceans and in the Mediterranean; the northern form, *C. cara*, is known from the northern part of the east coast of North America and the waters west of Greenland; moreover from the Gulf Stream area, whence it is regularly carried across the North Sea to the Norwegian coast and into the Skagerrak, as also by the Irminger Current along the south coast of Iceland into the Danmark Strait.

Undetermined *Physophoridæ* are recorded from numerous localities, partly by Paulsen (1904 and 1909), partly in the journals of the "Dana". In the samples preserved I have found the two species mentioned above. As both of them are characteristic Gulf Stream forms, it is worth while to give a short account of the occurrence of the specimens which cannot be referred to either of the two species. As will be seen from the

statements above, both of them have been found in a number of localities at the south and west coast of Iceland and also in some off-shore localities off the north-west coast. Their distribution towards the north seems to be somewhat variable in the different years.

In 1903 Physophorids had a particularly extensive distribution at Iceland, being found not merely at the south and west coast, but even at the north coast as far east as 66° 15′ N. 18° 58′ W., off Siglufjörður (Paulsen 1904). As to the occurrence in 1904 Paulsen states (1909) that "*Physophora*" occurs at the surface off the south coast, and at the west coast it is one of the oceanic organisms which appear in the coastal areas together with neritic forms. In the journal of 1924 Physophorids are recorded from two localities off the eastern part of the south coast, from several places in Faxaflói (some of these specimens were preserved and identified as *Cupulita cara*), and from a locality near Látrabjarg, but not from the north-west, north, and east coast. In 1925 there are several records from Faxaflói, but none from the areas farther north. 1926, a few localities in Faxaflói and Breiðifjörður. In 1927 Physophorids were found in many places along the entire south coast, as far east as 64° 15′ N. 12° 40′ W.; moreover recorded from a locality in the mouth of Breiðifjörður, from Ísafjarðardjúp, and from Djúpálsrif off the north-west coast; in this latter locality they were fairly abundant that year, and as the samples were preserved I have been able to state that both species were present there.

E. Scyphomedusæ.

31. *Haliclystus octoradiatus* (Lamarck).

Lucernaria octoradiata Keferstein 1863 p. 22, Pl. I figs. 1—3; Haliclystus auricula Clark 1878 p. 1—130, Pl. 1—9; Haliclystus octoradiatus Browne 1896 p. 1, Pl. 1.

Occurrence at Iceland: *S.*: Vestmannaeyjar.—*W.*: Grindavík in the western part of the south coast.

Distribution: European coasts from France to northern Norway; the Faroes; Spitzbergen; North America and West Greenland; Alaska; Japan.

32. *Halimocyathus lagena* (O. Fr. Müller).

Halicyathus lagena Haeckel 1880 p. 394; Halimocyathus lagena Mayer 1910 p. 537.

Occurrence at Iceland: *S.*: Vestmannaeyjar.

Distribution: Northern parts of Europe and North America; Greenland.

A third North-Atlantic Lucernarian, *Lucernaria quadricornis* O. Fr. Müller, has not yet been observed at Iceland, though there can hardly be any doubt that it occurs

there. It is common at the coasts of northern Europe from southern England to the White Sea and at the Faroes; also known from Spitzbergen, East Greenland, and from several localities at the west coast of Greenland; at the east coast of North America it occurs as far south as Massachusetts Bay.

33. *Periphylla hyacinthina* (Faber).

Periphylla hyacinthina Haeckel 1880 p. 419, Pl. 24; Vanhöffen 1892 p. 6, Pl. I figs. 1—10, Pl. II figs. 3—8, Pl. III figs. 1—7; Vanhöffen 1902 p. 23, Pl. II fig. 9, Pl. V figs. 30—34; Vanhöffen 1906 c p. 42, fig. 1.

Iceland records:

? Medusa (Phorcynia) galerita Faber 1829 p. 192.
Medusa (Melitea) hyacinthina Faber 1829 p. 197.
Periphylla hyacinthina Haeckel 1880 p. 419.

Occurrence at Iceland: The specimens examined by Haeckel (1880) were labelled "Iceland", without further particulars. Faber's "*Medusa* (*Melitea*) *hyacinthina*" was observed in Eyjafjörður on the north coast of Iceland in November 1819, his "*Medusa* (*Phorcynia*) *galerita*" was seen swimming near the shore at Eyrarbakki on the south coast in April 1821.

Precise records are at hand from the following localities: *N.W.:* Off Ísafjarðardjúp, 66° 36′ N. 23° 54′ W. (July 1832).—*S.:* Hvalsbaksbanki, 64° 15′ N. 12° 40′ W. (July 1927); near Ingólfshöfði, 63° 51′ N. 16° 25′ W. (May 1905), 63° 51′ N. 16° 29′ W. (August 1904).—Also found in several localities in the deep-sea areas south and west of Iceland.

Distribution: A cosmopolitan deep-sea medusa; in the warmer seas its occurrence is restricted to the deep strata, but in the colder areas it may ascend to the surface layers and occasionally be carried towards the coasts. It is common off the west coast and the east coast of Greenland and has also been found at Spitzbergen.

Remarks: The question of the correct name of this medusa and of its author will be further discussed on another occasion. In the literature J. Steenstrup is frequently quoted as the author of the generic as well as of the specific name, but Steenstrup's "Acta Musei Hafniensis", 1837 and 1842, from which Haeckel adopted the name, were never printed. As a matter of fact, Haeckel is the author of the generic name of *Periphylla;* if the medusa described by Faber (1829) as *Medusa* (*Melitea*) *hyacinthina* from Iceland is really identical with the species described by Haeckel (from specimens in the Zoological Museum of Copenhagen, collected at Greenland and Iceland), the author of the specific name is Faber; if not, then Haeckel (1880) becomes the author of the specific name too. It is possible that *Medusa* (*Phorcynia*) *galerita* Faber belongs to the same species, as indicated by Haeckel, but it is far from being an established fact which might

involve an alteration of the specific name from *hyacinthina* to *galerita*. It is very improbable that Olafsen's "Kiöbmands-Huuer" (1772) should be the same as *Melitea hyacinthina* as supposed by Faber (see above p. 1 and 12).

34. *Cyanea capillata* (Linné).

Cyanea capillata = arctica Haeckel 1880 p. 529, 530; Vanhöffen 1906 c p. 52, 53, figs. 15—19; C. capillata Mayer 1910 p. 596, Pl. 65 figs. 3—4.

Iceland records:

Medusa capillata Mohr 1786 p. 122.
Medusa (Ephyra) capillata Faber 1829 p. 194.
Cyanea capillata Paulsen 1909 p. 35, 39, 40, 41.

Occurrence at Iceland: The records in the literature disagree to some extent in their statements of the occurrence of this species. Mohr (1786) saw it at Akureyri in Eyjafjörður on the north coast of Iceland together with *Aurelia aurita*, though less abundant than this latter. According to Faber (1829) it is never seen on the north coast, but frequently on the south and west coast "doch ist sie immer viel seltener als *Medusa aurita* ... Im Juli und August streicht sie ... in die schmalen Buchten hinein, geht aber stets tiefer im Wasser als *M. aurita*, und treibt desswegen seltener ans Land. Im Frühjahre und Herbste wird sie schwimmend im hohen Meere, viele Meilen vom Lande, angetroffen".—Paulsen (1909) states that it was lacking at the south coast, but observed at the north coast in July and August, and at the east coast in July.

From preserved specimens and numerous records in the journals of the "Thor" and the "Dana" we can state that *Cyanea capillata* is generally distributed and very common round Iceland, though its occurrence in the different areas is dependent on the seasons and the prevailing currents.

Distribution: Widely distributed along the coasts on both sides of the North Atlantic; northern Norway, north coast of Russia, Spitzbergen, East Greenland as far north as Danmarks Havn, West Greenland as far north as Umanak.

35. *Cyanea lamarcki* Péron & Lesueur.

Cyanea lamarckii Haeckel 1880 p. 530; Vanhöffen 1906 c p. 53, 64; C. capillata var. lamarcki Mayer 1910 p. 597.

Occurrence at Iceland: Recorded in the journals of the "Dana" from the following localities: *N.W.*: Off Önundarfjörður, 66° 08′ N. 23° 43′ W.; 66° 53′ N. 23° 40′ W., with the addition that this form is observed now and then at Iceland. Dr. Å. V. Tåning tells me that the identification is beyond doubt, and Dr. B. Sæmundsson also informs me in a letter that he has seen this species.

Distribution: Very abundant at the southern coasts of England and in the southern and eastern parts of the North Sea; frequently carried into the Kattegat and northwards to the west coast of Norway, observed as far north as Bergen; also seen at the Faroes.

36. *Aurelia aurita* (Linné).

Aurelia flavidula L. Agassiz 1862 p. 10, 12, 51, 160, Pl. 6—11; A. aurita + flavidula Haeckel 1880 p. 552, 555; Aurelia aurita Mayer 1910 p. 623, Pl. 67 fig. 4, Pl. 68 figs. 1—4.

Iceland records:

Medusa aurita Mohr 1786 p. 122.
Medusa (Cyanea) aurita Faber 1829 p. 198.
Aurelia aurita Haeckel 1880 p. 552.
Aurelia aurita Paulsen 1904 p. 28—29.
Aurelia aurita Paulsen 1909 p. 35, 39, 40, 41.

Occurrence at Iceland: Mohr (1786) saw this medusa washed ashore in great abundance at Akureyri in Eyjafjörður in the autumn and winter; it was also observed by Faber (1829) in great numbers.—Paulsen (1909) records it from the north coast of Iceland in July and August, and from the east coast in July, whereas it was lacking at the south coast (in 1904).

Several preserved specimens are at hand, and in the journals of the "Dana" *Aurelia aurita* is repeatedly recorded from all parts of the Icelandic coasts. Dr. Sæmundsson has observed a gigantic specimen, 110 cm in diameter, washed ashore on a flat, sandy beach in Faxaflói.

Distribution: The typical form, *A. aurita* s. str., occurs at all the European coasts from the Mediterranean to the northern part of the west coast of Norway. The American variety, *A. flavidula*, is distributed from the West Indies to Umanak Fjord in Greenland, but it is not known from East Greenland. Other varieties occur in the Pacific.

? *Phacellophora ornata* (Verrill).

Callinema ornata Fewkes 1888 p. 235, Pl. VI figs. 1—5; Phacellophora ornata Vanhöffen 1906 c p. 59, figs. 25—26; Mayer 1910 p. 616, figs. 394—395.

Dr. B. Sæmundsson tells me in a letter that some years ago a gigantic medusa was caught in Berufjarðaráll at the south-east coast of Iceland; it measured 6 feet (nearly 2 metres) in diameter, and the four mouth arms were about 20 feet (about 6 metres) long. From an accompanying sketch I am inclined to think that it was a specimen of *Phacellophora ornata*, especially when compared with the new figure of Verrill's type specimen drawn by Mayer (1910), which is rather different from the figures given by Fewkes (reproduced by Van-

höffen 1906). *Ph. ornata* is a rare medusa found at Eastport, Maine and in the Bay of Fundy on the east coast of North America. Also found east of Montevideo in South America, 34° 02′ S. 49° 07′ W. One of Verrill's specimens was about 46 cm in diameter, and the closely related *Phacellophora camtschatica* Brandt in the Pacific attains a size of about 60 cm. Medusæ can evidently, under certain circumstances, survive during a longer period than normally and continue their growth far beyond their usual size; the observation by A. Agassiz (1865 p. 44) of a *Cyanea* 2.3 metres in diameter, and by Sæmundsson of an *Aurelia* 1.1 meter large (see above) may be explained by such continued growth. It is possible, therefore, that a specimen of *Phacellophora*, which even under normal circumstances is a large medusa, may have attained the considerable size of 2 metres while being carried across the North Atlantic from America to southern Iceland by the Gulf Stream; the locality where it was found confirms the supposition that it was brought to Iceland by the Gulf Stream.

F. Ctenophora.

37. *Mertensia ovum* (Fabricius).

Mertensia ovum A. Agassiz 1865 p. 26, figs. 29–37; Römer 1903 p. 72; Vanhöffen 1906 a p. 2, figs. 1–3; Mortensen 1912 p. 60.

Iceland record:

Medusa (Beroë) ovum Faber 1829 p. 201.

Occurrence at Iceland: Observed by Faber at the coasts of Iceland, mainly at the north coast; he found it in Eyjafjörður in January—April. Faber also records this species from Vestmannaeyjar at the south coast, but according to Mortensen (1912 p. 65) it is not very probable that this arctic species should have been found there. It has not been recorded from Iceland since it was observed by Faber, though it is possible that some of the specimens of "*Bolinopsis*", mentioned in the journals of the "Thor" and the "Dana" may have been *Mertensia;* it should be noted, however, that this Ctenophore is exceedingly difficult to preserve, so that its presence can only be stated through observation of living specimens. Faber writes as follows: "Diese Meduse, so schön sie im Wasser ist, ist doch so zerbrechlich, dass sie bei der mindesten Berührung auseinanderfällt. Wenn sie ans Ufer getrieben worden, ist es unmöglich sie aufzuheben, da sie gleich wie ein Schleim aussieht."

Distribution: Arctic, circumpolar; east coast of North America, carried southwards with the Labrador Current as fas as Newport; Greenland and Spitzbergen, but not with certainty recorded from Norway.

Pleurobrachia pileus (O. Fr. Müller). This cosmopolitan species, which is abundant at both sides of the North Atlantic, does not seem to belong to the fauna of Iceland; as it is fairly resistent and not difficult to preserve, it would certainly be brought home by some of the investigators of the Icelandic waters, if it occurred there. Mortensen (1912 p. 55) is however inclined to think that Faber's record (1829 p. 201) of "*Beroë ovum*" (= *Mertensia ovum*) being observed at Vestmannaeyjar is due to his mistaking a *Pleurobrachia pileus* for *M. ovum*. Moreover *Pleurobrachia* is recorded once in the journals of the "Dana": Near Snæfellsnes on the west coast, 64° 48′5 N. 24° 04′5 W., July 1936.

38. *Bolinopsis infundibulum* (O. Fr. Müller).

Bolina alata L. Agassiz 1850 p. 349, Pl. 6—8; Bolina infundibulum Vanhöffen 1906 *a* p. 5, fig. 11; Bolinopsis infundibulum Mayer 1912 p. 12, Pl. 4 figs. 12—15.

Iceland records:

Bolina Paulsen 1904 p. 27—28.
Bolina infundibulum Mortensen 1912 p. 75.

Occurrence at Iceland: *N.W.*: Skútilsfjörður. *N.*: 66° 13′ N. 20° 29′ W. (Paulsen); several stations between 66° 17′ N. 20° 16′ W. (north of Skagatá) and 66° 22′ N. 14° 27′ W. (near Langanes) (the journal of the "Dana"); 66° 15′ N. 18° 58′ W. (Paulsen).—*E.*: Off Seyðisfjörður; off Reyðarfjörður; off Papey (all from the journals of the "Dana").—*S.*: Near Eystrahorn, 64° 22′ N. 14° 22′ W. ("Dana"); 63° 13′ N. 15° 48′ W. (Paulsen).—*W.*: 63° 47′ N. 25° 20′ W. ("Dana"); Faxaflói, 64° 30′ N. 23° 15′ W. (Paulsen).

Like *Mertensia ovum*, this species is very fragile and difficult to preserve (the specimen from Skútilsfjörður is the only one preserved). According to the journals (from the north coast in July 1932) "*Bolinopsis* evidently occurs as fragments, but the specimens are immediately dissolved into slimy masses." We cannot preclude the possibility, therefore, that, as far as the north and east coast are concerned, some of the "slimy masses" seen in the nets have been remnants of *Mertensia ovum*, which has the same peculiar tendency of falling to pieces; but evidently *Bolinopsis* is really fairly common at the coasts of Iceland.

Distribution: Arctic seas, probably circumpolar. Western Atlantic from Woods Hole in New England to Umanak in Greenland; East Greenland; Spitzbergen; western Europe as far south as the North Sea; possibly also in the Mediterranean. Closely related species from various parts of the world are considered by some authors to be synonyms of *B. infundibulum*, which may then be regarded as a cosmopolitan species.

39. *Beroë cucumis* Fabricius.

Idyia roseola L. Agassiz 1860 p. 270, Pl. I—II; Beroë ovata Chun 1880 p. 308, Pl. 14 figs. 1—2; B. cucumis Vanhöffen 1906 a p. 7, figs. 16—17; B. ovata Mayer 1912 p. 49, Pl. 14 fig. 56, Pl. 15 figs. 63—69, Pl. 16 figs. 72—75; B. cucumis Mayer 1912 p. 52, Pl. 15 fig. 67, Pl. 17 fig. 76; Mortensen 1912 p. 83.

Iceland records:

Medusa (Beroë) cucumis Faber 1829 p. 200.
Beroë Paulsen 1904 p. 27—29.
Beroë cucumis Paulsen 1909 p. 35, 38—41.
Beroë cucumis Mortensen 1912 p. 83.

Occurrence at Iceland: Faber saw this species in Eyjafjörður on the north coast and in Breiðifjörður on the west coast; according to Paulsen it is very abundant at the north coast. Several preserved specimens are at hand, and in the journals of the "Thor" and the "Dana" *Beroë cucumis* is recorded from numerous localities at all parts of the Icelandic coasts, usually in great abundance.

Distribution: Cosmopolitan; common in arctic waters, circumpolar.

II. General Remarks.

The vast majority of the 39 species of jellyfish observed in the coastal areas round Iceland have their principal occurrence in the boreal regions, though several of them penetrate more or less into the Arctic, whereas others have a predominantly southern distribution. According to their zoogeographical character the species may approximately be divided as follows:

3 well-marked arctic species.
5 arctic-boreal.
9 northern-boreal.
8 boreal.
3 southern-boreal.
4 decidedly southern species.
7 cosmopolitan or very widely distributed.

Table I illustrates the occurrence of the 39 Icelandic species in other parts of the North Atlantic area. Up to now only 8 of these species have been observed at the east coast of Greenland which, however, is very deficiently investigated as far as pelagic animals are concerned; as seen from Table II altogether 12 species of jellyfish are known from East Greenland, 4 of which have not been found at Iceland; one of these, *Lucernaria quadricornis*, undoubtedly occurs there, the three others are

TABLE 1

Synopsis of the distribution of the Medusæ, Siphonophores, and Ctenophores occurring at Iceland.	West Greenland	East Greenland	Iceland	Spitzbergen	Norway N. of Lofoten	Norway S. of Lofoten	The Faroes
1. Sarsia tubulosa	×	—	×	—	×	×	×
2. Steenstrupia nutans	—	—	×	—	—	×	×
3. Hybocodon prolifer	—	—	×	—	×	×	×
4. Bougainvillia superciliaris	×	—	×	×	×	×	×
5. — principis	—	—	×	—	×	×	×
6. — ramosa	—	—	(×)[1]	—	—	×	—
7. Lizzia blondina	—	—	×	—	—	×	×
8. Podocoryne carnea	—	—	(×)	—	(×)	×	—
9. — arcolata	—		×	—	—	×	—
10. Rathkea octopunctata	×	—	×	—	×	×	×
11. Halitholus pauper	×	—	×	—	—	—	—
12. Leuckartiara octona	—	—	×	—	—	×	×
13. — breviconis	×	—	×	—	—	×	×
14. Catablema vesicarium	×	×	×	×	×	—	—
15. Neoturris pileata	—	—	×	—	—	×	—
16. Laodicea undulata	—		×	—	×	×	×
17. Staurophora mertensii	×	—	×	×	×	×	×
18. Melicertum octocostatum	—	—	×	—	—	×	—
19. Halopsis ocellata	×	—	×	—	×	×	—
20. Tiaropsis multicirrata	×	—	×	—	×	×	×
21. Obelia nigra	(×)	(×)	×	(×)	(×)	×	×
22. — geniculata	(×)	—	(×)	—	(×)	(×)	(×)
23. — dichotoma	—	—	(×)	—	(×)	(×)	(×)
24. Phialidium hemisphæricum	—	—	×	—	—	×	×
25. — islandicum	—	—	×	—	—	×	—
26. Eutonina indicans	—	—	×	—	—	×	—
27. Aglantha digitale	×	×	×	×	×	×	×
28. Cholophyes appendiculata	—	—	×	×	—		—
29. Physophora hydrostatica	—	—	×	—	×	×	×
30. Cupulita cara	×	—	×	—		×	×
31. Haliclystus octoradiatus	×	—	×	×	×	×	×
32. Halimocyathus lagena	×	—	×	—	×	×	
33. Periphylla hyacinthina	×	×	×	×	×	×	
34. Cyanea capillata	×	×	×	×	×	×	×
35. — lamarcki	—	—	×	—	—	×	×

[1]) (×) = only the polyp stage observed.

TABLE I (cont.)

Synopsis of the distribution of the Medusæ, Siphonophores, and Ctenophores occurring at Iceland.	West Greenland	East Greenland	Iceland	Spitzbergen	Norway N. of Lofoten	Norway S. of Lofoten	The Faroes
36. Aurelia aurita	×	—	×	—	×	×	×
37. Mertensia ovum	×	×	×	×	—	—	—
38. Bolinopsis infundibulum	×	×	×	×	×	×	×
39. Beroë cucumis	×	×	×	×	×	×	×
Total number of species	21	8	39	12	23	35	25

strictly arctic forms. The better investigated area west of Greenland has 21 species in common with Iceland, and almost all of the Icelandic jellyfish are known from the west coast of Norway. It is interesting to note that whereas only 12 of the Icelandic jellyfish are found at Spitzbergen, and several of them are unknown at the northern part of the Norwegian coast, almost all of them occur at the southern part, between Lofoten and Lindesnes, the only exceptions being the three truly arctic species *Halitholus pauper, Catablema vesicarium,* and *Mertensia ovum.* This clearly demonstrates the predominantly boreal character of the Icelandic fauna of jellyfish. 14 of the Icelandic species have not been observed at the Faroes, but undoubtedly several of them actually occur there.

Among the 28 species known from the Faroes (see Table II) only three have not been found at Iceland. Some of the 31 species from Norway south of Lofoten not observed at Iceland have their main occurrence in the deeper strata in the Norwegian fjords: *Tiaranna rotunda, Bythotiara murrayi, Calycopsis simplex, Ptychogena crocea, Cyclocanna welshi,* and *Octocanna funeraria.* The distribution of *Dipleurosoma typicum* and *Eutima elephas* is deficiently known. *Dimophyes arctica* and *Lucernaria quadricornis* must be supposed to live at Iceland, though they have not yet been found there; *Ptychogastria polaris* is an arctic species which is common at the northern part of the Norwegian coast but only occasionally met with south of Lofoten; the absence of *Pleurobrachia pileus* in the Icelandic waters is difficult to explain. 20 of the Norwegian jellyfish are species with a pronounced southern distribution which are not likely to be found as far north as Iceland; several of these are oceanic forms which are not constant inhabitants of the Norwegian coastal area, but are more or less regularly carried there by the Gulf Stream.

In case of a closer examination of the Icelandic fauna of jellyfish and

TABLE II

The Medusæ, Siphonophores, and Ctenophores of East Greenland, Iceland, the Faroes, and the west coast of Norway south of Lofoten (in depths down to about 300 m).	East Greenland	Iceland	The Faroes	Norway S. of Lofoten
Sarsia eximia Allman	—	—	—	×
— tubulosa (M. Sars)	—	×	×	×
— gemmifera Forbes	—	—	—	×
Euphysa aurata Forbes	—	—	—	×
Steenstrupia nutans (M. Sars)	—	×	×	×
Hybocodon prolifer L. Agassiz	—	×	×	×
Margelopsis hartlaubi Browne	—	—	—	×
Eleutheria dichotoma Quatrefages	—	—	—	×
Bougainvillia nordgaardi Browne	—	—	—	×
— britannica Forbes	—	—	—	×
— superciliaris L. Agassiz	—	×	×	×
— principis (Steenstrup)	—	×	×	×
— ramosa van Beneden	—	(×)	—	×
Lizzia blondina Forbes	—	×	×	×
Podocoryne carnea M. Sars	—	(×)	—	×
— areolata Alder	—	×	—	×
Rathkea octopunctata (M. Sars)	—	×	×	×
Tiaranna rotunda (Quoy & Gaimard)	—	—	—	×
Halitholus pauper Hartlaub	—	×	—	—
Leuckartiara octona (Fleming)	—	×	×	×
— breviconis (Murbach & Shearer)	—	×	×	×
Catablema vesicarium (A. Agassiz)	×	×	—	—
Neoturris pileata (Forskål)	—	×	—	×
Bythotiara murrayi Günther	—	—	—	×
Calycopsis simplex Kramp & Damas	—	—	—	×
Willia stellata Forbes	—	—	—	×
Laodicea undulata (Forbes & Goodsir)	—	×	×	×
Staurophora mertensii Brandt	—	×	×	×
Ptychogena crocea Kramp & Damas		—	—	×
Dipleurosoma typicum Boeck	—	—	—	×
Milicertum octocostatum (M. Sars)	—	×	—	×
Mitrocomella polydiademata (Romanes)	—	—	×	×
Cosmetira pilosella Forbes	—	—	—	×
Halopsis ocellata A. Agassiz	—	×	—	×
Tiaropsis multicirrata (M. Sars)	—	×	×	×
Cyclocanna welshi Bigelow	—	—	—	×
Obelia nigra Browne	×	×	×	×

TABLE II (cont.)

The Medusæ, Siphonophores, and Ctenophores of East Greenland, Iceland, the Faroes, and the west coast of Norway south of Lofoten (in depths down to about 300 m).	East Greenland	Iceland	The Faroes	Norway S. of Lofoten
Obelia geniculata (L.)	—	(×)	(×)	(×)
— dichotoma (L.)	—	(×)	(×)	(×)
Phialidium hemisphæricum (L.)	—	×	×	×
— islandicum Kramp	—	×	—	×
Octocanna funeraria (Quoy & Gaimard)	—	—	—	×
Eutonina indicans (Romanes)	—	×	—	×
Eutima elephas (Haeckel)	—	—	—	×
Tima bairdii Johnston	—	—	—	×
Æquorea vitrina Gosse	—	—	—	×
Ptychogastria polaris Allman	×	—	—	×
Homoeonema platygonon Maas	—	—	—	×
Aglantha digitale (O. Fr. Müller)	×	×	×	×
Solmaris corona Keferstein & Ehlers	—	—	—	×
Æginopsis laurentii Brandt	×	—	—	—
Lensia conoidea (Kef. & Ehlers)	—	—		×
Galetta australis (Quoy & Gaimard)	—		—	×
Dimophyes arctica (Chun)	—	—	—	×
Chelophyes appendiculata (Eschscholtz)	—	×	—	—
Agalmopsis elegans (M. Sars)	—	—	—	×
Physophora hydrostatica Forskål		×	×	×
Cupulita cara (A. Agassiz)	—	×	×	×
Lucernaria quadricornis O. Fr. Müller	×	—	×	×
Haliclystus octoradiatus (Lamarck)	—	×	×	×
Halimocyathus lagena (O. Fr. Müller)	—	×	—	×
Periphylla hyacinthina (Faber)	×	×	—	×
Nausithoë limpida Hartlaub	×	—	—	—
Pelagia noctiluca (Forskål)	—	—	—	×
Chrysaora hysoscella (L.)	—	—	—	×
Cyanea capillata (L.)	×	×	×	×
— lamarcki Péron & Lesueur	—	×	×	×
Aurelia aurita (L.)	—	×	×	×
Mertensia ovum (Fabricius)	×	×	—	—
Pleurobrachia pileus (O. Fr. Müller)	—	—	×	×
Bolinopsis infundibulum (O. Fr. Müller)	×	×	×	×
Beroë cucumis Fabricius	×	×	×	×
Total number of species	12	39	28	66

the distribution of the species at the various parts of the coast, the differences in the biological habits of the animals must be taken into consideration.

Two species are benthonic: the Lucernarians *Haliclystus octoradiatus* and *Halimocyathus lagena;* they are both littoral forms which are widely distributed in arctic as well as in boreal regions; at Iceland they have only been found in a few localities on the south coast, but most probably they have a more extensive distribution along the Icelandic coasts. They are included in Tables I—II, whereas the following discussion deals only with the pelagic organisms.

The 37 species of pelagic jellyfish mentioned in the present paper are partly meroplanktonic, partly holoplanktonic. The occurrence of the latter, which pass the whole of their life-cycle in the plankton, is altogether determined by the sea currents and the hydrographical conditions of the water, by which they are carried along, whereas the distribution of the meroplanktonic forms is also dependent on the occurrence of the benthonic polyp stage. They originate in the localities where the polyps are able to live, and they are carried to other places by the currents; how far they may be carried away, depends on the velocity of the current, the duration of life of the pelagic stage, and the changes of the hydrographical conditions of the water during the transportation to other regions.

Among the 37 species of jellyfish belonging to the Icelandic plankton, the Ctenophores (3 species), the Siphonophores (3 species), and the Trachymedusæ (1 species) are holoplanktonic; the life-cycle of the Scyphomedusa *Periphylla hyacinthina* is unknown; if it has a fixed stage (which we do not know), it must occur in deep water far from land; at any rate, *Periphylla* is a truly oceanic deep-sea medusa, and its occasional occurrence in the coastal water is entirely due to the oceanic currents. The majority of the Icelandic medusæ are meroplanktonic: 3 Scyphomedusæ and 26 Leptolina (Anthomedusæ and Leptomedusæ), and most probably almost all of them are indigenous in the Icelandic coastal waters, i.e. their polyps must be supposed to live there, though in most cases these polyps are unknown.

Holoplanktonic species.—*Aglantha digitale* (arctic-boreal), *Bolinopsis infundibulum* (arctic-boreal or perhaps cosmopolitan), and *Beroë cucumis* (cosmopolitan) are generally distributed throughout the northern Atlantic and adjacent waters, and they occur at all parts of the Icelandic coasts. *Mertensia ovum* has an entirely arctic distribution; at Iceland it has only been observed at the cold north coast. The Siphonophores *Cupulita cara* and *Physophora hydrostatica* (cosmopolitan) are typical Gulf Stream forms, and by the northern branch of the Gulf Stream they are carried westwards along the south coast of Iceland, following the

TABLE III

Distribution of the *meroplanktonic* species of Medusæ in the various sections of the Icelandic coastal area.	S.	W.	N.W.	N.	E.
11 Halitholus pauper	—	—	×	—	—
14 Catablema vesicarium	—	—	×	×	×
Number of *arctic* species (2)	0	0	2	1	1
1 Sarsia tubulosa	×	×	×	×	×
3 Hybocodon prolifer	—	×	×	×	×
4 Bougainvillia superciliaris	—	×	×	×	—
5 — principis	×	×	×	×	×
10 Rathkea octopunctata	—	—	×	×	×
17 Staurophora mertensii	×	×	×	×	×
18 Melicertum octocostatum	×	—	—	×	×
20 Tiaropsis multicirrata	—	—	×	×	×
25 Phialidium islandicum	×	×	×	×	×
34 Cyanea capillata	×	×	×	×	×
Number of *arctic-boreal* and *northern-boreal* species (10)	6	7	9	10	9
2 Steenstrupia nutans	×	×	—	—	—
9 Podocoryne areolata	×	—	—	—	—
13 Leuckartiara breviconis	×	×	—	—	—
19 Halopsis ocellata	×	×	×	—	—
26 Eutonina indicans	—	×	×	—	—
35 Cyanea lamarcki	—	—	×	—	—
36 Aurelia aurita	×	×	×	×	×
Number of *boreal* species (7)	5	5	4	1	1
6 Bougainvillia ramosa	×	—	—	—	—
7 Lizzia blondina	—	—	—	×	—
12 Leuckartiara octona	×	—	—	—	—
15 Neoturris pileata	×	×	×	—	—
16 Laodicea undulata	×	×	×	—	—
24 Phialidium hemisphæricum	×	×	—	—	—
Number of *southern-boreal* and *southern* species (6) ...	5	3	2	1	0

Irminger Current into the Danmark Strait, and northwards along the west coast of Iceland, sometimes even round Horn to the north coast. The third Siphonophore, *Chelophyes appendiculata*, is a rare guest from the south.

Meroplanktonic species.—*Periphylla hyacinthina* which,

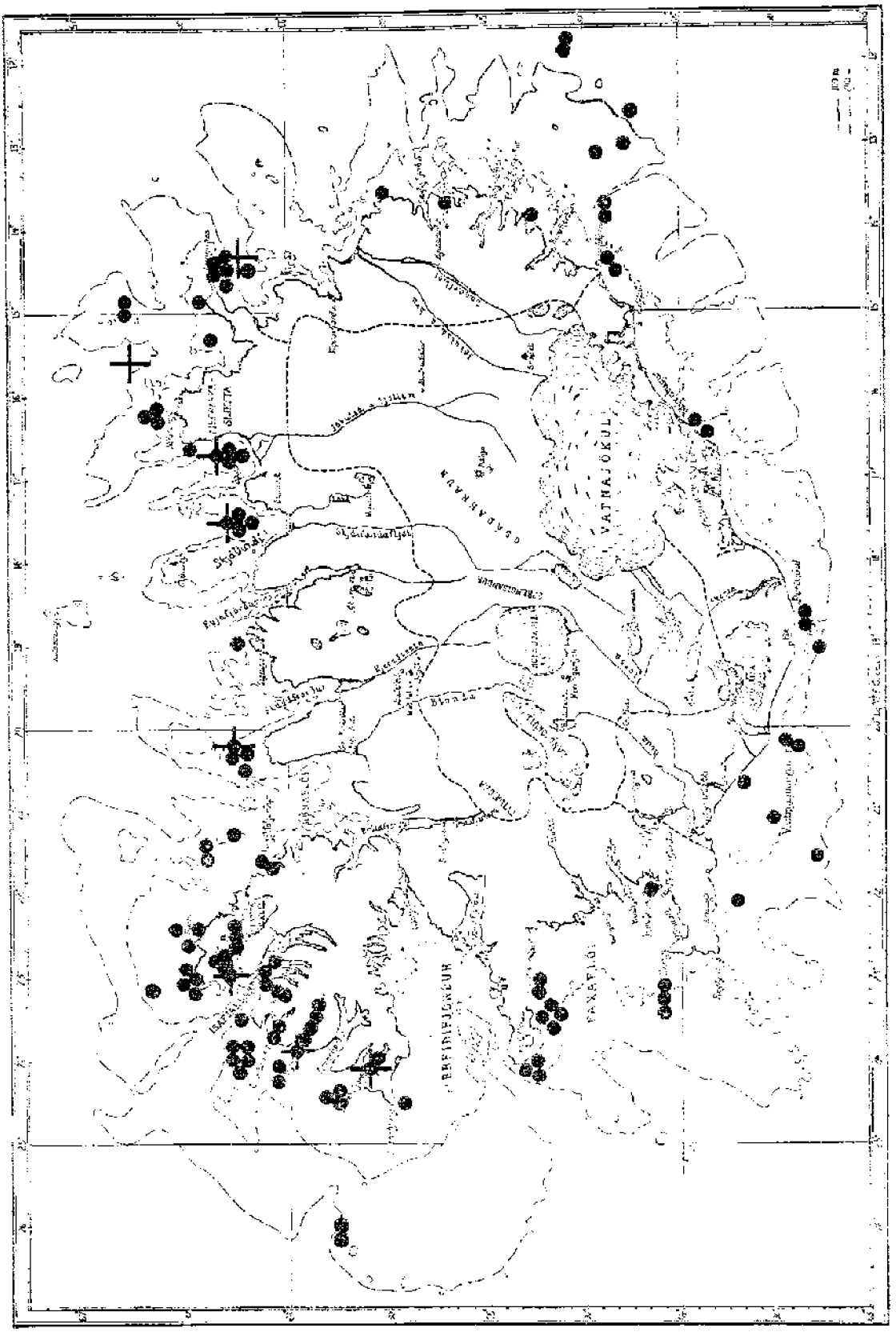

Fig. 1. The occurrence at Iceland of neroplanktonic Hydromedusæ. + arctic species, ● arctic-boreal and northern-boreal species.

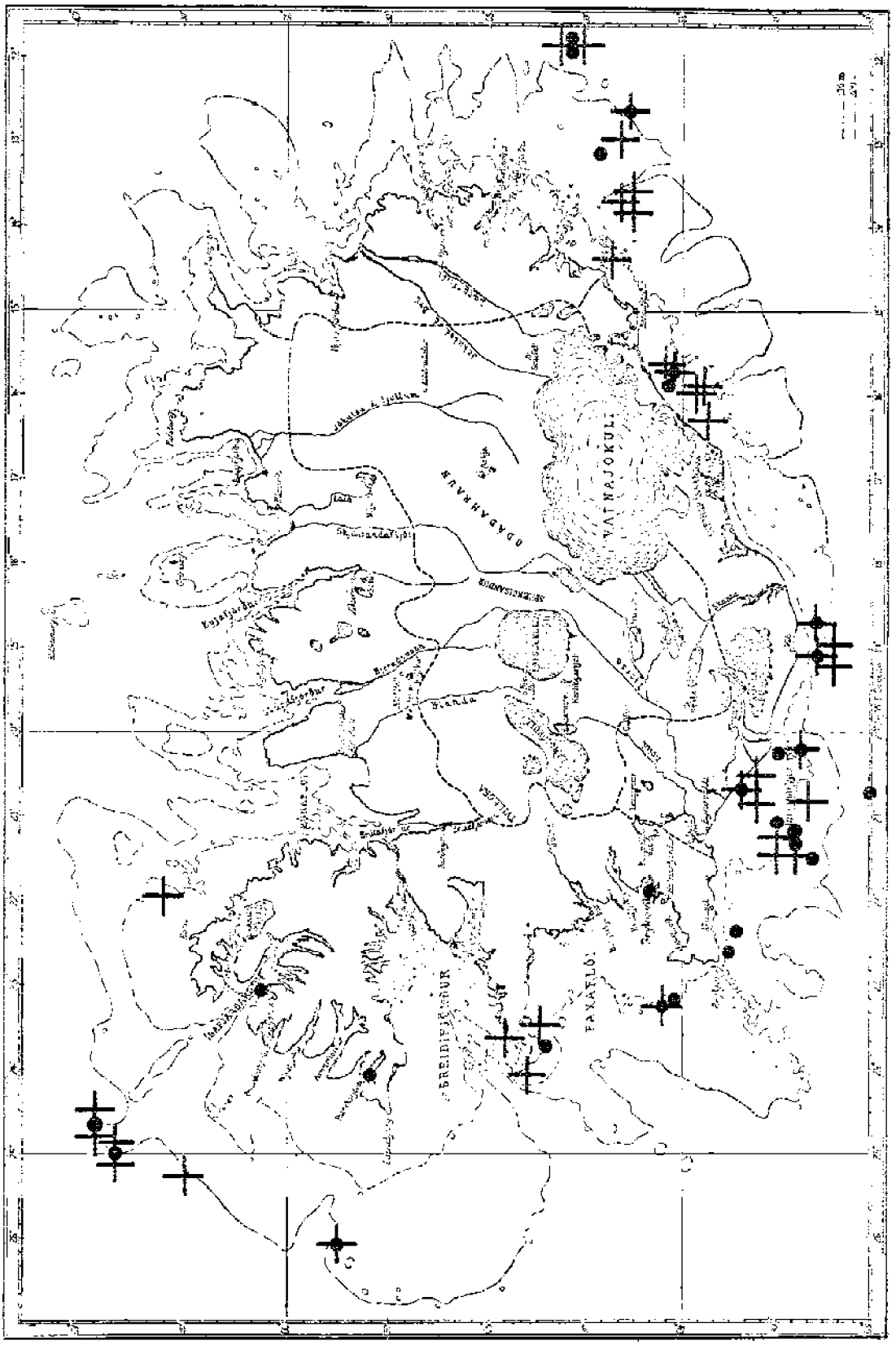

Fig. 2. The occurrence at Ireland of macroplanktonic Hydromedusæ. ● boreal species, + southern-boreal and southern species.

being a Scyphomedusa, is generally supposed to be meroplanktonic, is a cosmopolitan, oceanic deep-sea medusa which occasionally may ascend to the surface water in these northern latitudes and then may follow the same route as the Siphonophores along the southern and western coasts of Iceland.

The majority of the Leptolina as well as the Scyphomedusæ *Cyanea capillata* and *lamarcki* and *Aurelia aurita* are undoubtedly indigenous in the Icelandic coastal areas. The occurrence of the meroplanktonic medusæ at the various parts of the coasts of Iceland is determined partly by the occurrence of their polyps (most of which are unknown), and partly by their ability to stand the changes of the hydrographical conditions while they are carried round the coasts in a clockwise direction by the currents.

The occurrence of the meroplanktonic species in the various sections of the coastal area is illustrated in Table III and in the maps, figs. 1 and 2. The Scyphomedusæ *Cyanea capillata* and *Aurelia aurita* are generally distributed round Iceland; the occurrence of *Cyanea lamarcki* is deficiently known; they are included in the table, but not in the maps. In the table one locality far from land off the southern part of the east coast (64° 35′ N. 11° 45′ W.), where several species were found, is referred to the southern section (S.), because in this off-shore locality the influence of the warm currents, derived from the Gulf Stream, is still so remarkable that species with a predominantly southern distribution may occur there, at least in certain years.

The two well-marked arctic, meroplanktonic species have only been found at the northern and eastern parts of the Icelandic coast and in some of the north-western fjords; in summer the water is comparatively warm in these fjords, but in spring, when these arctic species were found (May—June), the cold water of the East Greenland Polar Current approaches this part of the coast, dominating over the warmer water of the Irminger Current.

The species with an arctic-boreal or northern-boreal distribution are fairly evenly distributed round Iceland, as clearly seen from the map, fig. 1; some of them have not yet been observed at the south and west coast, but considering their distribution in other parts of the North Atlantic area, it is highly probable that all of them actually occur there. This is the largest group of Icelandic medusæ, not merely because it comprises the greatest number of species (10), but also in so far as most of these species are particularly common in the Icelandic waters and have been found in several localities.

In striking contradistinction to this group of species, the occurrence of the boreal, southern-boreal, and southern species

is almost entirely restricted to the comparatively warm areas along the south and west coast. *Eutonina indicans* has also been found in the north-western fjords, and *Neoturris pileata*, *Halopsis ocellata*, and *Laodicea undulata*, which are large medusæ with a fairly long duration of pelagic life, are sometimes observed far from land off the north-west coast, in July and August when the influence of the warm Irminger Current is particularly perceptible. *Lizzia blondina* has only once been found at Iceland, in July 1902, in a locality near Horn at the boundary between the *N.W.* and *N.* sections; this southern-boreal species may not be a constant inhabitant of the Icelandic waters, but in that particular year it might, of course, also have been found off the north-west and west coast; it should be noticed, however, that this is a budding medusa, greatly increasing in number while being carried away by the currents, so that a few specimens reared from the (unknown) hydroid somewhere at the west coast, or even at the south coast, may give rise to a considerable stock of medusæ far from the place of origin. *Aurelia aurita* is the only "boreal" species occurring in all sections.

To the zoogeographical groups of species mentioned above might be added a group of cosmopolitan or widely distributed species. It only comprises the oceanic medusa *Periphylla hyacinthina* (which has been dealt with above) and the three species of *Obelia*, the pelagic medusæ of which cannot be separated with certainty; the distribution of the corresponding hydroids is mentioned in my paper on the hydroids of Iceland (Kramp 1938).

Table III and the maps, figs. 1 and 2, show a remarkable conformity between the zoogeographical character of the species of medusæ and their occurrence at Iceland. The species which, in relation to Iceland, have a predominantly southern distribution, follow the northern branch of the Gulf Stream (the Irminger Current) westwards along the south coast and northwards along the west coast; apparently very few of them are able to stand the cooling of this water after it has passed the north-western corner of the island, where the influence of the East Greenland Polar Current is remarkable. On the other hand, the few well-marked arctic species are entirely lacking at the south and west coast. Only the arctic-boreal and northern-boreal species occur all round the island.

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