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CIRRIPEDES IN IRELAND
(IRISH CIRRIPEDES IN THE COLLECTIONS OF THE NATIONAL
MUSEUM OF IRELAND AND IN THE LITERATURE)

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ABSTRACT

Twenty-four species of cirripede from Irish waters are listed, and references given. Irish cirripede specimens in the collections of the National Museum of Ireland are listed and particulars of localities and published data are given where available. Specimens from the Royal Irish Academy Expedition of 1886, the Royal Dublin Society Expeditions of 1890-91 and from the south and south west coasts have been identified and are now published for the first time. A brief indication is given of how representative the collection and previously published records are in relation to the British fauna.

INTRODUCTION

An examination of the crustacean collection of the National Museum of Ireland revealed a number of unidentified cirripede specimens particularly in the material taken on the Royal Irish Academy Expedition of 1886 (Haddon and Green, 1888) and the Royal Dublin Society Expeditions of 1890-91 (Holt, 1891), and among specimens collected in the Bantry Bay area in 1892 and off the south coast. The existence of these unidentified specimens and the scattered nature of the published references make the publication of a consolidated list of the Museum cirripede material desirable. The Museum material was identified or checked with the aid of Bassindale (1964) and Darwin (1851-4), and the systematic taxonomy is that used by Bassindale.

Class CRUSTACEA

Order CIRRIPIEDIA

Sub-order THORACICA

Family SCALPELLIDAE

Scalpellum scalpellum (L.) = *S. vulgare* Leach

Forty-four adult and several young specimens :—

Two from the "Irish Coast" (probably north or north east coast) collected by the Ordnance Survey, presumably about 1835.

Two probably from Log 53 (5–8 miles W. of Great Skellig in 35½ fathoms) and taken by the Royal Irish Academy Expedition of 1886 (*op. cit.*).

Two adults and two young taken at Log 56 (29½ miles W. by S. of Dursey Head in 93 fathoms), taken by the above expedition.

One from south west Ireland, presented by Rev. W. S. Green in 1890.

One from St. 63 (40 miles off Achill Head in 220 fathoms) on a spine of *Cidaris papillata* taken by the Royal Dublin Society Expedition of 1890.

One from St. 64 (30 miles off Achill Head in 144 fathoms) taken by the above expedition.

Two from St. 72 (20 miles off Achill Head in 127 fathoms) taken by the above expedition.

Seven adults and several young from St. 125 (40 miles W. of Bolus Head, Co. Kerry, in 115 fathoms) taken by the Royal Dublin Society Expedition of 1891.

Two from Bantry Bay purchased by the Museum in 1892.

Two from Dunmanus Bay purchased by the Museum in 1892.

Two from SR 97 (75 miles SW by W½W of Fastnet in 181–199 fathoms) presented by the Fisheries Branch, Department of Agriculture and Technical Instruction about 1912.

Six adults and eight young from SR 211 (70 miles SW of Fastnet in 81 fathoms).

Five adults and five young from R 9 (Nymphe Bank, 17½ miles SW½W of Coningbeg L.V. in 40 fathoms).

Eight adults and eight young from R 29 (15 miles SE by S of Mine Head, Co. Waterford in 40–42 fathoms).

One from S 36 (10 miles off Clogher Head in 20–22 fathoms).

The above Fisheries specimens are recorded by Annandale (1911).

LITERATURE : Thompson (1856, p. 415) records this species from Belfast Bay, Strangford Lough, Groomsport, and the Dublin Coast. Thompson (*op. cit.*) also refers to some Dublin Bay material in Professor Harvey's and Dr. Ball's collection; this material was previously recorded by Portlock (1837). In addition to the Fisheries specimens in the National Museum collection, Annandale (1911) records specimens from SR 147 (Porcupine Bank) and SR 360 (52° 4' N; 11° 27' W) but these are not represented in the National collection.

Massy (1911) records *S. scalpellum* from the Irish Sea at stations S 403, S 433, S 477, S 492, S 561 and Farran (1911) notes that it was frequently taken below twenty fathoms in the western parts of the Irish Sea, usually attached to stems of *Aglaophenia*. Williams (1954, p. 74) records *S. scalpellum* dredged off Ardglass in 54 metres attached to *Nemertesia antennina*. Bassindale (1964) gives their distribution as found attached to hydroid and polyzoan colonies from below L.W.M. to 200 fathoms.

Scalpellum kempi Annandale

Not represented in the National Museum collection.

LITERATURE : Recorded from SR 504 (50° 42' N; 11° 18' W in 627–728 fathoms) on *Lophohelia* by Annandale (1911). The type slide of this species is in the British Museum collection, registration number B.M. (N.H.) 1911.5.24.1. This is a little known species.

Scalpellum velutinum Hoek

Three specimens from SR 363 (51° 22' N; 12° 0' W, in 695–720 fathoms) presented by the Fisheries Branch.

LITERATURE : Annandale (1911) recorded five specimens from SR 363, three of which are in the Museum collection. It is known to occur in the north Atlantic and elsewhere in 50–2900 fathoms.

Mitella pollicipes (Gmelin)

= *Pollicipes cornucopia* Leach

Not represented in the National Museum collection.

LITERATURE : Recorded by Thompson (1856, p. 415) from a lock gate at Ringsend, Dublin. It is regarded as a Lusitanian species.

Family *LEPADIDAE*

According to Bassindale (1964), the five species of the Genus *Lepas* listed below live characteristically on almost any floating object and are washed up on our shores from the Atlantic.

Lepas anatifera (L.)

Thirty-four specimens :—

Fifteen labelled "Ireland" (probably from the north or north east coast), in the Ordnance Survey Collection, and probably collected about 1835.

Three from the Antrim coast, in the Ordnance Survey Collection, and probably collected about 1835.

Two from Bantry Bay, purchased by the Museum in 1892.

Six obtained from a log which drifted ashore at Inishbofin in August 1899 presented by E. W. L. Holt.

Eight from off the Tearaght, Co. Kerry, also presented by Holt.

LITERATURE : Thompson (1856, p. 414) records it under *Anatifa laevis* Lam. from Belfast Bay, Dundalk, Cork Harbour, Bundoran and Tory Island. Thompson's *A. dentata* Lam. is probably the variation of *L. anatifera* with the strongly barbed carina depicted by Darwin (1851, plate I, fig. 16), and he records a specimen from Magilligan, Co. Derry. Portlock (1837) mentions it being common all round the Irish coast. Beaumont (1899, p. 757) records it from beached hulks and a boat at Valencia in 1896. Farran (1913, p. 18) records it from drift timber, on Clare Island.

Lepas anserifera (L.)

Four specimens :—

Four unlocalized specimens presented to the Museum by T. W. Warren. As Warren was a well known Irish naturalist, the specimens are, very probably, of Irish origin.

LITERATURE : Thompson (1856, p. 414) records it as *Anatifa striata* Lam. from Magilligan, Portstewart, Cork Harbour, and the west of Ireland. It was said to be densely clustered over a piece of pine bark found floating off Waterford. The Dublin Bay material from Dr. Ball's collection is noted by Portlock (1837). A specimen from Cork is in the United States National Museum Collection (Pilsbry, 1907, p. 80).

Lepas fascicularis Ellis and Solander

About fifty-six adults and several young :—

Seven adults and four young attached to three shafts of bird feathers from the coast of Antrim (Ordnance Survey Collection). These specimens may well be those taken off the coast of Antrim by the Ordnance Survey collectors, and forwarded to Portlock (Portlock, 1837).

One from Roundstone, Co. Galway.

Three from the south west of Ireland, attached to a feather, and presented by Rev. W. S. Green in 1890.

Ten adults and seven young were taken at St. 63 or 64 (30 to 40 miles off Achill Head in 144 to 220 fathoms) by the Royal Dublin Society expedition of 1890.

One adult and one young from Bantry Bay were presented by A. R. C. Newburgh in 1893.

Thirty adults (approx.) and several young were taken off the Tearaght, Co. Kerry attached to *Fucus* floating on the surface. These were transferred to the National Museum from the Fisheries Branch, D.A.T.I. These may be the specimens to which Farran (1903) refers.

One from Portrush, Co. Antrim presented by Nichols (Nichols, 1915).

One from the north coast of Antrim or Derry, about 1915, is presumably unmentioned in the texts, as the label bears no generic or specific name.

Two found by Mr. L. H. English on Ballyliffin strand, Co. Donegal. These were forwarded to Fisheries Division, Department of Agriculture and Fisheries, where Mr. D. de G. Griffith identified them. The specimens are now deposited in the National Museum.

LITERATURE : Portlock (1837) mentions records from Clare in 1823 and Antrim in 1834. Thompson (1856, p. 414) refers to this species as *Anatifa vitrea* Lam., and states that it had been found adhering to *Fucus*, and feathers of sea fowl at Magilligan, Portstewart, the Giant's Causeway, Youghal (citing Portlock, 1837) and Roundstone Bay. Farran (1903) records this floating barnacle from varying distances off Cleggan, and 10-15 miles off Rathlin O'Beirne, Co. Donegal, as well as off the Tearaght. He refers again to its occurrence off Cleggan in the Clare Island Survey (1913, p. 18).

Lepas pectinata Spengler

Seven specimens :—

Three from the coast of Co. Derry from the Ordnance Survey Collection, collected, presumably, about 1835.

Four unlocalized specimens were presented by T. W. Warren. As Warren was a well known Irish naturalist the specimens are, very probably, of Irish origin.

LITERATURE : Thompson (1856, p. 414) records it under the name *Anatifa sulcata* Lam. from Killiney, attached to corkwood, from the shores of the Atlantic, from near Kenmare harbour, from Youghal (citing Portlock, (1837), Cork Harbour and Miltown Malbay, Co. Clare.

Lepas hilli Leach

Five specimens :—

Five from the coast of Derry in the Ordnance Survey Collection, presumably about 1835.

LITERATURE: The author is unable to trace any reference to the occurrence of this species in Ireland. It is possible that some of Thompson's (1856, p. 414) *A. laevis* Lam. may, in fact, have been *L. hilli*.

Conchoderma virgatum (Spengler)

One specimen:—

One from inside the mouth of a Sunfish (*Mola mola* (L.)) from Bantry Bay in 1892. It agrees with the variation *chelonophilus* of Leach (Darwin, 1851, p. 146). It is not clear whether the specimen was attached to the fish's mouth or whether it had just been eaten, presumably from a ship's hull where it commonly occurs. Pilsbry (1907, p. 99), however, mentions one on *Mola rotunda* from Martha's Vineyard, on the east coast of the United States.

LITERATURE: Thompson (1856, p. 415) records it under the name *Cineras vittata* Leach from hulls of vessels at Belfast, from wood washed ashore at Larne and from oysters at Malahide. It was also found attached to a plank cast ashore near Malahide, (Portlock, 1837). According to Bassindale (1964, p. 34), it has a world wide distribution on ships, whales and other floating objects, and, so attached, occasionally appears in the waters around these islands.

Conchoderma auritum (L.)

Not represented in the National Museum collections.

LITERATURE: Thompson (1856, p. 415) records this species under the name *Otion cuvieri* Leach. It is not quite clear if there is an established Irish record of this species. Portlock (1837) merely refers to *Otion cuvieri* attached with a *Cineras* to a *Balanus*. The *Cineras*, referred to in his preceding sentence, was attached to the plank at Malahide, no mention of a *Balanus* being made. Accordingly, it is presumed that the *Otion* was not found on the Malahide plank. Thompson (*op. cit.*) mentions that it is usually associated with *C. virgatum*, but gives no clear record.

Family VERRUCIDAE

Verruca stroemia O. F. Müller

Sixteen adult and several young specimens:—

Fifteen adult and several young on a *Pecten* valve from Dublin Bay.

One specimen from Connemara with a small cluster of *B. balanus*, incorrectly labelled *Acasta spongites*. It was probably collected by M'Calla at Roundstone about 1840.

LITERATURE: Thompson (1856, p. 418) records this species under the name *Creusia verruca* Leach from the coasts of Down and Antrim on crabs, shells, and floating wood, and on *Pinna* from Cork Harbour. It is also

recorded from Youghal. Farran (1913, p. 18, and 1914) records it from all round the shores of Blacksod Bay, Co. Mayo, on rocks and stones, from L.W.M. downwards. MacDonald (1947) records it from Greenisland, Co. Antrim, and Williams (1954, p. 74) records its being dredged off Ardglass, Co. Down attached to *Nemertesia antennina*. Bassindale (1964, p. 35) states that it is distributed around all coasts of Great Britain at extreme low water, and on the Atlantic coasts of Europe.

Family *CHTHAMALIDAE*

Chthamalus stellatus (Poli)

Several specimens from Lough Ine, Co. Cork, presented by Dr. J. A. Kitching in July 1938.

LITERATURE: This species is recorded by Thompson (1856, p. 416) under the name *Balanus punctatus* Mont. from Tory Island, Carrickfergus, Bangor, Cultra, Ballyholme Bay, Craigavad, Belfast Bay, Ireland's Eye and Youghal. Moore and Kitching (1939) noted a specimen on Saltpan Rock, south of Moville. McMillan (1950) records this species from Malin Head, Co. Donegal, and Williams (1954, p. 74) from the Strangford Lough area. Southward and Crisp (1954, p. 11) found *C. stellatus* all round Ireland, on the open coast except at Dunlaoghaire, and parts of Co. Antrim.

Family *BALANIDAE*

Balanus tintinnabulum (Linné)

Fourteen specimens:—

Fourteen from the hull of a lightship stationed off the south coast of Ireland, presented to the National Museum by Mr. Mayne in 1915. As the south coast lightships are stationed off Co. Wexford and the entrance to Cork Harbour, the specimens can be from either of these localities.

LITERATURE: Thompson (1856, p. 416) records it from driftwood at Howth on *Chlamys opercularis* (L.), from Dublin Bay and from ships' hulls in Cork Harbour. Bassindale (1964, p. 41) says that this species has not colonized the shores of these islands.

Balanus crenatus Bruguière

Six specimens:—

Six from the Irish Sea, locality unspecified.

LITERATURE: Thompson (1846, p. 416) records it under the name *Balanus rugosus* Mont., from the Down coast and regards it as common in Dublin Bay and Portmarnock. Pilsbry (1916, p. 173) lists four specimens from Cork

Harbour in 1846, Bantry Bay and the Aran Islands in the United States National Museum collection. MacDonald (1951, p. 87) records a colony on the carapace of *Hyas araneus* dredged in five fathoms in White Bay, Lough Foyle. Williams (1954, p. 74) records it from *Scalpellum scalpellum* dredged in 54 metres off Ardglass in 1939. Bassindale (1964, p. 38) regards it as the commonest sub-littoral barnacle, occurring on shells, stones and corals from L.W.M. to 50 fathoms.

Balanus perforatus Bruguiere

Not represented in the Museum collection.

LITERATURE : Thompson (1856, p. 416) records it under the name *Balanus communis* Mont., from the coasts of Co. Down and Co. Dublin and mentions it being common on rocks on the coast of Co. Cork. Pilsbry (1916, p. 125) lists a specimen in the United States National Museum collection from Cork Harbour. Williams (1954, p. 74) cites Thompson's record from Belfast Lough in 18 to 22 metres. Southward and Crisp (1954, p. 12), however, have this to say:— "The complete absence of *Balanus perforatus* from Ireland has been reported previously and it is attributed to historical causes rather than to an unfavourable environment (Crisp and Southward, 1953). A record of its occurrence in Strangford Lough, reported in an unpublished marine fauna list of the area (personal communications Mr. G. Williams and Mr. C. Edwards) and a record of the same species from Cork Harbour reported from Jeffrey's collection (Pilsbry, 1916) are probably the result of mistaken identification of elongated or *Lithothamnion* covered specimens of *Balanus balanoides* or *Balanus crenatus*." Bassindale (1964, p. 38) regards this as a warm water species, extending northwards to the south-west coasts of Great Britain, but not probably to Ireland, and regards the Cork Harbour record as very doubtful.

Balanus balanoides (L.)

Several specimens:—

Several specimens on *Patella* from Sherkin Island, Co. Cork, presented by A. R. Nichols in 1895.

Several specimens partially covering a coconut found 18 miles off Lambay, presented by Mrs. Syms.

Ten specimens from Malahide on limestone.

Several specimens on a piece of limestone from Portmarnock.

LITERATURE : This species is recorded by Farran, Williams, MacDonald, McMillan and others. Southward and Crisp (1954, p. 11) found that it was present virtually all round Ireland, but only on the east coast was it the dominant barnacle of exposed shores. Elsewhere it was common in more sheltered localities. They found that the distribution of *B. balanoides* was complementary to that of *C. stellatus*.

Balanus improvisus Darwin

Not represented in the Museum collection.

LITERATURE: Recorded as new to Ireland by MacDonald (1951, p. 87), who found this species in the Coolkeeragh area of Lough Foyle, and in Derry City, on stones, wood and shore.

Balanus balanus (L.)

=*Balanus porcatus* da Costa

Forty-seven adults and some young specimens:—

Thirty four from the north east coast of Ireland.

Two from Bantry Bay purchased in 1892.

Four adults and some young specimens from Dublin Bay on *Pecten*.

Four from the Dublin coast presented by T. W. Warren.

Three from Connemara, probably collected by M'Calla at Roundstone about 1840, and were incorrectly labelled *Acasta spongites*.

LITERATURE: Thompson (1856, p. 416) mentions it from the north, east, and south of Ireland under the name *Balanus costatus* Mont. He records it from Cork Harbour on *Pinna* from deep water. Farran (1913, p. 18; and 1914) records several off Ardelly Point, Blacksod Bay, on *Mytilus modiolus* from 4 $\frac{3}{4}$ fathoms. Pilsbry (1916, p. 161) lists specimens from Cork Harbour, Bantry Bay, and the north of Ireland in the United States National Museum collection. MacDonald (1947) records it from Greenisland, Co. Antrim, and Williams (1954, p. 74) states that it is dredged commonly in Strangford Lough, and mentions it from Ardglass and Killard. Bassindale (1964, p. 39) says that it is a sub-littoral species extending from L.W.M. to 90 fathoms, but it is common in depths from 10 to 15 fathoms.

Balanus hameri (Ascanius)

Twenty-two adults and several young specimens:—

Six adults and eight young on *Mytilus* from Belfast Lough, presented by T. W. Warren.

Three from the Irish Sea, locality unspecified.

Thirteen adults and several young from between Carlingford and the Isle of Man, presented by T. W. Warren. These may be the specimens mentioned by Thompson (1856, p. 416) under *Balanus candidus* Leach.

LITERATURE: Thompson also records this species from Belfast Bay attached to *Mytilus modiolus* (L.). Pilsbry (1916, p. 209) lists specimens from Larne, Dublin Bay and Bantry Bay in the collections of the United States National Museum. Bassindale (1964, p. 40) regards it as a sub-littoral species,

found all around the coasts of Great Britain. It is occasionally found in water of less than twelve fathoms in depth, and occurs down to 167 fathoms.

Balanus spongicola Brown

This species is not represented in the National Museum collection.

LITERATURE: Pilsbry (1916, p. 115), however, gives its distribution as Southern England, Wales and Ireland to the Mediterranean, etc., and lists (p. 118) a specimen in the United States National Museum from Dublin Bay, collected by J. Gwyn Jeffreys.

Elminius modestus Darwin

Four specimens :—

Four from Lough Ine, Co. Cork, one of which is on a stone surrounded by *B. balanoides*. These specimens were presented by D. M. Beard in 1958, who recorded occurrence of the species in this area (Beard, 1957).

LITERATURE: Hillis and Aitken (1959) note its occurrence at Ardglass, Co. Down, and Crisp and Southward (1959) published an account of its distribution in Ireland. They noted it from Larne to Ardglass, Dundalk to Clogher Head, Skerries to Dublin (North Wall), and from Ardmore, Youghal, Cork Harbour, Clonakilty, Glandore and Lough Ine. Later, they mention it from Derry. They noted its absence from Bantry, around the west and north coasts to Derry. Bassindale (1964, p. 43) mentions that this species is known to have established itself at all tide levels in somewhat sheltered places and mixes with *Chthamalus*, *B. balanoides*, and in the sub-littoral zone with *B. crenatus*.

Coronula diadema (L.)

Six adults and two young :—

Four from the skin of a hump-back whale stranded in Killala Bay in May 1893 (Warren, 1893).

One adult and two young from a hump-back whale stranded on the coast of Galway, and presented by R. Barrington in 1908.

One from Enniscrone, Co. Sligo, was presented by Mrs. C. Williams in 1929. It, also, was taken from a hump-back whale.

Pyrgoma anglicum Sowerby

Not represented in the National Museum collection.

LITERATURE: Recorded by Thompson (1856, p. 418) under the name *Adna anglica* Leach, from fragments of *Caryophyllia* from east of Cape Clear in 40 to 50 fathoms. Rees (1966, p. 291) records this species in association with *Caryophyllia* from Valentia Harbour in 75 feet, and Great Skellig Rock, depth 100 feet. Bassindale (1964, p. 43) states that it occurs on the southern coasts of the British Isles on *Caryophyllia* below L.W.M. to 45 fathoms.

DISCUSSION

Of the cirripedes listed, seven, *Scalpellum kempfi*, *Mitella pollicipes*, *Conchoderma auritum*, *Balanus perforatus*, *B. improvisus*, *B. spongicola*, and *Pyrogoma anglicum* are not represented in the Museum collections. This is hardly surprising, as *S. kempfi* is very rare, and *M. pollicipes* sparse in its distribution. *P. anglicum* is associated with the coral *Caryophyllia* in these waters, and, hence, would be very limited in its distribution. There is only one Irish record of *B. spongicola*. The records of *C. auritum* and *B. perforatus* are very doubtful and *B. improvisus* has been only recently recorded in Ireland.

The *Balanus crenatus* specimens in the collection, though from the Irish Sea, are not localized and Warren's *Lepas anserifera* specimens are, likewise, from an unspecified locality. *Acasta spongites* has not been recorded from Ireland. Stubbings (personal communication) states that it occurs usually in the sponge *Dysidea fragilis* at least on the S.W. coast of England.

Bassindale lists other species from the waters around Great Britain. No definite record is mentioned in the case of *Scalpellum stroemii* M. Sars and *Xenobalanus globicipitis* Steenstrup. *Alepas parasita* Sander Rang and *Anelasma squalicola* Loven are rare. Though *Balanus amphitrite* Darwin has not been, as yet, recorded from Irish waters, it has been noted on ships' bottoms in British ports, and may have established itself locally there. On the whole, then, the Order Cirripedia is fairly well represented in the Irish fauna and it is hoped that this publication will serve as a consolidated list of the Irish cirripede species.

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REFERENCES

- ANNANDALE, N. 1911 *Ann. & Mag. Nat. Hist.*, Ser. 8. Vol. 7, pp. 588-590.
BASSINDALE, R. 1964 "British Barnacles", *Linn. Soc. Synopsis*, No. 14.
BEARD, D. M. 1957 *Nature*, London, 180, p. 1145.
BEAUMONT, W. I. 1899 *Proc. R. Irish Acad.*, 57 B, pp. 1-29.
CRISP, D. J. and SOUTHWARD, A. J. 1959 *Journ. Mar. Biol. Assoc. U.K.*, 38, No. 3, pp. 429-437.

- DARWIN, C. 1851-4 "A Monograph of the Cirripedia", 1 & 2, *Ray Soc. Mon.*, London.
- FARRAN, G. P. 1902-3 *Ann. Rep. Fish., Ireland, 1902-03*, Pt. II, App. VII (1905), pp. 209-210.
- 1911 *Ann. & Mag. Nat. Hist.*, Ser. 8, Vol. 7, p. 588 — footnote.
- 1913 "Clare Island Survey—Marine Entomostraca", *Proc. R. Irish Acad.*, 31 B, Part 45, pp. 1-20.
- 1914 *Fisheries, Ireland, Sci. Invest.*, 1914, III (1915), p. 53.
- HADDON, A. C. and GREEN, W. S. 1888 *Proc. R. Irish Acad.*, 17, pp. 29-56.
- HILLIS, J. P. and AITKEN, J. J. 1959 *Irish Nat. J.*, 13, p. 100.
- HOLT, E. W. L. 1891 *Sci. Proc. R. Dublin Soc.*, 7, N.S., pp. 221-292.
- MACDONALD, R. 1947 *Irish Nat. J.*, 9, p. 22.
- 1951 in MacDonald & McMillan, *Proc. R. Irish Acad.*, 54 B, pp. 67-96.
- McMILLAN, N. F. 1950 *Irish Nat. J.*, 10, p. 20.
- MASSY, A. L. 1911 *Fisheries, Ireland, Sci. Invest.*, 1911, I (1912), pp. 133-194.
- MOORE, H. B. and KITCHING, J. A. 1939 *Journ. Mar. Biol. Assoc.*, U.K., 23, pp. 521-541.
- NICHOLS, A. R. 1915 *Irish Nat.* 24, pp. 189-190.
- PILSBRY, H. A. 1916 *Bull. U.S. Nat. Mus.*, 93, pp. 1-366.
- PORTLOCK, J. E. 1837 *Proc. R. Irish Acad.*, 1, pp. 31-32.
- REES, W. J. 1966 *Ann. & Mag. Nat. Hist.*, Ser. 13, 9, pp. 289-292.
- SOUTHWARD, A. J. and CRISP, D. J. 1954 *Proc. R. Irish Acad.*, 57 B, pp. 1-29.
- THOMPSON, WM. 1856 *The Natural History of Ireland*, 4, Bohn, London.
- WARREN, R. 1893 *Irish Nat.* 2, p. 119.
- WILLIAMS, G. 1954 *Proc. R. Irish Acad.*, 56 B, pp. 29-133.