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NEBALIACEA, CUMACEA, SCHIZOPODA, AND STOMATOPODA.

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The Clare Island marine area, as understood in this report, extends from Blacksod Bay in the north to Slyne Head in the south. Seawards it may be considered to extend to the fifty-fathom line.

Up to about a dozen years ago no collecting appears to have been done in this area. At least I can find no records pertaining to the orders of Crustacea here dealt with.

In 1899 the Fisheries Branch of the Department of Agriculture and Technical Instruction for Ireland established a marine station at Inishbofin and Ballynakill, and commenced a series of observations which have gone very far to elucidate the marine fauna of the southern part of the area.

The Clare Island Survey, commenced some three years ago, has more particularly dealt with the northern part of the district. In the preparation of this report I have supplemented the results obtained by the latter survey by including the species obtained by the former series of investigations, so that the present report includes all the species of the Crustacea concerned which have up till now been found in the area. The list of the Cumacea here given is partly derived from Calman's paper,[1] and partly from the collections made during the survey; while the list of Schizopoda has been largely supplemented by extracts from a larger paper on the littoral Schizopoda of Ireland, which I have in preparation.

The Crustacea here considered are creatures of normally bottom-haunting habits, living either in rock-pools on the shore, or among the littoral seaweeds, or buried in sand. But they have the additional peculiarity that they frequently become true pelagic forms during the hours of darkness, and may be captured in enormous numbers at such times. Whereas, therefore, the usual method of collecting such forms is by using a dredge or otherching

[1] Fisheries, Ireland, Sci. Invest., 1904, I. (1906).

fine-meshed nets to trawls worked over the ground, the use of a tow-net at night, especially in the shallow bays and harbours, not only facilitates the collection of species, but gives a better and more correct idea of the abundance or scarcity of the different species collected. In the Cumacea it is usually the males only which become free-swimming at night, but among the Mysidae both sexes appear to be equally represented in night gatherings.

The Stomatopoda are represented so far only by larval forms caught in the tow-nets. These belong to two distinct genera; but the species cannot yet be definitely settled pending the capture of adult specimens.

The present report includes one species of Cumacea and one of Mysidae new to Ireland and one species of the former and eight of the latter not hitherto recorded from the district.

SYNCARIDA.

Nebalia bipes (Fabricius).—*Nebalia bipes* is abundant throughout the district. It is to be found at low water at spring tides under stones on the shores, and seems to prefer the neighbourhood of black, evil-smelling mud. It is likewise frequently captured at night in tow-nettings taken in harbours and sheltered bays. On one occasion a lobster, which had died in the lobster-pot, was found to be covered literally with thousands of this Crustacean.

CUMACEA.

Bodotria scorpioides Montagu.—Taken in nineteen gatherings from Bofin Harbour, three from Fahy Bay, Ballynakill Harbour, and one from just north of Cleggan Bay. It never occurred in very large numbers, and was most abundant in the tow-nettings at night. Clew Bay, once.

B. pulchella (G. O. Sars).—Fahy Bay, Ballynakill Harbour, twice; north entrance to Ballinakill Harbour, once; Cleggan Bay, once; Blacksod Bay, twice.

Cumopsis goodsiri (van Beneden).—Feorinyeeo Bay, Blacksod Bay, two males and two females. New to Ireland.

Iphinoë trispinosa (Goodsir).—One of the most abundant species in the area in harbours and sheltered bays. Abundant in tow-nettings taken at night in Ballynakill and Bofin Harbours; Clew Bay, 5–11 fms., common; Blacksod Bay, 2–9fms., common.

Vaunthompsonia cristata, Spence Bate.—Occurs in considerable numbers in Ballynakill Harbour. Common in night tow-nettings, but only [illegible] specimens are captured in this way. Elly Bay, Blacksod Bay, [illegible] three specimens.

Eudorella truncatula (Spence Bate).—Taken three times in Bofin Harbour and three times in Fahy Bay, Ballynakill Harbour. Clew Bay, 1–5 fms., common. Blacksod Bay, 5 fms., two specimens.

Cumella pygmæa, G. O. Sars.—Generally distributed throughout the area, both in the harbours and sheltered bays, and in the open seas down to 45 fms.

Nannastacus unguiculatus, Spence Bate.—Very abundant in the sheltered bays and harbours of the district, but also found in the open seas round Clare Island and Inishturk. Blacksod Bay, one specimen.

N. brevicaudatus, Calman.—The types and only known specimens were found in Ballynakill Harbour.

Pseudocuma longicornis (Spence Bate).—The most abundant species of Cumacea in the area, and generally distributed. Often taken in large numbers in tow-nettings made at night.

P. similis, G. O. Sars.—Bofin Harbour, one specimen. 1¼ miles N.W. by W. of Inishturk, one specimen. Between Clare I. and Achillbeg, one specimen.

Diastylis rugosa, G. O. Sars.—From Ballynakill Harbour, on five occasions. Blacksod Bay, one specimen.

D. rostrata (Goodsir).—Twice taken in Ballynakill Harbour. Clew Bay, 5–10 fms., two specimens. Blacksod Bay, 3–9 fms., common. 5 mi. S.S.E. of Clare I. light, 17 fms., four specimens.

D. spinosa, Norman.—2½ miles S.E. of Clare I. light, 18 fms., one male. 3½ miles S.S.W. of Mulranny pier, Clew Bay, 15 fms., one female. Blacksod Bay, 9 fms., two males. New to the district.

EUPHAUSIACEA.

Meganyctiphanes norvegica (M. Sars).—*M. norvegica* is very frequently taken in tow-nettings in the open seas of the Clare Island marine area, but is seldom found in any of the harbours in that area. It may, however, be driven in during gales, and even cast up on the beach. It forms the main food of mackerel, herring, salmon, and trout in the springtime, and, judging from the contents of the stomachs of these fishes examined at that period of the year, this Euphausian must be enormously abundant at certain seasons. The contents of the stomach of a whale captured at Inishkea in the spring of 1900 were found to consist entirely of this species.

Nyctiphanes couchi Bell.—A smaller form than *M. norvegica*, *N. couchi* is usually found associated with this species in the open seas round Clare Island and district, and appears to be equally abundant. Considered

broadly, however, *N. couchi* is a more distinctly shallow water species than *M. norvegica*. Like the latter, it is a favourite food of pelagic fishes.

Thysanoessa inermis (Kroyer).—This species has a distribution in the district under review entirely coincident with that of *M. norvegica* and *N. couchi*, and is usually found associated with them. Under this species I include records formerly listed under the name *Boreophausia raschii* (Kröyer), and *Thysanoessa neglecta* (Kroyer), since, according to Hansen, these two supposedly distinct species are merely dimorphic forms of one species, which must bear the earlier name here given to it.

MYSIDACEA.

Siriella armata (Milne-Edwards).—Near Portlea, Clare Island, 7 fms. Inishgowla Harbour, Clew Bay, 1–4 fms. South side of Feorinyeeo Bay, Blacksod Bay, shore. Feorinyeeo Bay, 2–5 fms. Elly Bay, Blacksod Bay, 1–3 fms. Carrigeenmore, Blacksod Bay, in tow-net through weed close to shore. Entrance to Blacksod Bay, 7 fms. Bofin Harbour, common. Ballynakill Harbour, common. Cleggan Bay, 17 fms.

A very common and abundant species in the district generally, living among Laminaria and other seaweeds, or in rock-pools, frequently captured free-swimming at night, by means of tow-nets.

S. clausii, G. O. Sars.—Inishgowla Harbour, Clew Bay, 1–4 fms. South side of Feorinygeeo Bay, Blacksod Bay, rock-pools on the shore. Entrance to Blacksod Bay, 7 fms. Cleggan Bay, 17 fms. 2½ miles S.W. by W. of Shark Head, Inishark, surface. Half mile N. of Cleggan Head, surface. Bofin Harbour, very abundant. Ballynakill Harbour, very abundant.

A very common species, especially abundant at night in the bays and shallow bays of the area.

S. jaltensis, Czerniavsky.—Carrigeenmore, Blacksod Bay shore. South side of Feorinyeeo Bay, Blacksod Bay, shore. Elly Bay, Blacksod Bay, off Barranagh, Blacksod Bay, 2–3 fms. Portlea, Clare Island, in tow-net, 2½ miles S.W. by W. of Shark Head, Inishark, surface. 2 miles W. by S. of Inishturk, surface. ½ mile N. of Cleggan Head, surface. Bofin Harbour, very abundant. Ballynakill Harbour, very common.

A species of similar habitats and abundance to *S. armata*, and usually found associated with it. It has not been previously recorded from the area under review, though known to me for several years from collections of the Fisheries Branch of the Department of Agriculture for Ireland.

Mysis astrosaccus spinifer (Goes).—Entrance to Blacksod Bay, 7 fms. Between Inishturk and Inishark, surface. Between Innishinny and the Gun Rock, Inishbofin, surface. Fahy Bay, Ballynakill, 2 fms. Found also on one occasion in the stomach of a mackerel caught off Cleggan Head.

A free-swimming form usually found in the open sea and rarely taken in the harbours and bays of the area.

G. sanctus van Beneden.—Bofin Harbour, very abundant, especially at night. Ballynakill Harbour, taken on six occasions, and only very young specimens.

The specimens from Bofin Harbour depart from the typical forms in being without lobes on the posterior margin of the carapace.

G. normani G. O. Sars.—One mile outside Bofin Harbour, one specimen. Between Bofin and Carrickmahoga Rocks, one specimen. 2½ miles S.W. by W. of Shark Head, one specimen. 2 miles S.S.W. of Shark Head, two specimens. Between Inishturk and Inishark, one specimen.

An open-sea species, never taken in harbours or sheltered bays. All the west of Ireland specimens have upturned lobes on the posterior margin of the carapace, and differ in this respect from Mediterranean specimens, in which the lobes are absent. All the specimens were captured at the surface.

Anchialus agilis, G. O. Sars.—Taken on about a dozen occasions in the open seas round Inishbofin, Inishark, Inishturk, and Clare Island, but never taken in the harbours or enclosed bays of the district. It is usually captured at the surface of the sea. Not previously recorded from the area.

Heteromysis formosa S. I. Smith.—Bofin Harbour, 2½ fms., three young specimens. Not previously recorded from the area.

Erythrops elegans, G. O. Sars.—Fahy Bay, Ballynakill, 2 fms., one specimen. Not previously recorded from Ireland.

Mysidopsis angusta G. O. Sars.—North entrance to Ballynakill Harbour, 7 fms., one specimen. New to the district.

M. gibbosa G. O. Sars.—Bofin Harbour, rarely. Ballynakill Harbour not infrequently.

Leptomysis lingvura G. O. Sars.—Bofin Harbour, three specimens on three separate occasions. New to the district.

Hemimysis lamornae (Couch).—Entrance to Blacksod Bay, 7 fms., two specimens. Off Portlea, Clare Island, in tow-net.

Macropsis slabberi (van Beneden).—Ballinakill Harbour, surface, one specimen. Bofin Harbour, on three separate occasions at the surface at night.

Praunus flexuosus (Müller).—A very common species enormously abundant in the bays and harbours of the area, usually found among Laminaria and other seaweeds and in rock-pools.

M. inermis (Rathke).—Inishgowla Harbour, Clew Bay, 1–4 fms. Carrigeenmore, Blacksod Bay, in tow-net through weeds close to shore abundant. Off Portlea, Clare Island, in tow-net, 5–6 fms., abundant. Ballynakill Harbour, on two occasions. Bofin Harbour, common.

A moderately abundant species in the area, but never found along the shores or in rock-pools like *M. flexuosus*. It usually occurs in about 5 fms. of water.

Schistomysis ornata (G. O. Sars).—Entrance to Blacksod Bay 7 fms., abundant. Feorinyeeo Bay, Blacksod Bay, 5 fms., one specimen.

S. arenosa (G. O. Sars).—Off the white strand, Ship Sound, Bofin Harbour, 3 fms., in sand, very abundant. Carrigeenmore, Blacksod Bay, in tow-net through weeds, close to shore.

Neomysis integer (Leach).—Lough Leam, Mullet, abundant. Lough Leam is a brackish-water lough, cut off from the sea, and only entered by the tide at spring-tides. New to the district.

STOMATOPODA.

In 1905 I recorded the fact that Stomatopod larvae belonging to two distinct genera of adult Stomatopoda, occurred regularly in tow-nettings taken in the late autumn off Inishbofin and Ballynakill Harbour. Since the publication of that note further specimens have come to hand, and I now wish to correct an error in the identification of one of the types of larvae. I referred the two kinds of larvae to the larval genera Alima and Gonodactylus, the young forms of Squilla and Gonodactylus respectively. The latter larvae in reality belongs to the genus Lysiosquilla. I was able to correct this earlier determination by the discovery of a single specimen 16 mm. in length in the first adult stage, in which the raptorial claw bears nine teeth, including the large terminal one. It suffices for the present to include the genera Squilla and Lysiosquilla in the fauna of the Clare Island marine area. No adult specimens have yet been found; but the larvae in all stages of development occur free-swimming in the shallow seas of the district every year in the late summer and early autumn.

TABLE INDICATING THE KNOWN GEOGRAPHICAL DISTRIBUTION OF NEBALIACEA, CUMACEA, AND SCHIZOPODA.

	A Species known from Norway.	B Species known from British Area.	C Species known from the Atlantic Coasts of Europe S. of the British Area.	D Species known from the Mediterranean.
SYNCARIDA.				
Nebalia bipes,	×	×	×	×
CUMACEA.				
Bodotria scorpioides,	×	×	×	×
Eudorella pulchella,	—	×	×	×
Cumopsis goodsiri,	—	×	—	×
Iphinoe trispinosa,	×	×	×	×
Vaunthompsonia cristata,	—	×	×	×
Eudorella truncatula,	—	×	×	×
Cumella pygmæa,	×	×	—	×
Nannastacus unguiculatus,	—	×	—	×
Nannastacus brevicaudatus,	—	×	—	×
Pseudocuma longicornis,	×	×	×	×
Pseudocuma similis,	×	×	—	×
Diastylis rugosa,	×	×	×	×
Diastylis rostrata,	×	×	—	—
Diastylis spinosa,	—	×	—	—
EUPHAUSIACEA.				
Meganyctiphanes norvegica,	×	×	×	×
Nyctiphanes couchi,	—	×	×	×
Thysanoessa inermis,	×	×	—	—
MYSIDACEA.				
Siriella armata,	—	×	×	×
Siriella clausii,	—	×	—	×
Siriella jaltensis,	—	×	—	×
Gastrosaccus spinifer,	×	×	×	×
Gastrosaccus sanctus,	—	×	×	×
Gastrosaccus normani,	—	×	×	×
Anchialus agilis,	—	×	×	×
Heteromysis formosa,	×	×	—	—
Erythrops elegans,	×	×	—	×
Mysidopsis angusta,	×	×	—	×
Mysidopsis gibbosa,	×	×	—	×
Leptomysis lingvura,	×	×	×	×
Hemimysis lamornae,	×	×	×	×
Macropsis slabberi,	—	×	×	×
Macromysis flexuosa,	×	×	×	×
Macromysis inermis,	×	×	—	—
Schistomysis ornata,	×	×	×	×
Schistomysis arenosa,	—	×	×	×
Neomysis integer,	×	×	×	×

GEOGRAPHICAL DISTRIBUTION OF THE SPECIES NOTED ABOVE.

The preceding table indicates broadly the known geographical range of the species recorded above. A study of this table reveals the interesting fact that the marine fauna of the west of Ireland, as far as these orders of Crustacea are concerned, is a blending of northern forms with southern species from the Mediterranean, the latter element somewhat preponderating. The single species of Nebalia, *N. bipes*, extends from Norway to the Mediterranean. Among the Cumacea we find seven species have been recorded from Norway and ten from the Mediterranean, while five are common to Norway, the British area, and the Mediterranean. Five species *Nannastacus unguiculatus*, *Eudorella truncatula*, *Bodotria pulchella*, *Campylaspis* sp. and *Vaunthompsonia cristata*, have the northern limit of their geographical range in the British area, while two forms, *Pseudocuma similis* and *Diastylis Goodsiri* var. have yet to be met with south of the British area. One species *Nannastacus brevicaudatus*, is peculiar to the Clare Island marine area. *Diastylis spinosa* has so far only been found in the British area, and none of the species extend to the American coasts.

Of the three species of Euphausiacea, one, *Meganyctiphanes norvegica*, extends from Norway to the Mediterranean; the second, *Nyctiphanes couchii*, is known from the Mediterranean, but not from Norway; while the third *Thysanoëssa inermis*, is not certainly known to the south of Britain. *M. norvegica* is also found off the North American coast. Here again, therefore, we get a blending of northern and Mediterranean species.

Of the nineteen species of Mysidae here recorded, thirteen extend to the Mediterranean and eleven to Norway, but only five from Norway to the Mediterranean. Six of them have the southern limit of their known geographical range in the British area, while eight of them have not yet been recorded south of the English Channel. There are no species peculiar to the British area, and only one species, *Heteromysis formosa*, extends to the American coasts. No Stomatopoda are known from Norway, so that the Stomatopod element in the fauna of the West of Ireland is of southern origin.

Summing up the known geographical range of all the species here recorded we get the result set forth in the following table:—

	Norway.	British Area.	Mediterranean.	Common to all three.
Nebalia,	1	1	1	1
Cumacea,[1]	7	14	10	5
Euphausiacea,[2]	2	3	2	1
Mysidacea,[2]	11	19	13	5
Total,	21	37	26	12

This table brings out well the fact that the shallow-water marine fauna of the west coast of Ireland is a blending of a northern and southern fauna, the latter element preponderating slightly as a whole and in each separate order.

Concerning the horizontal and bathymetric distribution of the species here noted definite information is difficult to obtain, owing to the peculiarity of habit already noted for the majority of forms of becoming free-swimming at night. *Nebalia bipes* is a purely littoral species, not extending below the ten-fathom line. Of the Cumacea, the following species appear to be true littoral forms confined to the ten-fathom limit of the shore:—

Bodotria pulchella.
Iphinoe trispinosa.
Nannastacus brevicaudatus.
Diastylis rugosa.
Cumopsis goodsiri.

The seaward limit of the remaining species, as far as at present known, is as follows:—

Cumella pygmaea, 67 fms.
Bodotria scorpioides, 15 fms.
Vauntompsonia cristata, 50 fms.
Nannastacus unguiculatus, 64 fms.
Eudorella truncatula, 1443 fms.
Pseudocuma longicornis, 58 fms.
Pseudocuma similis, 28 fms.
Diastylis rostrata, 1063 fms.
Diastylis spinosa, 183 fms.

The three Euphausians are pelagic Crustacea, often extending far out to sea and in water of considerable depth, which reach the maximum of abundance in the adult stage at about the 100-fathom line, and in the young and half-grown stages in considerably shallower water. They are at

[1] Two species peculiar to the British Area.
[2] One species extends to America.

all these centres of the open shallow seas, and are rarely found in harbour and bays unless driven there under stress of weather.

The following species of Mysidae may be regarded as purely littoral species:—

Siriella armata.	Macropsis slabberi.
S. jaltensis.	Macromysis flexuosa.
S. clausii.	Schistomysis arenosa.
Heteromysis formosa.	Neomysis integer.
Leptomysis lingvura.	

The species of Gastrosaccus and Anchialus are more purely pelagic than the other Mysidae, but only *G. normani* extends seawards for any distance. It has been recorded from a depth of 180 fathoms.

The remaining species are bottom-living forms which range from all depths down to about fifty fathoms.