

The Shore Fauna of Cardigan Bay.

By

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CARDIGAN BAY occupies a considerable portion of the west coast of Wales. It is bounded on the north by the southern shores of Carnarvonshire; its central portion comprises the entire coast-lines of Merioneth and Cardigan, and its southern limit is the north coast of Pembrokeshire. The total length of coast-line between Braich-y-pwll in Carnarvon, and Strumble Head in Pembrokeshire, is about 140 miles, and in addition there are considerable estuarine areas. The entire Bay is shallow; for the most part four to ten fathoms inshore, and ten to sixteen about the centre. It is considered probable that the Bay was temporarily transformed into low-lying land by accumulations of boulder clay during the Ice Age. Wave action has subsequently completed the erosive removal of that land area, with the exception of a few patches on the present coast-line and certain causeways or sarns. Portions of the sea-floor probably still retain some remains of this drift, and owing to the shallowness, tidal currents and wave disturbance speedily cause the waters of the Bay to become opaque. The prevailing winds are, as usual, south-westerly, and heavy surf is frequent about the central shore-line. This surf action is accentuated by the large amount of shingle derived from the boulder clay. The action of the prevailing winds and set of drifts in the Bay results in the constant movement northwards along the shores of a very considerable quantity of this residual drift material. Where checked by shore contour or river current this drift accumulates to form storm-beaches, which have eventually deflected certain rivers and streams to the northward, as in the case of the Ystwyth at Aberystwyth, the Clarach stream a little further to the north, and the Leri at Borth. Other large accumulations have assisted in the raising of the sarns or "causeways," extensive shallow regions, several of which run out in its northern half into the Bay for a considerable distance. One of these, the Sarn Badrig, dries at low-water spring-tides, nearly 14 miles from land.

Large amounts of muddy fresh water are poured into Cardigan Bay by the numerous torrential rivers and streams which flow from the mountain regions where the rainfall is heavy. Some of these (from N. to S.) are the Soch, Rhyd-hir, Erch, Wen, Glaslyn, Dwyryd, Artro, Mawddach, Dysynni, Dyfi (with subsidiary streams Eion, Clettwr and Leri), Rheidol, Ystwyth, Wyre, Aeron, Teifi, and Nevern. Of these, the Glaslyn and Dwyryd, the Mawddach, the Dyfi and subsidiaries, and the Teifi, form estuaries of considerable extent. After heavy rain, the inshore waters of the Bay are discoloured for some distance from the river-mouths. This discolouration is chiefly to the northward of the river mouths, owing to the surface waters being driven in that direction by the prevailing rain winds. The junction between the surface of the muddy fresh water (floating over sea water) and the clear sea is frequently plainly visible. The Bay is bounded for the most part by high land, but the continuity is broken by the deep clefts and estuaries of numerous rivers. The coast-line comprises an alternating series of (1) steep, rocky cliffs, consisting of Cambrian Ordovician and Silurian grits and shales, though there are some exposures of igneous rock, (2) drift cliffs of lower elevation, and (3) estuaries. In each of these the characteristics of the tidal area are different. In the first it is chiefly reef and hard erosion plane, with great variability in local conditions according to the strike and dip of the rock, the amount of exposure, and the quantity of detritus which washes to and fro in the gullies between the rock-ridges. If the strike of the rocks is fairly parallel with the coast, the dip of the rocks becomes an important factor as regards the Fauna. If it is low, the whole surface is exposed to wave action and the rocks are barren; if it is high with a landward dip, they are also barren; but if high and seaward, there may be a fairly good Fauna on the more sheltered landward slope. Outlying reefs may provide shelter, even if submerged, because they break the force of a ground swell and lessen the amount of wave-borne detritus. The shingle derived from boulder clay and carried along the coast is often largely augmented by detritus from the grit cliffs of the locality.

(2) Where drift cliffs prevail, much of the foreshore consists of shingle with large stretches, or low reefs of boulders, and local patches of coarse sand.

(3) In the estuaries, and often for some distance on either side, the tidal area is sandy or muddy and the foreshore is dune-capped. More recently there appears to have been a considerable influx of finer sand (presumably from deeper water) along the greater part of the shore-line,

resulting in appreciable local modifications of some of the elements of the Fauna.

The portion of the Bay in which the above-mentioned conditions are most typically developed lies between Portmadoc to the north and Cardigan to the south. Aberystwyth lies practically in the centre, and as the faunistic work has been carried out from that point, and since time, distance, and accessibility have, as usual, played their parts, the coast in the vicinity of Aberystwyth has been much more thoroughly examined than the rest. Practically no records have been made south of the Teifi, and but few above Portmadoc. It is fortunate that the region most readily accessible includes all the types of coast. It will be seen that there are three principal types of shore, and that these are subject in a marked degree to several important factors. (1) Wave disturbance (surf action). (2) Erosion by detritus and shingle. (3) Muddy fresh water.

These adverse conditions are reflected in the comparative poverty of the Fauna. In connection with the above factors, peculiarities have been observed in the distribution of certain groups, notably some of the Mollusca, and these are dealt with separately. It is hoped, later, to study the Fauna of the Bay below low-water mark and a number of records are already available: the comparison should prove of interest. It follows from what has been said above, that the shore Fauna will consist chiefly of the more hardy species, supplemented by some others that may survive in the more sheltered spots. The nomenclature adopted is mainly that of the "Plymouth Marine Invertebrate Fauna," 1904.

It will be observed that the Echinoderms and Ascidians are very poorly represented. The Crustacea and fishes have been limited as far as possible to shore forms, but a hard-and-fast line cannot be drawn. The worms have not been at all adequately examined and require the attention of a specialist. The following abbreviations are used to denote the observers responsible for the various records:—

H. J. F. = Prof. H. J. Fleure, D.Sc.

F. S. W. = F. S. Wright.

C. L. W. = C. L. Walton.

LIST OF LITTORAL ALGÆ.

A—Aberystwyth; C—Clarach and north; S—Allt Wen and south.

CHLOROPHYCEAE.

- Enteromorpha compressa*, Grev.;
A, C, S.
Enteromorpha linza, J. Ag.; C.
Enteromorpha intestinalis, J. Ag.;
A, C, S.
Ulva latissima, J. Ag.; A, C, S.
Chaetomorpha melagonium, Kütz.;
A, S.
Chaetomorpha tortuosa, Kütz.; A.
Cladophora pellucida, Kütz.; A.
Cladophora albida, Kütz.; A, C.
Cladophora sericea, Reinb.
Bryopsis plumosa, C. Ag.; A, C.

PHAEOPHYCEAE.

- Desmarestia aculeata*, Lamx.; A, C.
Dictyosiphon feniculaceus, Grev.; A.
Punctaria latifolia, Grev.; A, C.
Myriotrichia clavaformis, Harv.
var. filiformis, Farl.; A.
Asperococcus echinatus, Grev.; A.
Streblonema faciculatum, Thur.; A.
Ectocarpus confervoides, Le Jol.; A, C.
var. siliculosa, Kjell.
E. tomentosus, Lyngb.; A, S.
Elachista fucicola, Fries.; A.
Sphacelaria cirrhosa, C. Ag.; A.
Sphacelaria plumigera, Holm.; A.
Cladostephus spongiosus, C. Ag.;
A, C, S.
Cladostephus verticillatus, C. Ag.; A, C.
Stypocaulon scoparium, Kütz.; C, S.
Ralfsia verrucosa, Aresch.; A.
Stilophora rhizodes, J. Ag.; S.
Chordaria flagelliformis, C. Ag.; A, S.
Mesoglea vermiculata, Le Jol.; S.
Castagnea virescens, Thur.; A, S.
Castagnea griffithsiana, J. Ag.; A.
Leathesia difformis, Aresch.; A, C, S.
Phyllitis fascia, Kütz.; A.
Chorda filum, Stackh.; A.
- Laminaria saccharina*, Lamx.; A, C, S.
Laminaria digitata, Edm.; A, C, S.
Fucus cerenoides, Linn.; A.
Fucus vesiculosus, Linn.; A, C, S.
Fucus serratus, Linn.; A, C, S.
Ascophyllum nodosum, Le Jol.; A, C, S.
Pelvetia canaliculata, Dene eb, Thur.
Halidrys siliquosa, Lyngb.; A, C, S.
Dictyota dichotoma, Lamx.; S.

RHODOPHYCEAE.

- Bangia fuscopurpurea*, Lyngb.; C.
Porphyra linearis, Grev.; A.
Chantransia virgatula, Thur.
Chondrus crispus, Stackh.; A, S.
Gigartina teedii, Lamx.; A.
Phyllophora membranifolia, J. Ag.; A.
Ahnfeldtia plicata, Fries.; A.
Catanelia spuntia.
Rhodymenia palmata, Grev.; A.
Lomentaria articulata, Lyngb.; A.
Laurencia hybrida, Lenorm.; S.
Polysiphonia urceolata, Grev.; A.
var. patens, J. Ag.
Polysiphonia elongata, Grev.; S.
Polysiphonia violacea, Wyatt; A.
Polysiphonia nigrescens, Grev.; A.
Callithamnion hookeri, C. Ag.
Plumaria elegans, Bonnem.; S.
Ceramium strictum, Harv.
var. divaricata, Holm. & Batt. A.
C. diaphanum, Roth.; A.
C. rubrum, C. Ag.; A.
var. proliferum, J. Ag.
C. acanthonotum, Carm.; A.
C. ciliatum, Ducluz; A.
Furcellaria fastigiata, Lamx.; S.
Polyides rotundus, Grev.; A.
Hildenbrandtia prototypus, Nard.
var. rosea, Kütz.; A, C, S.
Lithothamnion polymorphum, Aresch.;
A, S.
Corallina officinalis, Linn.; A, C, S.

The region between Ystwyth and Dyfi appears to be hostile to certain *Algæ*, notably *Stilophora rhizoides*, *Mesoglaea vermiculata*, *Dictyota dichotoma* and *Laurencia hybrida*, which are absent from it, and *Chondrus crispus* and *Castagnea virescens*, which become more common outside it.

LIST OF SHORE FAUNA.

PORIFERA.

- Sycon compressum, Fleming. Low-water mark, in sheltered spots, upon Algæ, etc. (H. J. F. ; C. L. W.)
- S. coronatum, Ellis and Sol. Same as last. (C. L. W.)
2. 9/10. Halisarca dujardini, Johnston. Under surface of stones. (C. L. W.)
- Halichondria panicea, Pallas. Common in sheltered spots almost everywhere. (C. L. W.)
- Hymeniacion sanguineum, Grant. Aberystwyth. (C. L. W.)

CCELENTERATA.

- Podocoryne carnea, M. Sars. Aberystwyth. (C. L. W.)
- Coryne vaginata, Hincks. On Algæ in rock-pools or reefs south of Borth. (C. L. W.)
- Zanclaea implexa, Alder. One colony, collected by Dr. Salter, 1907. (C. L. W.)
- Obelia dichotoma. On piles of Railway Wharf, Aberdovey, and rock-pools Gwbert-on-Sea. (C. L. W.)
- O. geniculata, Linnæus. Generally distributed. (H. J. F. ; C. L. W.)
- Sertularia pumila, Linnæus. Generally distributed ; often abundant on *Fucus*. (C. L. W.)
- Plumularia echinulata, Lamarek. Aberystwyth. (C. L. W.)
- P. pinnata, Linnæus. General in sheltered pools. (C. L. W.)
- P. similis, Hincks. (H. J. F.)
- Actinia equina, Linnæus. Generally distributed and locally common. Aberystwyth, Y-Gamlas, Mochras, etc. (C. L. W.) See Journal Marine Biological Association, October, 1911. pp. 228-230.
- Anemonia sulcata, Penn. Generally only a few. Aberystwyth and for a few miles to the south. Tonfunau, etc. (C. L. W.)
- Sagartia miniata, Gosse. One specimen. Aberystwyth. (C. L. W.)
- S. undata, O. F. Müller. Observed at Clarach, a little bay to the north of Aberystwyth. Small specimens occur under stones which have become fixed in grooves, on an otherwise very barren erosion plane. Individuals, when kept in captivity, very averse to light. One large specimen on reef below the College. (C. L. W.)

S. ornata, Holdsworth. This rare Actinian has occurred in pools at extreme low water, on reefs below the University. (C. L. W.)
See Journal Marine Biological Association, October, 1911. pp. 236-237.

Tealia coriacea, Cuvier. Not common, but occurs in favourable situations as in pools at Clarach, which are sheltered by large shelving rocks; there specimens of large size may be seen. One individual observed among Mussels at Mochras. (C. L. W.)

ECHINODERMATA.

Henricia sanguinolenta, O. F. Müller. One specimen. Aberystwyth; extreme low water, February, 1913. (C. L. W.)

Asterias rubens, Linnæus. Has been common 1898 and 1904-5, but now scarce, Aberystwyth. (H. J. F.) Sometimes occurs on the seaward Mussel beds, Aberdovey. (C. L. W.)

Amphiura sp. Not uncommon under stones. (C. L. W.)

Ophiothrix fragilis, O. F. Müller. A number were observed under stones among *Laminaria* during the abnormally low tides of February, 1913. (C. L. W.)

TURBELLARIA.

Fovia affinis, Stimpson. Under stones, near Harbour, Aberystwyth. (C. L. W.)

Leptoplana tremellaris, O. F. Müller. Common. (C. L. W.)

NEMERTINI.

Amphiporus lactifloreus, Johnston. Aberystwyth. (C. L. W.)

Lineus longissimus, Gunn. Aberystwyth. (H. J. F.)

Tetrastemma sp. Aberystwyth. (C. L. W.)

Dinophilus tæniatus, Harmer. Aberystwyth. (H. J. F.)

POLYCHÆTA.

Lagisca floccosa, Savigny. Aberystwyth. (C. L. W.)

Harmothoe imbricata, Linnæus. Gwbert-on-Sea, two specimens. (C. L. W.) Central dorsal area dark, margins pale.

Eulalia viridis, Müller. Frequent on reefs and with *Sabellaria*. (C. L. W.)

Psamathe fusca, Johnston. Aberystwyth. (C. L. W.)

Castalia punctata, Müller. Clarach, with ova, June 9th, 1910. (C. L. W.)

Nereis pelagica, Linnæus. Aberystwyth. (C. L. W.)

Lysidice sp. Aberystwyth. (C. L. W.)

Terebella sp. Fairly common. Aberystwyth. (C. L. W.)

Lanice conchilega, Pallas. Local. (C. L. W.)

Arenicola marina, Linnæus. Abundant on Cockle beds in estuaries.
(C. L. W.)

Cirratulus cirratus, O. F. Müller. Aberystwyth. (H. J. F.)

Pomatoceros triqueter, Linnæus. Not uncommon under stones. (C. L. W.)

Spirorbis borealis, Daudin. General on *Fucus*, etc. (C. L. W.)

Sabellaria alveolata, Linnæus. Locally very abundant near sandy areas, and has then a considerable influence in binding together boulders and loose stones. It is almost invariably accompanied by *Eulalia viridis* and *Ulva*, but precludes many other species by filling up the crevices and bases of rocks and stones which otherwise afford them shelter. (C. L. W.)

GEPHYREA.

Sipunculus nudus, Linnæus. One specimen, Aberystwyth. (H. J. F.)

POLYZOA.

Scrupocellaria reptans, Linnæus. Aberystwyth. (C. L. W.)

Membranipora pilosa, Linnæus. Aberystwyth, etc. (C. L. W.)

M. membranacea, Linnæus. Aberystwyth. (C. L. W.)

Crisia cornuta, Linnæus. Under stones, Aberystwyth. (C. L. W.)

C. denticulata, Lamarck. Aberystwyth. (C. L. W.)

Alcyonidium hirsutum, Fleming. Upon *Algæ*, Aberystwyth, Borth, etc.
(C. L. W.)

Amathia lendigera, Linnæus. Upon old Mussels, Aberdovey. (C. L. W.)

Bowerbankia imbricata, Adams. With above. (C. L. W.)

Pedicellina cernua, Pallas. With *A. hirsutum*, Clarach. (C. L. W.)

MOLLUSCA.

Acanthochites fascicularis, Linnæus. Aberystwyth, etc. (C. L. W.)

Trachydermon cinereus, Linnæus. Aberystwyth. (H. J. F.) Morva,
Clarach. (C. L. W.)

Patella vulgata, Linnæus. Abundant; mainly on the sheltered landward side of shelving rocks, and then often of very large size.
(C. L. W.)

Helcion pellucida, Linnæus. Aberystwyth, above extreme low tides rather rare. (H. J. F.) Fairly common on *Laminaria* when tides are unusually low. (C. L. W.) Coves, Gwbert-on-Sea, fairly common. (C. L. W.) One specimen was discovered near Aberystwyth at high-water mark attached to a stone, evidently due to *Laminaria* cast up after storms.

- Fissurella græca*, Linnæus. One specimen, Aberystwyth. (H. J. F.)
- Acmæa virginea*, Müller. Llanina, near New Quay, one specimen. (C. L. W.) Shells are fairly frequent. (H. J. F.)
- Gibbula magus*, Linnæus. Y-Gamlas, near Pwllheli. (C. L. W.)
- G. cineraria*, Linnæus. Rare. Two living specimens south of Llanrhystyd and two at Gwbert-on-Sea. (C. L. W.)
- G. umbilicata*, Montagu. Very abundant in certain areas. (H. J. F.; C. L. W.) New Quay, Llanrhystyd, north of Towyn, Mochras, near Pwllheli, etc. Considerable differences in form and colouration are observable. The general shell form varies from a dorso-ventrally flattened or "Tam-o'-Shanter," to a clumsy rounded turban shape. In the latter the summit is generally eroded and the penultimate whorl often imbricate and inflated. These differences appear to be due to age. The umbilicus varies between large, open, and deep, and narrow, slit-like, and shallow. These differences appear equally in local examples and in specimens sent from Plymouth, and do not depend entirely upon age and size; as in several instances the umbilicus was wider and deeper as size increased. The narrowing appears to be due to growth of the adjacent edge of the inner lip, which takes place in some individuals, but not in others. The colour bands may be few and obvious, or numerous and obscure.
- Monodonta crassa*, Montfort. Distribution more restricted than the last; often very abundant and large. (C. L. W.)
- Calliostoma zizyphinus*, Linnæus. One small specimen, Aberystwyth. (C. L. W.)
- Phasianella pullus*, Linnæus. One specimen, on *Laminaria*, extreme low water, Aberystwyth. (C. L. W.)
- Lacuna divaricata*, Fabricius. On *Algæ*, not uncommon. (C. L. W.)
- L. puteolus*, Turton. Aberystwyth, one specimen living among *Balanus perforatus*. (C. L. W.)
- Littorina littorea*, Linnæus. Common almost everywhere. Strongly ribbed when young, ribbings becoming either faint or obsolete after a height of 20 mm. has been attained. (C. L. W.)
- L. neritoides*, Linnæus. Seldom common, but widely distributed. (C. L. W.)
- L. obtusata*, Linnæus. Abundant everywhere, on *Fucus*. (H. J. F.; C. L. W.)
- L. rudis*, Maton. Abundant almost everywhere. The largest shell so far found in the Bay is from Aberdovey. Total length, 19 mm.;

greatest diameter, 13 mm.; aperture of mouth, 11 mm. long, 8 mm. broad. Shell thick, apex acute.

Paludestrina stagnalis, Baster (*Hydrobia ulvæ*). Exceedingly abundant on sands, Ynys Lâs, Dyfi estuary; and on stones and muddy sand at Borth-y-Gest, Glaslyn estuary. (C. L. W.)

Trivia europea, Montagu. Rare, Aberystwyth. (H. J. F.)

Purpura lapillus, Linnæus. Abundant. (H. J. F.; C. L. W.)

Nassa reticulata, Linnæus. Aberystwyth, not common. (H. J. F.)

Æolidia papillosa, Linnæus. Aberystwyth, etc., not uncommon. (H. J. F.; C. L. W.)

Aeolidiella augulata, Alder and Hancock. One specimen under a stone very low water, Aberystwyth, February 22nd, 1913. (C. L. W.)

Æ. glauca, Alder and Hancock. Rocks below College.

Facelina drummondi, Thompson. Aberystwyth. (H. J. F.)

F. coronata, Forbes and Goodsir. Not uncommon, Aberystwyth. (C. L. W.)

Doto coronata, Gmelin. Aberystwyth. (H. J. F.)

Archidoris tuberculata, Alder and Hancock. Gwbert, near New Quay, Aberystwyth, Clarach, etc. (H. J. F.; C. L. W.)

Jorunna johnstoni, Alder and Hancock, Aberystwyth. (C. L. W.)

Polycera lessoni, D'Orbigny. Rare, Aberystwyth. (C. L. W.)

Acanthodoris pilosa, Müller. Aberystwyth, rare. (C. L. W.)

Lamellidoris bilamellata, Linnæus. Aberystwyth, Llannia, Gwbert, etc. (C. L. W.)

Goniodoris castanea, Alder and Hancock. One specimen, Aberystwyth, on *Botryllus violaceus* coating *Halidrys*. (C. L. W.)

G. nodosa, Montagu. Not uncommon, Aberystwyth, Clarach, etc. (C. L. W.)

Ancula cristata, Alder. Aberystwyth. (C. L. W.)

Ænomia ephippium, Linnæus. Fairly common under stones. (H. J. F.)

Mytilus edulis, Linnæus. Locally very abundant on shores and in estuaries. Small where marine conditions prevail; large and of considerable commercial importance in the estuaries of Portmadoc, Barmouth, and Aberdovey. (C. L. W.)

Volsella barbata, Linnæus. Two specimens among *Sabellaria*, Clarach, 1906. One, Aberystwyth, 1913. (C. L. W.)

Scrobicularia plana, da Costa. In mud on the Cockle beds of the various estuaries. (C. L. W.)

Tellina tenuis, da Costa. One living specimen among Cockles, Ynys Lâs, Dyfi estuary. (C. L. W.)

- Macoma balthica*, Linnæus. Abundant on Cockle beds. (C. L. W.)
Donax vittatus, da Costa. Borth. (C. L. W.)
Tapes decussatus, Linnæus. Aberystwyth. (H. J. F.; F. S. W.) Occasionally; Aberdovey, not uncommon; Monk's Cave (south of Aberystwyth). (C. L. W.)
T. virgineus, Linnæus. Borth, etc. (C. L. W.)
Cardium edule, Linnæus. Very abundant in the various estuaries (C. L. W.)
Saxicava rugosa, Linnæus. Aberystwyth, Clarach, etc. Often with *Sabellaria*. (H. J. F.; C. L. W.)

CRUSTACEA.

[I am indebted to Mr. F. S. Wright for this list, and the records are his unless otherwise indicated.]

- Canthocamptus palustris*, Brady. Aberystwyth, Clarach, etc. (H. J. F.)
Balanus balanoides, Linnæus. Aberystwyth. (H. J. F.)
B. perforatus, Bruguière. Aberystwyth, etc. (C. L. W.)
Chthamalus stellatus, Poli. Aberystwyth, etc. (C. L. W.)
Verruca stroemia, O. F. Müller. Aberystwyth, etc. (C. L. W.)
Sacculina carcini, Thompson. Aberystwyth, etc. On *Carcinus*. (H. J. F.; C. L. W.)
Dexamine spinosa, Montagu. Aberystwyth. Common.
Amathilla homari, Fabricius. Two specimens in stony pools, very low water, Aberystwyth. (C. L. W.)
Gammarus pulex, de Geer. Aberystwyth, etc., common.
G. locusta, Linnæus. Aberystwyth, etc., common.
Caprella linearis, Linnæus. At low water, Aberystwyth.
Calliopius læviusculus, Kroyer. Aberystwyth and Clarach.
Idotea baltica, Pallas, Aberystwyth.
I. marina, Linnæus. Aberystwyth.
Sphæroma serratum, Fabricius. Aberystwyth, common.
Jæra marina, Fabricius. Aberystwyth, common under stones. (C. L. W. F. S. W.)
Gnathia edwardii, Spence Bate. A female was discovered under a fixed stone in a deep pool. It occupied a burrow within a colony of *Halichondria panicea*, and within the burrow were found a number of small yellow ova, June 24th, 1910.
Ligia oceanica, Linnæus. Common.
Leander serratus, Pennant. Aberystwyth, common.
Crangon vulgaris, Linnæus. Common.

- Hippolyte varians*, Leach. Aberystwyth. (C. L. W. ; H. J. F.)
Athanas nitescens, Leach. Occasional, Aberystwyth.
Axius stirhynchus, Leach. One specimen, March 24th, 1909, at extreme low water, Aberystwyth, in a handful of gravelly sand. Kept in confinement in a glass vessel with a little sand, it kept the water turbid by constant movement of the swimmerets. The identification was confirmed by Canon A. M. Norman.
Homarus vulgaris, Milne-Edwards. Sometimes found at low-tide mark on rocky shores. (C. L. W.)
Galathea squamifera, Leach. Aberystwyth. In sheltered areas not subject to severe wave action. Generally in early summer, but appearance very erratic ; sometimes abundant, at others rare or absent. (H. J. F.) A number occurred during the very low tide of February 21st-22nd, 1913. (C. L. W.) One specimen, October, 1912, Gwbert. (C. L. W.)
Porcellana platycheles, Pennant. Abundant under stones.
P. longicornis, Linnæus. Extreme low water, Aberystwyth. Appearance very uncertain. (H. J. F.)
Dromia vulgaris, Milne-Edwards. One small specimen, Aberystwyth. (H. J. F.)
Eupagurus bernhardus, Linnæus. Common.
Portunus puber, Linnæus. Not uncommon, Aberystwyth, etc.
Carcinus mænas, Pennant. Common.
Cancer pagurus, Linnæus. Common.
Pilumnus hirtellus, Linnæus. Rare.
Pinnotheres pisum, Linnæus. Appears to be abundant with *Mytilus edulis*, Aberdovey, etc. (C. L. W.)

PYCNOGONIDA.

- Pycnogonum littorale*, Ström. Aberystwyth. (H. J. F.)
Nymphon gracile, Leach. Upon *Plumularia pinnata*. (F. S. W.)

TUNICATA.

- Styelopsis grossularia*, van Beneden. One specimen, Aberystwyth. (C. L. W.)
Botryllus violaceus, M.-Edwards. Common under stones, Aberystwyth, etc. (H. J. F. ; C. L. W.)
Botrylloides sp. Aberystwyth.

PISCES.

- Blennius pholis*, Linnæus. Common and often very large. (F. S. W. ; H. J. F.)
- B. gattorugine*, Bloch. Aberystwyth, occasionally. (F. S. W.)
- Cottus bubalis*, Euphrasen. Fairly common and large, in rock-pools. (F. S. W. ; H. J. F.)
- Centronotus gunnellus*, Bloch. Fairly common. (F. S. W.)
- Onos (Motella) mustelus*, Linnæus. Common, often high in tidal zone. (H. J. F. ; F. S. W.)
- O. (Motella) tricirratu*s, Bloch. One specimen, Aberystwyth, February 22nd, 1913. (C. L. W.)
- Lepadogaster decandolii*, Risso. One specimen found at Aberystwyth during a low spring tide, March, 1909. (F. S. W.)
- Liparis montagui*, Donovan. Specimens have occurred occasionally in tide-pools below the University. (F. S. W.)
- L. vulgaris*, Fleming. Occasional young specimens, Aberystwyth. (F. S. W.)
- Nerophis lumbriciformis*, Willoughby. Scarce ; two specimens in half-tide pools, Aberystwyth. (F. S. W.)
- Gasterosteus spinachia*, Linnæus. Rare, Aberystwyth. (H. J. F.)
- Crenilabrus melops*, Cuvier. Two young specimens, Aberystwyth. (F. S. W.) One, February, 1913. (C. L. W.) Summer, 1910.
- Ctenolabrus rupestris*, Linnæus. Fairly common. (H. J. F. ; F. S. W.)
- Cyclopterus lumpus*, Linnæus. Fairly common. (H. J. F. ; F. S. W.)
- Trachinus draco*, Linnæus. Rare, Aberdovey. (H. J. F.)
- Zeugopterus punctatus*, Bloch. Occasional. (H. J. F. ; C. L. W.) One specimen was obtained clinging to the under surface of a stone by means of the margins of the body. I have since seen this species adhere to the sides of a tank in Plymouth Aquarium, in a similar manner. (C. L. W.)