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E. FORBES.

INVESTIGATION OF BRITISH

MARINE ZOOLOGY.

1850

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*M. De Koninck*  
*with two reports*  
**REPORT** *of the author*

ON THE  
**INVESTIGATION**  
OF  
**BRITISH MARINE ZOOLOGY,**  
BY MEANS OF THE DREDGE.

**PART I.**  
**THE INFRA-LITTORAL DISTRIBUTION OF MARINE INVERTEBRATA**  
**ON THE SOUTHERN, WESTERN, AND NORTHERN COASTS OF**  
**GREAT BRITAIN.**

BY  
**EDWARD FORBES, F.R.S.,**  
PROFESSOR OF BOTANY IN KING'S COLLEGE, LONDON, AND PALEONTOLOGIST  
OF THE GEOLOGICAL SURVEY OF THE UNITED KINGDOM.

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[From the REPORT OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF  
SCIENCE for 1850.]

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LONDON:  
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1850.





*Report on the Investigation of British Marine Zoology by means of the Dredge. Part I. The Infra-littoral Distribution of Marine Invertebrata on the Southern, Western, and Northern Coasts of Great Britain.* By EDWARD FORBES, F.R.S., Professor of Botany in King's College, London, and Palæontologist of the Geological Survey of the United Kingdom.

At the Meeting of the British Association at Birmingham in 1839, a Committee was appointed for the investigation of the Marine Zoology of the British seas, by means of the dredge; and at the joint recommendation of the Natural History and Geological Sections, a sum of money was granted towards its expenses. Ever since that time the Committee has been annually reappointed, with grants of various amounts placed at its disposal. At each meeting, a provisional report, stating the nature and success of the researches conducted during the interval, has been presented. A considerable mass of valuable materials having been collected, it is now proposed in this Report to present the results in connexion, in such a form as may be useful to science. The extent and value of the data will sufficiently prove the expediency of the researches.

For some years past much attention has been paid to marine zoology by the naturalists of Europe and America. Among the inhabitants of the sea, are many creatures whose organization is as attractive to the physiologist as the singularity of their shapes to the students of external conformation. Many of them were apparent anomalies in their respective classes, and of doubtful position in the animal series. To throw light on the general history of animal tissues, and on the various modifications of vital organs, to fill up gaps in the scale of being as known to zoologists, to ascertain whether in the depths of the ocean there are not still remaining the analogues and homologues of apparently lost species, and the representatives of unknown or conjectural types, it was most desirable that a more searching investigation should be conducted into the number, kinds, and distribution of the inhabitants of the ocean. No single tract had been scientifically explored, and the dredger was in most instances a distinct person from the naturalist by whom he was employed.

The chief purpose for which the dredge had been employed on our coast, was for the procuring of specimens of shells of the Mollusca. Consequently our knowledge of the extent of the marine molluscan fauna of Britain, and of the distribution of the testaceous species in our seas, was much in advance of that of other departments of marine zoology; but even this could be but partially depended on. It was formerly too much the aim of British naturalists and collectors, to endeavour to swell the catalogue of British animals,—the former, from a mistaken patriotism, the latter not always with such disinterested motives; consequently the catalogues of our fauna, especially of the marine mollusca, became enriched by numerous species, very doubtful natives of our coasts. Some of these did not excite surprise, their true distribution being then unknown: others led to hopes of the finding in our seas species of a far more southern type than really inhabit them; and all went to destroy the authority of our lists, and to confound the calculations of the investigators of the laws of geographical distribution, and of the relations of living animals to fossil. The only hope of purging catalogues so vitiated, and at the same time of extending them in those departments to which but little attention had been directed, lay in the establishment of a new series of researches more rigidly precise than had ever before been attempted, and set

1850. o

on foot solely with regard to the determination of the true state of our submarine fauna.

It was for this object mainly the "Dredging" Committee was formed. Their first act was to print blank formulæ, in which the information obtained might be registered at the time and place where procured. Each form consists of a ruled sheet, with a heading for the registration of particulars of *date* of the operation, of the *locality* where conducted, of the *depth* of the sea in the place where the dredge was sunk, of the *distance from the shore* at which the observation was made, of the *ground, i. e.* the nature of the sea bottom in the place examined, and of the *region* under which the portion of the sea-bed explored might be classed. Below the heading are ranged the names of the species procured, opposite columns stating the number of living individuals taken, the number of dead specimens, and any observations which might be suggested by the condition of the specimens, or the manner in which they were associated together.

A great mass of these papers has now been accumulated, and are in the possession of the reporter. The time has come when they can be tabulated and reduced to an uniform language with advantage to science. Until very lately this could not have been done. British marine invertebrate zoology has advanced with gigantic strides since the year the Committee was established. Within the last ten years, the nomenclature and characterization of the species of British Mollusca, Crustacea, Echinodermata, Aculephæ, and Zoophyta, have undergone complete and thorough revision. Much has been done too among the Annelidous tribes\*. Indeed, at the present moment no marine fauna in the world has been investigated with anything like the care devoted to that of the British seas.

Nevertheless much remains to be done. All parts of the British and Irish shores have been more or less explored, but not all in an equally systematic manner. On the eastern coasts, the registration of the depths of marine animals has been carefully attended to by Mr. Alder, Lieut. Thomas, R.N., Mr. Albany Hancock, Mr. Howse, and Mr. King; whilst Dr. Johnston, Sir John Dalyell, Dr. Fleming, Mr. Bean, Mr. Embleton, Professors Goodsir and Macgillivray, the late lamented Dr. J. Reid, and many other able observers, have devoted themselves to the examination of the marine invertebrata. From the north-eastern coast of Scotland, many valuable dredging papers have been filled up by Mr. MacAndrew, and a considerable accumulation of valuable data for tabulating the depths of the Testacea in the southern part of the German ocean, were accumulated by the late Capt. Owen Stanley, R.N., and are in possession of the reporter. Around the shores of Ireland, a valuable mass of data has been collected by Mr. W. Thompson of Belfast, Dr. Robert Ball, Mr. Patterson, Professors Harvey, Allman, and McCoy, Mr. Hyndman, Dr. Farran, Mr. Humphreys, and Mr. Warren, all Irish naturalists, and added to by Mr. Barlee, Mr. Jeffreys, Mr. Hassell, Mr. MacAndrew, and myself. Both from the eastern coasts of Britain, and the whole range of the Irish coast, more well-filled tabulated forms are still wanting; consequently I have thought it advisable in the first instance to report on the results of dredging on the western, southern and northern shores of Great Britain, from which data have been collected very fully and systematically,

\* The following works are used as text-books for these reports:—Yarrell's History of British Fishes; Forbes and Hanley's History of British Mollusca; Bell's History of British Crustacea; Baird's Monograph of British Entomostraca; Forbes's History of British Echinodermata; Forbes's Monograph of British Medusæ; Johnston's History of British Zoophytes, 2nd Edition; Johnston's History of British Sponges. All these works, with the exception of the first, have been published since the Meeting of the British Association at Birmingham in 1839, and much of their most valuable materials have been collected in consequence of the researches set on foot at that meeting.

and more than 140 forms of "Dredging papers" fully filled up. With one exception (by Mr. Hyndman), these have been recorded on the spot at the time of the operation, by Mr. MacAndrew and myself, jointly or separately. Numerous isolated records of depths of particular species within this area are embodied in the following tables from the observations of Mr. Jeffreys, Mr. Smith of Jordan Hill, Mr. Barlee, Mr. Alder, Mr. Hanley, Mr. Clark of Bath, and Captain Otter, R.N.; and for the Orkney Isles, a most valuable record of depths has been drawn up by Lieut. Thomas, R.N., during his survey of those islands. The obligations of science to the officers engaged in the Hydrographical Survey of the British seas cannot be too strongly expressed.

In order to reduce the contents of these papers, and to embody the isolated observations in a useful form, I have tabulated the data in two series of tables. One includes all the depths at which the species of testaceous Mollusca and Radiata were taken during these operations, the species themselves being ranged in systematic order. The nature of the ground upon which they were found is in every registered case recorded, and also whether the individuals were taken alive or dead.

In a second series of tables, all the fully-registered dredging forms are tabulated and analysed, with a record of the year of observation, the distance from shore, the depth, the nature of the sea-bed, the number of species of Univalve testacea taken alive and dead, the same of Bivalve testacea, and the number of Echinodermata, a statement of the species taken most abundantly, of the rare forms found, and of any peculiarities in the assemblage of creatures observed in the particular locality.

The above sets of tables concern mainly the Testacea and Echinodermata. A statement of the results of the search for plants and for animals of other classes and orders is given in a less formal manner in supplementary paragraphs.

To show the range of the several species of Testacea and Echinodermata as perfectly as possible, the lists of English and Scottish species are drawn up separately. Each are moreover grouped under provinces, these provinces being not merely sections of the coast chosen for convenience, but areas presenting peculiar zoological features of their own, dependent on causes which are briefly discussed in the general observations offered in the latter part of this Report.

The English provinces which have contributed materials to this Report are five:—1st, the coasts of Hants and Dorset; 2nd, the coasts of Cornwall and Devon; 3rd, South Wales and the British Channel; 4th, North Wales and the neighbouring sea; and 5th, the sea around the Isle of Man.

The Scottish provinces (western and northern) are also five:—1st, the Clyde region; 2nd, the Inner Hebrides; 3rd, the Outer Hebrides and the sea off Sutherlandshire; 4th, the Orkney Islands; and 5th, the Zetland Islands.

As all these provinces, English and Scotch, have been personally explored by myself, I am enabled, in tabulating the contents of the dredging papers and the isolated observations on depth embodied in the list of species, to judge with greater accuracy than I otherwise could have done of the value and bearing of the data, and to venture with greater confidence on the general considerations which follow.

The reader must bear in mind constantly that the object of the following papers and tables is not to give a complete enumeration of the animals inhabiting each province, but to present an authentic series of accurate observations on the distribution of such species as can only be procured by the aid of the dredge.

TABLE I.  
Analysis of Dredging Papers drawn up on the Southern and Western Coasts of England.

The depth is given in Fathoms.

| Date. | Locality.                  | Miles from shore. | Depth. | Ground. | Univalves. |       | Bivalves. |       | Number of shells. | Remarks, especially noting the animals most abundant.                                                                                                                                                                                                                                        | Observations. |
|-------|----------------------------|-------------------|--------|---------|------------|-------|-----------|-------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|       |                            |                   |        |         | Alive.     | Dead. | Alive.    | Dead. |                   |                                                                                                                                                                                                                                                                                              |               |
| 1833. | Off Ballaugh, Isle of Man. | 5                 | 20     | sh.     | 14         | 1     | 11        | 11    | ...               | (Ab.) Trochus tumidus, Emarginata Mulleri, Buccinum undatum, Pecten opercularis, Hiattella arctica, Tapes virginea; alive and dead.                                                                                                                                                          | E. F.         |
| 1836. | Off Ballaugh, Isle of Man. | 5                 | 20     | sh.     | 18         | 2     | 18        | 6     | 14                | (Ab.) Pecten opercularis, Venus virginea, Hiattella arctica, Nassa incrassata, Arca virginea, Chiton asellus; also in lesser numbers, Pecten tigrinus, maximum and sinuosus, Trochus ziziphinus, Fusus antiquus, gracilis, Buccinum undatum, Fisurulla reticulata. Corallines. Nudibranchia. | "             |
| 1838. | Off Ballaugh, Isle of Man. | 5                 | 20     | sh.     | 21         | ...   | 27        | 2     | 15                | (Ab.) Same as above. Murex erinaceus, Velutina lævigata, Filicopsis hungaricus, and Trophon Bamfius, more plentiful; four species of Nudibranchia.                                                                                                                                           | "             |

These three Registries are all from the same spot in different years. The difference in the number of species noted, possibly depended on the number of hauls of the dredge. All the Manx observations are of many hauls.

|       |                                      |     |       |        |    |     |    |     |     |                                                                                                                                                             |   |
|-------|--------------------------------------|-----|-------|--------|----|-----|----|-----|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1840. | North-west coast of the Isle of Man. | 1-2 | 7-12  | s. st. | 5  | ... | 3  | ... | ... | Laminariae. Compound Ascidians. (Ab.) Rissoa interrupta and Hiattella arctica. Two specimens of Amphioxus lanceolatus. A few of Chiton ruber on the stones. | " |
| 1840. | Off Douglas Head, Isle of Man.       | 1   | 15-18 | N.     | 16 | 4   | 13 | 9   | ... | (Ab.) Trochus tumidus, Arca virginea, Chiton asellus, Pectunculus glycymeris, alive, and dead shells of Trochus montacuti. Corallines, Ascidians.           | " |

NORTH WALES PROVINCE.

|       |                             |   |    |        |   |   |   |    |   |                                                                                                                                                                                                                                                                                                                               |        |
|-------|-----------------------------|---|----|--------|---|---|---|----|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 1844. | Off Doolas, Anglesey.       | 5 | 12 | m. gr. | 2 | 4 | 8 | 8  | 3 | (Ab.) Valves of Nucula nucleus. Corallines plentiful. Sabella.                                                                                                                                                                                                                                                                | M.A. & |
| 1844. | East entrance of the Menai. | ½ | 7  | sh. s. | 1 | 3 | 8 | 12 | 2 | (Ab.) Ostrea edulis, Syndonema alba. In this dredge were taken dead shells of Patella vulgata and Littorina litorea, also a single Helix aspersa covered by Balani, and inhabited by a living Pagurus. Corallines. Near this point the dredge brought up at the same depth great quantities of Modiola modiolus, mostly dead. | E. F.  |
|       |                             |   |    |        |   |   |   |    |   |                                                                                                                                                                                                                                                                                                                               | "      |

NORTH WALES.

|                                                                   | ‡   | 12    | sh&gr        | 1   | 1   | 6  | 5   | 5   | 5 | ''                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------|-----|-------|--------------|-----|-----|----|-----|-----|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1844. Channel between Puffin Island and Anglesey.                 |     |       |              | 1   | 1   |    |     |     |   | (Ab.) Valves of Pecten sinuosus and opercularis, and Ostrea edulis. Many Crustacea.                                                                                                                                                                     |
| 1844. Off Ormeshead.                                              | 2   | 12    | s.           | 1   | 1   | 3  | 10  | 2   |   | (Ab.) Donax trunculus, alive and dead; and dead valves of Tellina solivola and fabula, Syndosmya alba and prismatica, and Solen orsis. Two more dredges were taken at four and eight miles off Ormeshead, with the same products in similar proportion. |
| 1844. Off Ormeshead.                                              | ‡   | 7     | gr.          | 6   | 2   | 8  | 5   | 4   |   | (Ab.) Trochus zisiphinus (mostly the smooth variety), Modiola modiolus, Mactra elliptica, and Echinus miliaris. A frond of Laminaria. Crustacea.                                                                                                        |
| 1844. Off Moelfre, on the north-east coast of Anglesey.           | 5   | 12    | s.           | 3   | 1   | 6  | 6   | 1   |   | (Ab.) Dead valves of Tellina donscina and Venus ovata; also Ophiura albida.                                                                                                                                                                             |
| 1844. Caernarvon Bay, middle part.                                | 6   | 9½    | s.&gr.       | 4   | ... | 4  | 4   | 1   |   | (Ab.) None. Most specimens (5) of Trochus magus, alive, and valves (10) of Artemis caeleta. Echinus miliaris.                                                                                                                                           |
| 1844. Caernarvon Bay, off west coast of Anglesey.                 | 5   | 12    | ...          | 2   | ... | 1  | 9   | 2   |   | (Ab.) Dead valves of Venus striatula, Syndosmya alba, Solen siliqua and Pecten opercularis; Psammobis ferrocensis next in number. A single valve of Cytherea chione.                                                                                    |
| 1844. Roscolyn Bay.                                               | ‡   | 10    | st. & oyst.  | 12  | 2   | 8  | ... | 3   |   | (Ab.) Ostrea edulis. The univalves were species of Trochus, Cypraea, Buccinum, Naasa, Fusus, Murex and Pleurotoma. Fustus foliacea.                                                                                                                     |
| 1844. Caernarvon Bay.                                             | 6   | 12    | gr.          | 7   | 2   | 5  | 2   | 4   |   | (Ab.) Trochus magus and Ophiobrix rosula. Scertulariae and Crustacea. A Doris.                                                                                                                                                                          |
| 1844. Off Point Linas, Anglesey.                                  | 1½  | 14    | st.          | 3   | 1   | 1  | 4   | ... |   | (Ab.) Dead valves of Nucula nucleus and Anomia, and shells of Natica Alderi; Trochus zisiphinus var. Lyonsii alive in plenty. Serpule.                                                                                                                  |
| 1844. Off Point Linas, Anglesey.                                  | 1   | 16½   | st. & sabel. | 4   | ... | 3  | 2   | ... |   | (Ab.) Anomia undulata, Histella rugosa and Trochus zisiphinus, alive. Nucula nucleus, dead. The stones coarse and incrustated with Pomatoceros tricuspis and Tubularia muscoides.                                                                       |
| 1844. Off Point Linas, Anglesey.                                  | 3   | 20    | gr.          | 5   | 3   | 5  | 6   | 2   |   | (Ab.) Trochus zisiphinus, alive. Anomia, Ostrea, Pecten and Modiola, dead. Ophiobrix rosula. Corallines.                                                                                                                                                |
| 1844. North of Point Linas, Anglesey.                             | 2   | 20    | m.           | ... | 3   | 1  | 3   | 1   |   | (Ab.) Modiola modiolus, dead, a few alive. Dead valves of Nucula nucleus and Syndosmya alba. Ophiobrix and Corallines. Actinea scaglia.                                                                                                                 |
| The mud slimy and gray, and mingled with dead Modiola and gravel. |     |       |              |     |     |    |     |     |   |                                                                                                                                                                                                                                                         |
| 1848. South-west part of Caernarvon Bay.                          | 1-2 | 15-20 | gr. st.      | 12  | 15  | 24 | 5   | ... |   | (Ab.) Nucula nucleus, Modiola modiolus, Crenella marmorata, Ostrea edulis, Pecten varius, Trochus zisiphinus and tumidus, alive. One Amphioxus lanceolatus.                                                                                             |

## NORTH WALES (continued).

| Date. | Locality.                                                                                       | Miles from shore. | Depth. | Ground.      | Univalves. |       | Bivalves. |       | Mollusca, etc. | Remarks, especially noting the animals most abundant.                                                                                                                                                                                                     | Ob. server.  |
|-------|-------------------------------------------------------------------------------------------------|-------------------|--------|--------------|------------|-------|-----------|-------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|       |                                                                                                 |                   |        |              | Alive.     | Dead. | Alive.    | Dead. |                |                                                                                                                                                                                                                                                           |              |
| 1844. | Off north coast of Anglesey.                                                                    | 8                 | 25     | gr. st. sab. | 5          | 6     | 14        | 2     | 2              | (Ab.) Pecten varius, Modiola modiolus. Crenella discrepans and marmorata, Hiattella rugosa, Nucula nucleus, Trochus ziziphinus and tumidus, alive; and dead valves of Pecten annuotus and opercularis, and Trophon Bamfuis. Balanus scoticus. Ascidiaria. | M'A. & E. F. |
| 1844. | Off north of Anglesey; Point Llanas bearing south; Middle Mouse, south-west; West Mouse, west.  | 8                 | 30     | gr. & sab.   | 3          | 4     | 2         | 2     | 1              | (Ab.) Modiola modiolus in nests of stones and byssus. A rolled fragment of Purpura lapillus.                                                                                                                                                              | "            |
| 1844. | Off Middle Mouse, north of Anglesey; in a line of strong current; slate and serpentine pebbles. | 7                 | 30     | st.          | 1          | 2     | 3         | 3     | 1              | No species abundant. Modiola modiolus and Crenella discrepans invested by nests. A rolled Purpura lapillus. Corallines.                                                                                                                                   | "            |

## SOUTH WALES AND BRISTOL CHANNEL.

|       |                            |                  |      |          |    |    |    |    |   |                                                                                                                                                                                                    |   |
|-------|----------------------------|------------------|------|----------|----|----|----|----|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1848. | Milford Haven.             | ...              | 3-6  | m.       | 5  | 3  | 3  | 2  | 4 | Comatula. Compound Ascidians.                                                                                                                                                                      | " |
| 1848. | Milford Haven.             | ...              | 8    | gr. m.   | 4  | 4  | 5  | 8  | 1 | Solen pellucidus, abundant.                                                                                                                                                                        | " |
| 1848. | Milford Haven.             | ...              | 10   | gr. m.   | 7  | 4  | 8  | 6  | 4 | Scalaria clathratulus. Northern limit of Calyptra sinensis.                                                                                                                                        | " |
| 1848. | East side of Lundy Island. | $\frac{1}{2}$ -2 | 7-25 | s. & gr. | 22 | 25 | 27 | 20 | ? | (Ab.) Mactra elliptica, Venus ovata, Pectunculus pileatus. Trochus ziziphinus and tumidus, and Murex erinaceus; alive and dead shells of Diplozona rotundata, Rissoa parva and Turritella terebra. | " |

| CORNWALL AND DEVON. |                          |     |      |          |    |    |    |    |   |                                                                                                                                                                                                          |   |
|---------------------|--------------------------|-----|------|----------|----|----|----|----|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1846.               | Reach of Dartmouth.      | ... | 7-12 | m. & st. | 15 | 18 | 10 | 12 | 6 | (Ab.) Nassa reticulata, Turritella terebra, Syndosmya alba, Corbula nucleus, Nucula nucleus alive; dead shells of littoral mollusks. Comatula. Numbers of Cynthis aggregata. Chemnitzia fenestrata, new. | " |
| 1846.               | Off the mouth of the Ex. | 4   | 10   | s.       | 1  | 3  | 7  | 6  | 1 | (Ab.) Solen pellucidus, Syndosmya alba, Nucula nucleus, Anomia aculeata, Mactra subtruncata, and Ophiobrix, all alive.                                                                                   | " |

|                                                                                   |     |       |        |     |     |    |     |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                          |              |
|-----------------------------------------------------------------------------------|-----|-------|--------|-----|-----|----|-----|-----|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1846. Off Teignmouth.                                                             | 4   | 12    | s.     | 3   | 3   | 1  | 5   | 3   | 3   | (Ab.) Turritella communis, alive; valves of Montacuta and Nucula nucleus, dead.                                                                                                                                                                                                                                                                                                                                          | "            |
| 1846. Off Teignmouth, clean sand.                                                 | 15  | 25    | s.     | ... | ... | 2  | ... | ... | ... | Corbula nucleus and Venus striatula only, both sparingly.                                                                                                                                                                                                                                                                                                                                                                | "            |
| 1846. Between Penzance and Land's End.                                            | 3   | 20-25 | sh. s. | 11  | 23  | 18 | 27  | 11  | 11  | (Ab.) Venus fasciata (remarkably brilliant in colour), Pectunculus glycineris, Rissoa striata; alive and dead shells of Solecurtus candidus, Lutraria hians, Area tetragona. Next in quantity were Tellina domacca, Venus ovata, Nucula nucleus, Pecten similis and sinuosus, Trochus tumidus, Rissoa parva, Aporrhais pes-pelecani, Nassa incrassata and Cypræa alive; many rarities. Zoophytes and Crustacea numerous. | "            |
| 1846. Penzance Bay.                                                               | 1   | 27    | r.     | 2   | 1   | 1  | 7   | ... | ... | (Ab.) Eupomatus on stones.                                                                                                                                                                                                                                                                                                                                                                                               | "            |
| 1846. Off Plymouth Bay, half-way to Eddy-stone; gravelly sand, with a little mud. | ... | 20-25 | gr. s. | 3   | 6   | 5  | 18  | 9   | 9   | (Ab.) Dead shells of Pecten opercularis, Venus ovata, Nucula nucleus and Turritella communis. Corallines. Ophura texturata and Ophiothrix.                                                                                                                                                                                                                                                                               | "            |
| 1848. Off the Eddy-stone.                                                         | 11  | 30-35 | s. gr. | 7   | 2   | 12 | 12  | ... | ... | (Ab.) Balani, Dentalium tarentinum alive, Turritella communis dead. (R.) Adna anglica.                                                                                                                                                                                                                                                                                                                                   | M'A.         |
| 1846. Off Dartmouth.                                                              | 8   | 27    | s.     | 6   | 1   | 6  | 9   | 3   | 3   | (Ab.) Dentalium tarentinum, Solen pellucidus, Nucula nitida alive; and dead shells of Syndosmya alba and Macra subtruncata.                                                                                                                                                                                                                                                                                              | M'A. & E. F. |
| 1847. Sixty miles north-west from Land's End.                                     | 60  | 50    | s.     | 2   | 17  | 8  | 14  | ?   | ?   | (Ab.) Cardium suecicum and Corbula nucleus, alive. Among the species of which fewer were taken were Syndosmya intermedia and Nucula decussata.                                                                                                                                                                                                                                                                           | M'A.         |
| 1847. Sixty-five miles from Land's End.                                           | 65  | 50    | s.     | ... | 9   | 3  | 20  | ?   | ?   | The species taken alive were Syndosmya prismatica, Corbula nucleus and Venus ovata. Among the dead shells were Nassa cuspidata, Lucina borealis, Psammobia ferroensis, Perna ingens, Scalaria Treveliana, Trochus millegranus and Ditrupa.                                                                                                                                                                               | "            |

| DORSET AND HANTS.                      |     |       |           |    |     |    |    |     |     |                                                                                                                                                                                                                                                                                                     |              |
|----------------------------------------|-----|-------|-----------|----|-----|----|----|-----|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1846. Bay of Weymouth.                 | 1½  | 7     | st. w.    | 15 | 2   | 9  | 2  | 3   | 3   | (Ab.) Trochus cinereus and magus, Phasianella pulla, Acmea virginea, Rissoe, Chiton asellus, Crenella discrepans and marmorata, Anomia aculeata. Crustacea and Ascidie.                                                                                                                             | "            |
| 1846. Bay of Weymouth.                 | 2   | 7     | m.        | 4  | ... | 8  | 3  | 3   | 3   | (Ab.) Turritella terebra and Corbula nucleus, and Ophiothrix, alive. Next in numbers Trochus cinereus, Syndosmya alba and Macra subtruncata.                                                                                                                                                        | "            |
| 1846. Bay of Weymouth.                 | 2½  | 12    | m.        | 4  | ... | 1  | 2  | 2   | 2   | Crustacea plentiful. Nassa lyngbyea and Lucina flexuosa among the live shells; Lacinopsis undata and Tellina squallida among the dead.                                                                                                                                                              | "            |
| 1846. East Bay of Portland.            | 1-2 | 8-12  | m. g. n.  | 19 | 7   | 19 | 9  | ... | ... | (Ab.) Venus ovata, Nucula nucleus, Crenella discrepans, Trochus tumidus and Anomia ephippiata, alive. Certhium reticulatum, dead.                                                                                                                                                                   | "            |
| 1846. West Bay of Portland.            | 2   | 15-20 | gr.       | 15 | 13  | 20 | 17 | 9   | 9   | (Ab.) Venus fasciata and ovata, Nucula nucleus, Crenella marmorata, Pecten opercularis, Anomia squamata, Chiton asellus, Trochus montacui and Zonitoides, Ascidie, Serpulus and Ophiothrix alive. Crustacea and Corallines abundant. Zoanthus Couchii, Mediodora and Tyronia.                       | M'A. & E. F. |
| 1848. West Bay of Portland.            | 1   | 15-17 | gr. & st. | 5  | 6   | 15 | 12 | ... | ... | (Ab.) Pecten opercularis, Nucula nucleus, Pholis parva, Pholadidea papyracea, Saccorhiza rubra, Nassa incrassata, alive. Turritella communis, dead.                                                                                                                                                 | M'A.         |
| 1850. Weymouth Bay, off Lulworth Cove. | 1   | 15    | n. st.    | 10 | ... | 7  | 9  | 2   | 2   | (Ab. alive.) Trochus tumidus, Acmea virginea, Emarginula rosea, Pecten opercularis and Anomia; and dead Tyros angulatus, Pecten species were Area lactea, Pecten varius and Buccinum undatum, Pterocerauchus plumatus; eight species of Ascidie, Zoanthus Couchii, Crustaceans, Balani and Sponges. | E. F.        |





|                                                                |                |           |       |                      |                                |                  |                              |                               |                 |                        |                        |       |
|----------------------------------------------------------------|----------------|-----------|-------|----------------------|--------------------------------|------------------|------------------------------|-------------------------------|-----------------|------------------------|------------------------|-------|
| <i>Phasianella pulus</i> .....                                 | 15-18          | n.        | ..... | 7-25                 | s. gr.                         | .....            | 7-12<br>20-25                | st.<br>sh. s.                 | 7<br>8-12<br>15 | .....<br>.....<br>8-12 | w.<br>s. gr.<br>s. gr. | 0-20  |
| <i>Adeorbis subcarinatus</i> .....                             |                |           |       |                      | 12<br>7-25                     | m. st.<br>s. gr. | 7-12<br>50                   | st.                           | 15              | .....                  | .....                  | 0-?   |
| <i>Trochus striatus</i> .....                                  |                |           |       |                      | .....                          | .....            | .....                        | s. sh.                        | 7               | .....                  | w.                     | 0-15  |
| <i>Trochus exiguus</i> .....                                   |                |           |       |                      | .....                          | .....            | .....                        | .....                         | 8-12<br>15      | .....                  | s. gr.<br>gr.          | 0-12  |
| <i>Trochus Montagu</i> .....                                   | 15-18<br>25    | n.<br>sh. | ..... | 7-25                 | 3-6                            | m. st.<br>s. gr. | *                            | .....                         | .....           | .....                  | .....                  | 3-30  |
| <i>Trochus millegranus</i> .....                               | *              |           |       |                      | 7-25                           | s. gr.           | 50                           | s.                            | .....           | 15-17                  | gr.                    | 10-50 |
| <i>Trochus granulatus</i> .....                                | 25             | sh.       | ..... | 12                   | .....                          | m. st.           | .....                        | .....                         | 15              | .....                  | gr.                    | 10-30 |
| <i>Trochus ziziphinus</i> .....                                | 15-18<br>25    | n.<br>sh. | ..... | 8<br>10<br>12        | st. m.<br>st. m.<br>st. m. gr. | .....            | 7-2<br>20-25                 | st.<br>s. sh.                 | 15              | .....                  | gr. n.<br>sh.          | 0-50  |
| <i>Trochus tumidus</i> .....                                   | 15-18<br>20-25 | m.<br>sh. | ..... | 10<br>12             | st.<br>gr.                     | .....            | 7-12<br>20-25                | st.<br>s. st.                 | 7<br>8-12       | .....                  | w.<br>s. gr.           | 3-50  |
| <i>Trochus magus</i> .....                                     | 15-18          | m.        | ..... | 9<br>12              | m.<br>gr.                      | .....            | 30-35<br>50                  | s. gr.                        | 15              | .....                  | gr. n.                 | 3-20  |
| <i>Trochus cinerarius</i> (chiefly<br>Littoral and Laminarian) | 7-12           | s.        | ..... | 3-6<br>8<br>10<br>12 | st. w.<br>st. m.<br>gr.        | .....            | 7-12                         | st.                           | 7<br>15         | .....                  | w. m.<br>gr. sh.       | 0-15  |
| <i>Trochus pusillus</i> .....                                  |                |           |       |                      | .....                          | .....            | (10)                         | .....                         | .....           | .....                  | .....                  | ?     |
| <i>Cæcum trachea</i> .....                                     |                |           |       |                      | .....                          | .....            | *                            | .....                         | .....           | .....                  | .....                  |       |
| <i>Cæcum glabrum</i> .....                                     |                |           |       |                      | .....                          | .....            | *                            | .....                         | .....           | .....                  | .....                  |       |
| <i>Turritella communis</i> .....                               | *              |           |       |                      | 10                             | st. m.<br>s. gr. | 7-12<br>12<br>20-25<br>30-35 | st. m.<br>s.<br>sh.<br>gr. s. | 7<br>8-12       | .....                  | m.<br>s. gr.           | 5-50  |

| Species.                                         | Around the Isle of Man. |          | North Wales. |          | South Wales and Bristol Channel. |          | Cornwall and Devon. |          | Dorset and Hants. |          | Range.   |
|--------------------------------------------------|-------------------------|----------|--------------|----------|----------------------------------|----------|---------------------|----------|-------------------|----------|----------|
|                                                  | Alive.                  | Dead.    | Alive.       | Dead.    | Alive.                           | Dead.    | Alive.              | Dead.    | Alive.            | Dead.    |          |
| <i>GASTEROPODA.</i>                              |                         |          |              |          |                                  |          |                     |          |                   |          |          |
| <i>Certhium reticulatum</i>                      | fathoms.                | fathoms. | fathoms.     | fathoms. | fathoms.                         | fathoms. | fathoms.            | fathoms. | fathoms.          | fathoms. | fathoms. |
|                                                  | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | .....    |
|                                                  | 0-50                    | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 0-50     |
| <i>Certhium adversum</i>                         | *                       | .....    | *            | .....    | .....                            | .....    | .....               | .....    | *                 | .....    | 5-30     |
| <i>Aporrhais pes-pelecani</i>                    | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 3-50     |
| <i>Scalaria clathratulus</i>                     | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 5-25     |
| <i>Scalaria communis</i>                         | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | *                 | .....    | 7-30     |
| <i>Scalaria Treveliana</i>                       | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 50       |
| <i>Scalaria Turtonii</i>                         | .....                   | .....    | *            | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | ?        |
| <i>Certhiopsis tubercularis</i>                  | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | *                 | .....    | 5-30?    |
| <i>Chemnitzia fenestrata</i>                     | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 3-12?    |
| <i>Chemnitzia elegantissima</i>                  | *                       | .....    | 15-20        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 1-20     |
| <i>Chemnitzia Jeffreysi</i>                      | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 3-15?    |
| <i>Aclis similima</i>                            | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 3-15?    |
| <i>Eulimella scillæ?</i>                         | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 50       |
| <i>Chemnitzia fulvocincta</i>                    | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 7-30     |
| <i>Odosstomia unidentata</i> , and other species | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 1-30     |
| <i>Eulima distorta</i>                           | 30 gr.                  | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | *                 | .....    | 15? 30   |
| <i>Eulima polita</i>                             | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 7-30     |
| <i>Eulima subulata</i>                           | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 10-30    |
| <i>Littorinæ</i>                                 | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | lit.     |
| <i>Lacunæ</i>                                    | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 0-15     |
| <i>Rissoa interrupta</i>                         | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 0-12     |
| <i>Rissoa parva</i>                              | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 0-30     |
| <i>Rissoa vitrea</i>                             | .....                   | .....    | .....        | .....    | .....                            | .....    | .....               | .....    | .....             | .....    | 0-30     |







| Species.                                         | Around the Isle of Man. |       | North Wales. |             | South Wales and Bristol Channel. |             | Cornwall and Devon. |                | Dorset and Hants. |             | Range.         |
|--------------------------------------------------|-------------------------|-------|--------------|-------------|----------------------------------|-------------|---------------------|----------------|-------------------|-------------|----------------|
|                                                  | Alive.                  | Dead. | Alive.       | Dead.       | Alive.                           | Dead.       | Alive.              | Dead.          | Alive.            | Dead.       |                |
| <i>ACEPHALA.</i>                                 |                         |       |              |             |                                  |             |                     |                |                   |             |                |
| <i>Solecurtus candidus</i> .....                 | fathoms, 25             | sh.   | fathoms.     | fathoms, 12 | fathoms, 8                       | fathoms, 12 | fathoms, 20-25      | fathoms, 20-25 | fathoms, 15       | fathoms, 15 | fathoms, 20-30 |
| <i>Diodonta fragilis</i> .....                   | *                       |       | *            |             |                                  |             | *                   | 20-25          | gr.               | gr.         | 0-15?          |
| <i>Psammobia vespertina</i> .....                |                         |       |              |             |                                  |             |                     | 20-25          | 15                | gr.         | 20-30          |
| <i>Psammobia costulata</i> .....                 | 20-25                   | sh.   |              |             | 7-28                             |             |                     | sh. s.         | 15                | gr.         | 5-40           |
| <i>Psammobia tellinella</i> .....                |                         |       |              |             |                                  |             |                     | 20-25 s.       |                   |             |                |
| <i>Psammobia ferroensis</i> .....                | 20-25                   | sh.   |              | 12 s.       |                                  |             |                     | 20-25 sh. s.   | 8-12              | st.         | 5-50           |
| <i>Tellina crassa</i> .....                      | *                       |       |              | 15-20 gr.   |                                  |             |                     | 27 s.          |                   |             |                |
| <i>Tellina tenuis</i> .....                      | *                       |       |              | 7 s.        |                                  |             |                     | 30 s.          | 15-17             | gr.         | 0-30           |
| <i>Tellina fabula</i> .....                      | *                       |       |              | 7 s.        |                                  |             |                     | 27 s.          |                   |             | 0-3?           |
| <i>Tellina solidula</i> .....                    | *                       |       |              | 12 s.       |                                  |             |                     | 27 s.          |                   |             | 0-3?           |
| <i>Tellina donacina</i> (with <i>pyg-maea</i> ). | *                       |       |              | 12 s.       |                                  |             |                     | 27 s.          | 8-12              | st. m.      | 5-40           |
| <i>Tellina incarnata</i> .....                   | *                       |       |              | 12 s.       |                                  |             |                     | 30-35 s.       | 15                | gr.         | 0-15?          |
| <i>Tellina balaustina</i> .....                  |                         |       |              |             |                                  |             |                     |                | 7                 | m.          | ?              |
| <i>Scrobicularia piperata</i> .....              |                         |       |              |             |                                  |             |                     |                |                   |             | 0-7            |
| <i>Synodosmya prismatica</i> .....               | 20                      | sh.   | *            | 12 s.       |                                  |             |                     | 50 s.          | *                 | *           | 1-50           |
| <i>Synodosmya intermedia</i> .....               |                         |       |              |             |                                  |             |                     |                |                   |             | 50             |
| <i>Synodosmya alba</i> .....                     | 20                      | sh.   | 7, 12        | s.          | 10-12                            | m.          |                     | 7-12           | 7                 | w.          | 1-30           |
|                                                  |                         |       | 12           | m.          | 12                               | st.         |                     | 10             | 8-12              | s. gr.      |                |
|                                                  |                         |       | 15-20        | gr.         | 7-25                             | s. gr.      |                     |                | 15                | gr.         |                |
|                                                  |                         |       | 25           | st.         |                                  |             |                     |                |                   |             |                |
| <i>Donax trunculus</i> .....                     | *                       |       | 12           | s.          | *                                |             |                     | *              | *                 |             | 0-12           |
| <i>Ervillea castanea</i> .....                   | 15-18                   | n.    | 7, 12        | s.          |                                  |             |                     | 20-25          | sh. s.            |             | ?              |
| <i>Maetra elliptica</i> .....                    | 25                      | sh.   | 12           | gr. m.      | 7-25                             | s. gr.      |                     | 8-12           | 7                 | m.          | 5-40           |
|                                                  |                         |       | 30           | gr. st.     |                                  |             |                     | 30-35          | 8-12              | s. gr.      |                |
| <i>Maetra solida</i> .....                       | *                       |       | *            | gr. st.     | *                                |             |                     |                | 15                | gr.         | 0-15           |



| Species.                           | Around the Isle of Man. |                  | North Wales.  |                           | South Wales and Bristol Channel. |                           | Cornwall and Devon.     |                  | Dorset and Hants. |                   | Range.           |
|------------------------------------|-------------------------|------------------|---------------|---------------------------|----------------------------------|---------------------------|-------------------------|------------------|-------------------|-------------------|------------------|
|                                    | Alive.                  | Dead.            | Alive.        | Dead.                     | Alive.                           | Dead.                     | Alive.                  | Dead.            | Alive.            | Dead.             |                  |
| <i>Acephala</i> .                  |                         |                  |               |                           |                                  |                           |                         |                  |                   |                   |                  |
| <i>Cardium echinatum</i> .....     | fathoms.<br>*           | fathoms.<br>7-25 | fathoms.<br>* | fathoms.<br>10-12<br>7-25 | fathoms.<br>7-25                 | fathoms.<br>10-12<br>7-25 | fathoms.<br>27-35<br>50 | s.<br>s.         | fathoms.<br>*     | fathoms.<br>15-17 | fathoms.<br>5-50 |
| <i>Cardium pygmaeum</i> .....      | *                       |                  |               | 2-6                       |                                  | m. st.<br>m.              | m. st.<br>m. st.        | m. st.<br>m. st. | *                 | 8-12              | s. gr.<br>gr.    |
| <i>Cardium fasciatum</i> .....     | *                       |                  |               | 7-25                      |                                  | s. gr.                    | 27                      | sh. s.<br>s. r.  |                   | 15                |                  |
| <i>Cardium norvegicum</i> .....    | 25                      | sh.              | 12            | 8                         | 20-35                            | m.<br>sh. s.              | 15-17                   | gr. s.           |                   | 15                | n.               |
| <i>Cardium nodosum</i> .....       |                         |                  |               | 20-25                     | 7-25                             | s.<br>s. gr.              | 50                      | s.               |                   |                   |                  |
| <i>Cardium rusticum</i> .....      |                         |                  |               |                           |                                  |                           |                         | 20-25            |                   | 7                 | 5-20?            |
| <i>Cardium succicum</i> .....      |                         |                  |               |                           |                                  |                           |                         | sh. s.           |                   | 15-17             | gr.              |
| <i>Lucina leucoma</i> .....        |                         |                  |               |                           |                                  |                           | 50                      | s.               |                   |                   | 0-?              |
| <i>Lucina borealis</i> .....       | 12, 25                  | sh.              | 10            | 12                        |                                  | gr.                       | *                       | s.               |                   | 8-12              | s. gr.           |
| <i>Lucina flexuosa</i> .....       |                         | n.               | *             |                           | *                                |                           | 7-12                    | m.               |                   |                   | 5-50             |
| <i>Lucina spinifera</i> .....      |                         |                  |               |                           |                                  |                           | 50                      | s.               |                   |                   | 15-30?           |
| <i>Lucina divaricata</i> .....     |                         |                  |               |                           |                                  |                           | 30-35                   | s.               |                   |                   | ?                |
| <i>Lucinopsis undata</i> .....     |                         |                  | 10            |                           |                                  |                           | 20                      | s.               |                   |                   | 0-15             |
| <i>Diplodonta rotundata</i> .....  |                         | sh.              | 12            | 12                        |                                  | m.                        | 27                      | sh. s.           | *                 | 7, 12             | m.               |
| <i>Montacuta ferruginosa</i> ..... |                         |                  |               |                           |                                  | s. gr.                    | 20-25                   |                  |                   |                   |                  |
| <i>Montacuta substriata</i> .....  | 25                      | sh.              |               |                           | *                                |                           | 7-12                    | m. st.           |                   |                   | 0-12             |
| <i>Montacuta bidentata</i> .....   |                         |                  | 12            |                           | *                                | s.                        | 20-25                   | sh. s.           |                   |                   | 10-30            |
| <i>Galeomma Turtoni</i> .....      |                         |                  |               |                           |                                  |                           | 1                       | w.               |                   |                   | 0-2              |
| <i>Kellia suborbicularis</i> ..... | 25                      | sh.              | 25            | 7-25                      |                                  | s. gr.                    | 20-25<br>30-35          | sh. s.<br>s.     | 15                |                   | n.               |
| <i>Kellia rubra</i> .....          | *                       |                  | 12            |                           | *                                |                           | 7                       | st.              | *                 |                   | 0-7              |
| <i>Lepton squamosum</i> .....      |                         |                  | 12            | 7-28                      |                                  | s. gr.                    | 20-27                   | s.               |                   | 8-15              | s. gr.           |
| <i>Pinna ingens</i> .....          |                         |                  |               |                           | *                                | s. m. gr.                 | 1                       | s.               | *                 |                   | 0-50             |
| <i>Mytilus edulis</i> .....        | *                       |                  | 7             |                           | 10                               | s. gr.                    | 7-12                    | m. st.           | *                 |                   | 0-10             |





| Species.                          | Around the Isle of Man. |                | North Wales.           |                      | South Wales and Bristol Channel. |                  | Cornwall and Devon.                   |                                        | Dorset and Hants.         |                        | Range.         |
|-----------------------------------|-------------------------|----------------|------------------------|----------------------|----------------------------------|------------------|---------------------------------------|----------------------------------------|---------------------------|------------------------|----------------|
|                                   | Alive.                  | Dead.          | Alive.                 | Ground.              | Alive.                           | Ground.          | Alive.                                | Ground.                                | Alive.                    | Dead.                  |                |
| <i>ACEPHALA</i>                   |                         |                |                        |                      |                                  |                  |                                       |                                        |                           |                        |                |
| <i>Pecten maximus</i> .....       | fathoms, 20-25          | fathoms, 15-20 | fathoms, 7-25          | gr.                  | fathoms, 7-25                    | s. gr.           | fathoms, 7-12<br>20-25<br>30-35       | gr. st.<br>sh. s.<br>s.                | fathoms, 8-12<br>20<br>15 | s. gr.<br>st.<br>n.    | fathoms, 10-30 |
| <i>Pecten opercularis</i> .....   | 15-18<br>20-25          | n.<br>sh.      | 7-12<br>25<br>20       | gr. s.<br>st.<br>gr. | 7-25                             | s. gr.           | 7-12<br>10<br>20-25<br>20-25<br>27-35 | m. st.<br>s.<br>sh. s.<br>gr. s.<br>s. | 7<br>8-12<br>15           | m.<br>s. gr.<br>gr. n. | 5-50           |
| <i>Pecten sinuosus</i> .....      | 20-25                   | sh.            | 25<br>12-20            | st.<br>gr.           | 10<br>7-25                       | st.<br>s. gr.    | 7-12<br>20-25<br>27-35                | m. st.<br>sh. s.<br>s.                 | *                         |                        | 10-30          |
| <i>Pecten varius</i> .....        | 20-25                   | sh.            | 7-12<br>15-20<br>25    | gr.<br>gr.<br>st.    | 10<br>7-25                       | st. m.<br>s. gr. | *                                     |                                        | 7<br>15                   | gr.<br>gr. n.          | 3-30           |
| <i>Pecten tigrinus</i> .....      | 15-18<br>20-25          | n.<br>sh.      | 15-20<br>25            | gr.                  | 7-25                             | m.<br>s. gr.     | 20-25<br>30-35                        | sh. s.<br>s.                           | 15-17                     | gr.                    | 5-50           |
| <i>Pecten striatus</i>            | 15-18                   | n.             | 7-12                   | s.                   | 9                                | m. st.           | 50<br>50                              | s.<br>s.                               |                           |                        | 50             |
| <i>Ostrea edulis</i> .....        | 20-25                   | sh.            | 7-20                   | gr.                  | 7-25                             | s. gr.           | 7-12<br>20-25                         | m. st.<br>sh. s.                       | 8-12<br>15                | s. gr.<br>gr. n.       | 0-30           |
| <i>Anomia ephippium</i> .....     | 15, 18                  | n. sh.         | 7                      | gr.                  | 7-25                             | s. gr.           | 20-25<br>50                           | n.<br>s.                               | 8-12<br>15                | s. gr.<br>n.           | 0-50           |
| <i>Anomia patelliformis</i> ..... | 25                      | sh.            | 12<br>14, 20<br>25, 30 | gr.<br>gr.<br>st.    | 7-25                             | s. gr.           | 50<br>10                              | n.<br>st.<br>s.                        |                           |                        | 0-50           |
| <i>Anomia aculeata</i> .....      | 15-18                   | n.             | 8                      | gr.                  |                                  | w.               | 50<br>10                              | st.<br>s.<br>sh. s.                    | 7<br>15                   | w.<br>gr.              | 0-30           |



| Species.                            | Around the Isle of Man. |       | North Wales.      |       | South Wales and Bristol Channel. |                   | Cornwall and Devon. |                   | Dorset and Hamts. |                   | Range.            |
|-------------------------------------|-------------------------|-------|-------------------|-------|----------------------------------|-------------------|---------------------|-------------------|-------------------|-------------------|-------------------|
|                                     | Alive.                  | Dead. | Alive.            | Dead. | Alive.                           | Dead.             | Alive.              | Dead.             | Alive.            | Dead.             |                   |
| <i>Echinus sphaera</i> .....        | fathoms.<br>7 20        | sh.   | fathoms.<br>7, 20 | gr.   | fathoms.<br>20-25                | fathoms.<br>20-25 | fathoms.<br>20-25   | fathoms.<br>20-25 | fathoms.<br>20-25 | fathoms.<br>20-25 | fathoms.<br>0-30  |
| <i>Echinochlamys pusillus</i> ..... | 20                      | sh.   | 10, 12            | st.   | .....                            | .....             | .....               | .....             | .....             | .....             | fathoms.<br>7-30  |
| <i>Spatangus purpureus</i> .....    | 20                      | sh.   | 12                | s.    | .....                            | .....             | .....               | .....             | .....             | .....             | fathoms.<br>7-30  |
| <i>Amphidetus roseus</i> .....      | 20                      | sh.   | 12                | s.    | .....                            | .....             | .....               | .....             | .....             | .....             | fathoms.<br>10-30 |
| <i>Cucumaria pentactes</i> .....    | 20                      | sh.   | .....             | ..... | .....                            | .....             | .....               | .....             | .....             | .....             | fathoms.<br>1-25  |
| <i>Cucumaria Montagui</i> .....     | .....                   | ..... | .....             | ..... | .....                            | .....             | .....               | .....             | .....             | .....             | fathoms.<br>7-12  |
| <i>Thyone Portlockii?</i> .....     | .....                   | ..... | .....             | ..... | .....                            | .....             | .....               | .....             | .....             | .....             | fathoms.<br>7-25  |
| <i>Thyone papillosa</i> .....       | .....                   | ..... | .....             | ..... | .....                            | .....             | .....               | .....             | .....             | .....             | fathoms.<br>1-15  |
| <i>Sipunculus Bernhardus</i> .....  | 20                      | ..... | 25, 30            | gr.   | .....                            | .....             | .....               | .....             | .....             | .....             | fathoms.<br>1-    |
| <i>Sipunculus Forbesi</i> .....     | .....                   | ..... | .....             | ..... | .....                            | .....             | .....               | .....             | .....             | .....             | .....             |

TABLE IV.  
Analysis of Dredging Papers drawn up on the Western and Northern Coasts of Scotland.

The depth is given in Fathoms.

| Date. | Locality.               | Miles from shore. | Depth. | Ground. | Univalves. |       | Bivalves. |       | Miles from shore. | Depth. | Remarks, especially noting the animals most abundant.                                                                                                                                                                                    | Observer.     |
|-------|-------------------------|-------------------|--------|---------|------------|-------|-----------|-------|-------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|       |                         |                   |        |         | Alive.     | Dead. | Alive.    | Dead. |                   |        |                                                                                                                                                                                                                                          |               |
| 1839. | Rothsay Bay.            | 4                 | 7      | m.      | 2          | ..... | 4         | ..... | 6                 | .....  | (Ab.) <i>Corbula</i> nucleus.<br>(R.) <i>Brisson</i> lyrifer and <i>Ophiocoma</i> filiformis, the last very abundant.                                                                                                                    | E. F. & J. G. |
| 1839. | Loch Ranza, Arran.      | 4                 | 6      | m.      | .....      | ..... | 2         | 3     | 1                 | .....  | (Ab.) <i>Synedonys</i> alba alive, <i>Lacuna flexuosa</i> dead.                                                                                                                                                                          | "             |
| 1839. | Lamlash Bay, Arran.     | 4                 | 15-20  | sh.     | .....      | ..... | 12        | 10    | 22                | 9      | No species very numerous. Serpule.                                                                                                                                                                                                       | "             |
| 1839. | Whiting Bay, Arran.     | 4                 | 12     | sh.     | .....      | ..... | .....     | 2     | .....             | .....  | Only some valves of <i>Pecten maximus</i> and quantities of dead shells of <i>Maetra subtruncata</i> .                                                                                                                                   | "             |
| 1845. | Loch Fyne.              | 1                 | 20     | m.      | 2          | 1     | .....     | ..... | 1                 | .....  | <i>Emarginula crassa</i> , dead.                                                                                                                                                                                                         | M'A. & E. F.  |
| 1845. | Loch Fyne, near Tarbet. | 1 1/2             | 30     | gr. st. | 6          | 3     | 11        | 5     | 2                 | .....  | (Ab.) <i>Dentalium entalis</i> , <i>Chiton asellus</i> , <i>Terebratula Capet-serpentis</i> , <i>Crania Nucula</i> nucleus, <i>Astarte sulcata</i> , all alive, and dead valves of <i>Pecten danicus</i> , <i>Placostegus</i> on stones. | "             |

CLYDE DISTRICT.

|                                                                      |     |      |        |    |     |   |     |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                  |
|----------------------------------------------------------------------|-----|------|--------|----|-----|---|-----|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1841. Saana Island off Mull of Cantyre.                              | 2   | 40   | sh.    | 3  | 10  | 3 | 20  | 5   | (Ab.) Dead valves of <i>Lima hians</i> , <i>Pectunculus glycimera</i> , <i>Pecten opercularis</i> , <i>Venus casina</i> and <i>Macra elliptica</i> . 26 species of <i>Zoophytes</i> and <i>Bryozoa</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Hyndman & Getty. |
| 1845. Loch Fyne, below Tarbet.                                       | ... | 40   | s. m.  | 8  | ... | 7 | 3   | 3   | (Ab.) <i>Astarte sulcata</i> , <i>Leda caudata</i> , <i>Nucula tenuis</i> and <i>Thyone fusus</i> alive, and numbers of valves of <i>Pecten danicus</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | M'A. & E. F.     |
| 1845. Loch Fyne, near Tarbet; dark mud.                              | ... | 50   | m. st. | 3  | 3   | 7 | 1   | 1   | (R.) <i>Nesera costulata</i> , new to Britain. No <i>Corallines</i> . Ear-bones of fish.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | "                |
| 1845. South-west of Loch Ranza.                                      | ‡   | 60   | m.     | 1  | ... | 1 | ... | ... | (Ab.) Dead valves of <i>Pecten danicus</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | "                |
| 1845. Half-way between Loch Ranza and Skipnish.                      | ... | 40   | s.&st. | 3  | 2   | 8 | 4   | 1   | <i>Nucula nucleus</i> and <i>Rissoa abyssicola</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | M'A.             |
| 1845. Loch Fyne, middle of the Loch below Tarbet; fine brownish mud. | ... | 100  | m.     | 1  | ... | 4 | 3   | 2   | Cup sponges. <i>Placostegus</i> , <i>Cuvieria</i> , <i>Pecten islandicus</i> . Dredged here dead valves.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | "                |
| 1850. Entrance of Loch Fyne, West Kyles of Bute.                     | ‡‡  | 5-10 | n.     | 17 | 4   | 8 | 17  | ?   | (Ab.) <i>Nucula tenuis</i> and <i>Leda caudata</i> , both alive; dead valves of <i>Nucula nucleus</i> , <i>Rissoa abyssicola</i> and <i>Lima subauriculata</i> alive. <i>Cardium succineum</i> dead. <i>Bryozoa lyrifer</i> and <i>Ophiocoma filiformis</i> . <i>Cruzaceae</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | "                |
| 1850. Glen Luce Bay.                                                 | ‡   | 15   | gr.    | 12 | 13  | 8 | 16  | ?   | (R.) <i>Rissoa interrupta</i> and <i>Cerithium reticulatum</i> dead. <i>Acmea testudinaria</i> taken alive.<br>(Ab. spec.) <i>Dentalium entalis</i> , <i>Chiton asellus</i> , <i>Natica Alderi</i> , <i>Acmea virginea</i> , <i>Trochus cinereus</i> and <i>tumidus</i> , <i>Lima hians</i> and <i>Serpula</i> , all alive; also <i>Rissoa interrupta</i> and <i>Cerithium reticulatum</i> dead. <i>Acmea testudinaria</i> taken alive.<br>(Ab. spec.) <i>Modiola modiolus</i> , <i>Anomia ephippium</i> and <i>Chiton asellus</i> alive; also dead, <i>Emarginula Mulleri</i> , <i>Acmea virginea</i> , <i>Trochus cinereus</i> and <i>tumidus</i> , <i>Rissoa calathus</i> and <i>strata</i> , <i>Fusus Benfieldi</i> , <i>Balanus</i> , <i>Serpula</i> and <i>Pecten</i> . Among remarkable species are <i>Lepton squamosum</i> and <i>Trichotropis</i> . | "                |

HEBRIDES.

|                                                                                 |     |       |           |    |     |    |     |     |                                                                                                                                                                                                                                                                                                |              |
|---------------------------------------------------------------------------------|-----|-------|-----------|----|-----|----|-----|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1845. Oban.                                                                     | ‡   | 15    | w.        | 11 | 4   | 16 | 2   | 6   | (Ab.) <i>Chiton asellus</i> , <i>Acmea virginea</i> , <i>Pecten opercularis</i> , <i>Lima hians</i> , <i>Nucula nucleus</i> , <i>Anomia</i> , <i>Syndesmya</i> alba, <i>Crenella marmorata</i> and <i>Ascidie</i> . <i>Pecten niveus</i> moored to Laminarie here. <i>Balanus plicifidus</i> . | "            |
| 1845. North of Oban, between Kerrera and Lismore; mud of bottom dark and slimy. | ‡-2 | 15    | m.        | 4  | 2   | 13 | 7   | 4   | (Ab.) <i>Lima subauriculata</i> , <i>Corbula nucleus</i> (in myriads), <i>Syndesmya intermedia</i> , <i>Lucina spinifera</i> ; and dead shells of <i>Apurthia pes-pelecani</i> , <i>Nucula nucleus</i> , <i>Pecten opercularis</i> , and especially <i>Venus ovata</i> .                       | "            |
| 1845. Off Mull.                                                                 | ... | 15-20 | s. gr. m. | 7  | ... | 7  | 2   | 2   | (R.) <i>Isocardia cor</i> alive. <i>Pennatulula</i> and <i>Favonaria</i> here; a single fish, <i>Callionymus</i> .                                                                                                                                                                             | "            |
| 1845. Off Armadale, Sound of Skye.                                              | ‡   | 15-20 | st. m.    | 10 | 1   | 6  | 6   | ... | (Ab.) <i>Crania norvegica</i> and <i>Terebratula Caput-serpentis</i> alive on stones.<br>(R.) <i>Nucula pygmaea</i> , <i>Ascidie</i> , <i>Zoophytes</i> .                                                                                                                                      | "            |
| 1845. East of Mull.                                                             | ... | 20    | st. gr.   | 6  | 1   | 8  | ... | 1   | (Ab.) <i>Chiton asellus</i> , <i>Terebratula Caput-serpentis</i> , <i>Leda caudata</i> , <i>Astarte sulcata</i> , <i>Ascidie</i> , <i>Ophiobrix rosula</i> .                                                                                                                                   | M'A. & E. F. |

HEBRIDES (continued).

| Date. | Locality.                                                                          | Miles from shore.             | Depth. | Ground.      | Univalves. |       | Bivalves. |       | Sex. | Remarks, especially noting the animals most abundant.                                                                                                                  | Ob-<br>server. |
|-------|------------------------------------------------------------------------------------|-------------------------------|--------|--------------|------------|-------|-----------|-------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
|       |                                                                                    |                               |        |              | Alive.     | Dead. | Alive.    | Dead. |      |                                                                                                                                                                        |                |
| 1846. | Between Lochnell Point and Lisimore.                                               | $\frac{1}{4}$ -1              | 20-30  | m. gr. & st. | ...        | 2     | 12        | 7     | 2    | (Ab.) Anomia undulata, Corbula nucleus, Nucula nucleus, Venus ovata, Terebratula Caput-serpentis, Crania norvegica, Ostosomie, all alive. (R.) Favonaria and Cuvieria. | M'A. & E. F.   |
| 1845. | Off Armadale, Sound of Skye.                                                       | 1 $\frac{1}{2}$               | 25     | m. & st.     | 8          | 3     | 10        | 11    | 2    | (Ab.) Chiton cinereus, Crania, Terebratula Caput-serpentis (very numerous), Anomia undulata and Leda pygmaea alive; and dead valves of Venus ovata and Sarcodictyon.   | "              |
| 1846. | North end of Island of Lisimore.                                                   | $\frac{1}{4}$ - $\frac{1}{2}$ | 20-30  | s.           | 7          | 4     | 17        | 4     | ...  | (Ab.) Crenella marmorata, Corbula nucleus, Venus ovata, Terebratula Caput-serpentis, Crania, Turritella communis alive; and dead valves of Pecten danicus.             | "              |
| 1845. | Sound of Raza, just within western entrance; dark brown slimy mud.                 | 1 $\frac{1}{2}$               | 30     | st. & m.     | 4          | ...   | 5         | ...   | ...  | (Ab.) Dead shells of Turritella terebra, and valves of Venus ovata, Anomia and Nucula decussata. Cellepora cervicornis plentiful on the stones.                        | "              |
| 1847. | Off Croulin Island, in the Sound of Skye.                                          | $\frac{1}{4}$                 | 30     | st. & m.     | 7          | 4     | 15        | 11    | ...  | (Ab.) Terebratula Caput-serpentis, Megathyrus cistellula, Lucina ferruginosa, Crania, all alive. Valves of Pecten islandicus and Arca radientata.                      | M'A.           |
| 1845. | Sound of Skye in front of Kilmore House.                                           | $\frac{1}{4}$ - $\frac{1}{2}$ | 15-40  | s.           | 1          | ...   | 1         | 5     | ...  | .....                                                                                                                                                                  | "              |
| 1845. | Same locality, a mile more to the north.                                           | $\frac{1}{4}$ - $\frac{1}{2}$ | 18     | m. s. st.    | 8          | 2     | 11        | 4     | 1    | (Ab.) Anomia and Terebratula Caput-serpentis. (R.) Propidium ancyloides, Leda pygmaea and Pecten danicus. Cuvieria.                                                    | "              |
| 1845. | North of Raza; dark slimy mud.                                                     | 2-3                           | 150    | m.           | 1          | ...   | 1         | ...   | ...  | Rissoa abyssicola and Nucula polii.                                                                                                                                    | M'A. & E. F.   |
| 1845. | East of Raza.                                                                      | ...                           | 100    | m.           | ...        | ...   | ...       | ...   | 1    | Brisaus lyrifer. No trace of shells.                                                                                                                                   | "              |
| 1845. | Entrance of Sound of Skye.                                                         | 1                             | 40     | m.           | ...        | ...   | 1         | ...   | 3    | (Ab.) Nucula pygmaea. (R.) Septola and Orbis taken here.                                                                                                               | "              |
| 1845. | Entrance of Sound of Skye.                                                         | $\frac{1}{2}$                 | 20-30  | st. m.       | 3          | 1     | ...       | 1     | ...  | Cemoria, Sarcodictyon.                                                                                                                                                 | "              |
| 1846. | Off Copenhagen Head, Skye.                                                         | 4                             | 40     | s. gr.       | 8          | 3     | 13        | 9     | ...  | (Ab.) Crania, Anomia, alive. Dead valves of Pecten danicus and Pecten islandicus here.                                                                                 | M'A.           |
| 1848. | Half-way between Skye and Raza at the entrance of the Sound; dark brown slimy mud. | 1                             | 45     | m.           | ...        | 3     | 1         | ...   | ...  | (Ab.) Dead shells of Turritella communis and valves of Nucula polii. Astarte sulcata and Natica grenlandica.                                                           | M'A. & E. F.   |

|                                                   |                  |       |            |    |     |    |     |     |     |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------------------|------------------|-------|------------|----|-----|----|-----|-----|-----|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1845. Off Armadale, Sound of Skye.                | 2-3              | 40    | m.         | 6  | 6   | 6  | 6   | 12  | 2   | " | (Ab.) Turritella terebra, Dentalium entalis. Lucina ferruginosa next in number. Astarte crebricosta (dead) here. Fragments of Patella vulgata and Littorina obtusata.                                                                                                                                                                                                                                                                                                                            |
| 1845. Off east coast of Mull.                     | ...              | 40-80 | gr.        | 2  | ... | 2  | ... | ... | ... | " | Ceromia, Propidium, Nucula nucleus and Astarte sulcata. Plumularia pennatula the only zoophyte.                                                                                                                                                                                                                                                                                                                                                                                                  |
| 1845. Off east coast of Mull.                     | $\frac{1}{2}$    | 90-95 | gr. s.     | 5  | 4   | 10 | 5   | 4   | 4   | " | (Ab.) Leda caudata alive, and dead valves of Venus ovata. Plumularia mytilophyllum, Balani and Serpulae.                                                                                                                                                                                                                                                                                                                                                                                         |
| 1850. Loch Kishon (north side).                   | 50-100 fathoms   | 20-25 | gr. s.     | 22 | 5   | 22 | 6   | 7   | 7   | " | (Ab. alive.) Nucula nucleus, Cardium fasciatum, Crauia, Trochus, Trochus pectinatus, Chiton cinereus, Trochus millegranus; also Crenella marmorata, Nassa incrassata, Dentalium entalis and Echinus sphaera.                                                                                                                                                                                                                                                                                     |
| 1850. South coast of Mull, west of Loch Speltive. | 0- $\frac{1}{2}$ | 12-16 | s. st.     | 12 | 6   | 11 | 8   | ?   | ?   | " | (Rare sp. alive.) Thracia convexa, Syndosmya intermedia, Leda pygmaea, Pecten danicus, Chiton latus, Ceromia, Filidium fulvum, Eulimella MacAndrewe, Natica sortida, Margarita undulata?, Trophon Barvicensis, Olivata, Boothii, and Trichotropis borealis. Character of the assemblage, boreal.                                                                                                                                                                                                 |
| 1850. Kyleakin, north entrance of Sound of Skye.  | 0- $\frac{1}{2}$ | 4-5   | w.         | 16 | 1   | 26 | 3   | 5   | 5   | " | (Most frequent sp.) Corbula nucleus, Astarte sulcata, Nucula nucleus, Chiton cinereus, Trochus tumidus and Laccina vinica. Of the rarer and more peculiar shells Cochlosoma pretense, Chiton levis, Salaria Turroni and Trichotropis were taken.                                                                                                                                                                                                                                                 |
| 1850. Oban, off Dunolly Castle.                   | 0- $\frac{1}{2}$ | 10-12 | m. s. & w. | 8  | 6   | 9  | 11  | 3   | 3   | " | No particular species prevailing. The majority belonged to the families Venetidae and Trochidae. The species most characteristic of the depth, belonged to Tellina, Trochus and Margarita; those of the region were Margarita carinata, Astarte elliptica and Crenella decussata. Among soft Mollusks, Aplysia and Polycrera occurred. Laminariae were plentiful.                                                                                                                                |
| 1850. Oban, off Dunolly Castle.                   | 0- $\frac{1}{2}$ | 12-15 | gr. m. st. | 5  | 8   | 10 | 12  | 3   | 3   | " | Sp. most abundant was Turritella terebra. Among local species were Syndosmya intermedia, Fusus Barvicensis, Pecten danicus (dead), and Clavatulna rufa. Balani abundant. Ophiocoma chitagi, Plumularia cristata, Spongia suberita. Ascidae. Red fuci.                                                                                                                                                                                                                                            |
| 1850. Entrance of Portree Harbour, Skye.          | 0- $\frac{1}{2}$ | 20    | m.         | 2  | 2   | 5  | 10  | 1   | 1   | " | Sp. abundant. Astarte sulcata. Local forms alive, Lucinopsis undata, Neera cuspidata; dead, Nucula polli and Clavatulna brachystoma. Zoophytes, Favosaria and Corallines.                                                                                                                                                                                                                                                                                                                        |
| 1850. West of Tobermorey Mull.                    | 0- $\frac{1}{2}$ | 22    | gr. s.     | 1  | 4   | 7  | 6   | 3   | 3   | " | The only abundant shell was Turritella communis dead, a few alive. Of local species there were Syndosmya intermedia, Cardium, Zenith and Clavatulna brachystoma alive; Thracia convexa, Leda pygmaea, Solanus anatus and Pecten striatus dead. Ophiocoma filiformis (veris) plentiful. No Ascidiata.                                                                                                                                                                                             |
| 1850. Aros Bay, Sound of Mull.                    | 1                | 25    | st. s.     | 9  | 7   | 12 | 8   | 6   | 6   | " | (Ab.) Alive, Astarte sulcata; local forms, Brachiopoda. The only gastropod was Chiton asellus, Balani common.                                                                                                                                                                                                                                                                                                                                                                                    |
| 1850. Aros Bay, Sound of Mull.                    | 1 $\frac{1}{2}$  | 30    | st.        | 1  | ... | 3  | 1   | 3   | 3   | " | (Ab.) Alive, Modiola modiolus, Pecten opercularis, Nucula nucleus, Chiton asellus. Cyprina islandica of full size but dead; large Fusus and Buccinum undatum alive. Ascidae, Sponges, Alcyonium, Sarcodictyon, Crabs (Ebalia).                                                                                                                                                                                                                                                                   |
| 1850. Off Croulin Island.                         | $\frac{1}{2}$ -1 | 25    | gr. & s.   | 11 | 9   | 8  | 9   | 9   | 9   | " | Crauia and Terebratulna, Modiola modiolus, Chiton asellus and Balani.                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                   |                  |       |            |    |     |    |     |     |     | " | No species remarkably abundant; many local forms, as Chiton Hanleyi, Leda pygmaea, Arca rarisidentata, Laccina vinica, Trochus, Trochus pectinatus, Chiton, Trichotropis alive, and Filidium fulvum, Balani, Balanus, Balanus, Eulimella MacAndrewe, Margarita and Natica dead. Among the Echinoderms were Asteropterus, Cuvieria squamata and a large Fungus. Among the Zoophytes, Sarcodictyon, several Annulididae, including Aphroditae, and Placostegus. Four or five species of Ascidiata. |

HEBRIDES (continued).

| Date. | Locality.                     | Miles from shore. | Depth. | Ground.   | Univalves. |       | Bivalves. |       | Echinodermata. | Remarks, especially noting the animals most abundant.                                                                                                                                                                                                                                                                                                                                                               | Obs. server. |
|-------|-------------------------------|-------------------|--------|-----------|------------|-------|-----------|-------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|       |                               |                   |        |           | Alive.     | Dead. | Alive.    | Dead. |                |                                                                                                                                                                                                                                                                                                                                                                                                                     |              |
| 1850. | Off Cronlin Island.           | ½                 | 30     | st. gr.   | 1          | 2     | 6         | 3     | 4              | The living univalve was <i>Trochus ziziphinus</i> . <i>Arca ra ridentata</i> , and <i>Pecten similis</i> are among the bivalves alive, and large <i>Cyprina</i> dead. Three species of <i>Ascidie</i> and a new <i>Sarcodictyon</i> .                                                                                                                                                                               | M.A. & E. F. |
| 1850. | Off Loch Leigh, Ross of Mull. | 2                 | 30-40  | m.        | 4          | 5     | 5         | 8     | 1              | None plentiful; general assemblage very boreal; characterized by <i>Syndesmya intermedia</i> , <i>Lucina ferruginea</i> , <i>Rissoa abyssicola</i> , <i>Cardium Loveni</i> , <i>Bulla</i> , <i>Brachiopoda</i> , <i>Alectio petasus</i> .                                                                                                                                                                           | "            |
| 1850. | Off Sound of Scalpa.          | 1½                | 30-40  | st. & sh. | 6          | 3     | 5         | 10    | 8              | None peculiarly plentiful. <i>Brachiopods</i> , <i>Chiton Hanleyi</i> , <i>Leda pygmaea</i> , <i>Arca ridentata</i> , <i>Lucina ferruginea</i> , <i>Trichopsis</i> and large and waved <i>Buccinum undatum</i> alive. <i>Pecten islandicus</i> and <i>danicus</i> (probably fossils), and <i>Pilidium fulvum</i> dead. <i>Asteropsis</i> and <i>Palimpse</i> , <i>Comatula</i> , <i>Ascidie</i> , <i>Serpulie</i> . | "            |
| 1850. | Off Loch Staffin, Skye.       | 4                 | 35     | gr.       | 1          | 6     | 4         | 15    | ...            | None abundant; among the living species were <i>Circæ</i> , <i>Venus fasciata</i> , <i>Crania</i> , and <i>Chiton asellus</i> . <i>Fuistra truncata</i> and another.                                                                                                                                                                                                                                                | "            |
| 1850. | Off Loch Leigh.               | 2½                | 50     | m. & st.  | ...        | ...   | 2         | 1     | ...            | <i>Terebratula Caput-serpentis</i> in abundance; two specimens of <i>Anomia undulata</i> ; a dead valve of <i>Astarte sulcata</i> . <i>Itepora</i> and <i>Cynthia echinata</i> alive.                                                                                                                                                                                                                               | "            |
| 1850. | Off Cronlin Island.           | 1                 | 50     | m. & gr.  | ...        | 3     | 2         | 12    | 1              | The living species were <i>Lima subauriculata</i> , <i>Leda pygmaea</i> and <i>Ophiozona chiagii</i> . The dead bivalves were almost all pleistocene fossils; as <i>Pecten obsoletus</i> and <i>danicus</i> , <i>Astarte elliptica</i> and <i>crebricostata</i> , <i>Leda oblonga</i> and <i>thraciaformis</i> (first time in Europe), and large form of <i>Hiatella rugosa</i> . An otolithic of a fish was taken. | "            |
| 1850. | Off the Storr, Skye.          | 2                 | 70     | m.        | 2          | ...   | 1         | 5     | 1              | The living species taken were <i>Ophiozona chiagii</i> , an <i>Odoestomia</i> , <i>Turritella tenera</i> (the only abundant dead shell, a few living), and <i>Syndesmya intermedia</i> . <i>Nucula decussata</i> and <i>Thracia convexa</i> among the dead valves.                                                                                                                                                  | "            |

NORTH WESTERN DISTRICT.

|       |                |     |    |          |   |    |   |    |   |                                                                                                                                                                                                                                                                                                                                                                              |   |
|-------|----------------|-----|----|----------|---|----|---|----|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1850. | Off Stornoway. | ... | 8  | w.       | 4 | 1  | 3 | 1  | 3 | <i>Cerithium reticulatum</i> and <i>Comatula</i> .                                                                                                                                                                                                                                                                                                                           | " |
| 1850. | Off Stornoway. | 0-½ | 18 | s. & gr. | 4 | 2  | 4 | 9  | 3 | Most abundant species were <i>Dentalium entalis</i> alive, and <i>Artemis lineata</i> dead. Of scarce species, <i>Syndesmya prismatica</i> and <i>Rissoa zelandica</i> were taken.                                                                                                                                                                                           | " |
| 1850. | Off Stornoway. | 0-½ | 18 | st. & n. | 5 | 13 | 7 | 12 | 5 | Most abundant species were <i>Chiton cinereus</i> and <i>Venus fasciata</i> ; of scarce species, there were <i>Chiton levis</i> , <i>Trochon Barvicense</i> , <i>Circæ minima</i> , <i>Pandora oblonga</i> alive, and <i>Solecurtus antiquatus</i> , <i>Arca lævis</i> and <i>Trichoropsis</i> dead. Among <i>Radiata</i> were <i>Palimpse</i> and <i>Zoanthus Couchii</i> . | " |
| 1850. | Off Stornoway. | 1   | 18 | s. m.    | 9 | 2  | 8 | 7  | 2 | None abundant. Of scarce species, there occurred alive <i>Pilidium fulvum</i> , <i>Bulla scabra</i> and <i>Syndesmya intermedia</i> , and a young <i>Buccinum Hum phreysianum</i> ; and of dead shells, <i>Lucinopsis undata</i> and <i>Lula cranchii</i> .                                                                                                                  | " |
| 1850. | Off Stornoway. | 1   | 20 | m. s.    | 3 | 6  | 4 | 14 | 2 | None abundant. Of scarce species, <i>Lucina ferruginosa</i> and <i>Fusus Barvicensis</i> occurred alive; <i>Arca tetragona</i> , <i>Lima subauriculata</i> , <i>Thracia convexa</i> , <i>Solecurtus antiquatus</i> , <i>Leda pygmaea</i> and <i>Bulla cranchii</i> dead.                                                                                                     | " |



|                                                         |     |       |             |     |     |    |    |     |     |                                                                                                                                                                                                                                                                                            |      |
|---------------------------------------------------------|-----|-------|-------------|-----|-----|----|----|-----|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1850. Off Stornoway.                                    | 1   | 15-20 | gr. n.      | 9   | 3   | 2  | 4  | 4   | 4   | None abundant. The bivalves taken alive were <i>Lyonsia</i> and <i>Pecten maximus</i> ; a <i>Sepiola</i> was taken; also a <i>Caryophylla</i> .                                                                                                                                            | "    |
| 1850. Off Stornoway.                                    | 1   | 15    | n.          | 3   | 3   | 3  | 9  | 1   | 1   | Erato alive.                                                                                                                                                                                                                                                                               | "    |
| 1850. Off the Shiant Isles.                             | 6   | 60    | s.          | ... | 3   | 11 | 1  | ... | ... | The only living species taken was <i>Leda caudata</i> .                                                                                                                                                                                                                                    | "    |
| 1850. Off Stornoway.                                    | 2   | 30    | m.          | 1   | ... | 5  | 2  | 2   | 2   | Almost all the species boreal: <i>Nucula tenuis</i> , <i>Synedonysa intermedia</i> , <i>Montacuta bidentata</i> , <i>Lacuna ferruginea</i> , <i>Solen pellucida</i> , <i>Brissonia lyrifera</i> and <i>Ophiozona chagayi</i> alive. <i>Nucula sulcata</i> and <i>Lucina sitossea</i> dead. | "    |
| 1845. Stornoway Lough.                                  | ... | 4     | s. & w.     | 16  | 1   | 2  | 1  | ... | ... | (Ab.) <i>Trochus cinerarius</i> , <i>Rissoe</i> , <i>Lacuna fasciata</i> , <i>Patella pellucida</i> , <i>Cardium nodifurum</i> .                                                                                                                                                           | M'A. |
| 1845. Cape Wrath, bearing E.N.E.                        | 9   | 55    | c. s. & st. | 5   | 4   | 10 | 4  | ... | ... | (Ab.) <i>Maetra elliptica</i> , <i>Venus ovata</i> , <i>Tellina donacina</i> , <i>Astarte triangularis</i> , <i>Crenella decussata</i> , all alive.                                                                                                                                        | "    |
| 1845. Cape Wrath, bearing S.S.E.                        | 5   | 50    | gr.         | 5   | 12  | 9  | 15 | ... | ... | (Ab.) <i>Venus ovata</i> , <i>Circe minima</i> , <i>Maetra elliptica</i> alive. <i>Pecten tigrinus</i> , <i>Tellina crassa</i> (odd valves), <i>Natica Alderi</i> , <i>Trochus millegranus</i> dead. Two valves of <i>Pecten islandicus</i> dredged here.                                  | "    |
| 1846. In the Minch, ten miles east of the Shiant Isles. | 10  | 50    | s. & g.     | 6   | 1   | 5  | 14 | 2   | 2   | (Ab.) <i>Leda pygmaea</i> and <i>Dentalium entalis</i> alive. <i>Venus ovata</i> and <i>Cardium stueccum</i> dead.                                                                                                                                                                         | "    |
|                                                         |     |       |             |     |     |    |    |     |     | (A.) <i>Orbis</i> and <i>Ditrupa</i> , both dead.                                                                                                                                                                                                                                          |      |
|                                                         |     |       |             |     |     |    |    |     |     | (R.) <i>Comatula</i> , nov. sp.                                                                                                                                                                                                                                                            |      |

ORKNEYS AND EXTREME NORTH-EAST COAST.

|                                |     |       |        |    |    |    |    |     |     |                                                                                                                                                 |       |
|--------------------------------|-----|-------|--------|----|----|----|----|-----|-----|-------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1839. Stromness.               | ... | 5-8   | s.     | 6  | 3  | 4  | 6  | 6   | 6   | <i>Corymorpha nutans</i> .                                                                                                                      | E. F. |
| 1839. Stromness.               | ... | 10-20 | s. sh. | 14 | 3  | 12 | 7  | 8   | 8   | <i>Ascidie</i> abundant.                                                                                                                        | "     |
| 1847. North side of Shapinsha. | 1   | 12    | s. n.  | 18 | 16 | 16 | 16 | ... | ... | (Ab.) <i>Tellina donacina</i> , <i>Trochus tumidus</i> , <i>Acmea virginea</i> , <i>Fusus gracilis</i> , alive.                                 | M'A.  |
| 1847. Off Duncansby Head.      | 15  | 35-40 | s.     | 8  | 7  | 16 | 7  | 3   | 3   | (Ab.) <i>Dentalium entalis</i> and <i>Lacuna crassa</i> alive; and dead shells of <i>Emarginula Mulleri</i> . <i>Ascidia vitrea</i> and others. | "     |

THE ZETLAND ISLES.

|                                                       |     |      |       |    |   |    |   |   |   |                                                                                                                                                                                                                                    |              |
|-------------------------------------------------------|-----|------|-------|----|---|----|---|---|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1845. Hillswick Voe, west coast; a land-locked creek. | ... | 4-7  | m. w. | 7  | 1 | 6  | 7 | 1 | 1 | (Ab.) <i>Trochus cinerarius</i> , <i>Turritella communis</i> , <i>Rissoa interrupta</i> , <i>Venus galina</i> , <i>Modiola vulgaris</i> and <i>Anomia squamula</i> . <i>Balanus</i> , <i>Ascidie</i> , <i>Ophiobrix fragilis</i> . | M'A. & E. F. |
| 1847. Balta Sound, Unst.                              | 4-4 | 5-10 | s.    | 15 | 7 | 30 | 2 | 2 | 2 | (Z.) <i>Lucernaria fascicularis</i> .<br>(Pl.) <i>Laminaria digitalis</i> .<br>(Ab.) <i>Bulla akera</i> . Most of the bivalves, especially <i>Cardium pygmaeum</i> and <i>Crenella decussata</i> .                                 | M'A.         |

## THE ZETLAND ISLES (continued).

| Date. | Locality.                                                                                                                                                                | Miles from shore.             | Depth. | Ground.    | Univalves. |       | Bivalves. |       | Echinodermata. | Remarks, especially noting the animals most abundant.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Observer.   |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--------|------------|------------|-------|-----------|-------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|       |                                                                                                                                                                          |                               |        |            | Alive.     | Dead. | Alive.    | Dead. |                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |
| 1847. | Bressa Sound, North Entrance.                                                                                                                                            | $\frac{1}{2}$ — $\frac{3}{4}$ | 15—30  | n.s.s.     | 22         | 4     | 14        | 9     | 7              | (Ab.) <i>Lucina sinuosa</i> , <i>Chiton asellus</i> , <i>Dentalium entalis</i> , <i>Fusus antiquus</i> , alive; <i>Arenis exotica</i> and <i>Fuillastra virginea</i> dead. <i>Buccinum undatum</i> of large size.                                                                                                                                                                                                                                                                                                                              | M.A.        |
| 1845. | St. Magnus Bay, west of Zetland.                                                                                                                                         | 0— $\frac{1}{2}$              | 20     | s.         | 1          | 1     | 4         | 4     | 1              | (Ab.) Dead valves of <i>Maetra elliptica</i> , <i>Synodosmya prismatica</i> and <i>Venus ovata</i> . <i>Cynthia tubularis</i> abundant; also <i>Ophitocoma filiformis</i> .                                                                                                                                                                                                                                                                                                                                                                    | M.A. & E.F. |
| 1845. | Off Papa Stour in St. Magnus Bay; on a bottom of broken Barnacles and Serpulae in a strong tideway.                                                                      | 0— $\frac{1}{4}$              | 25     | sh.        | ...        | 4     | 5         | 12    | 3              | (Ab.) Dead valves of <i>Arca tetragona</i> .<br>(E.) <i>Comatula europaea</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                | "           |
| 1845. | St. Magnus Bay.                                                                                                                                                          | 1                             | 30—35  | s.gr.s.    | 2          | 8     | 3         | 4     | ...            | Valves of Balani, and fragments of <i>Serpulae</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | "           |
| 1845. | St. Magnus Bay.                                                                                                                                                          | $\frac{1}{4}$                 | 35     | s.         | ...        | 5     | 1         | 1     | ...            | Valve of <i>Solecurtus strigillatus</i> ; a living <i>Synodosmya intermedia</i> ; a dead <i>Marignella laevis</i> . Two specimens of the Nudibranch <i>Idalia</i> .                                                                                                                                                                                                                                                                                                                                                                            | "           |
| 1845. | St. Magnus Bay, in a strong tideway.                                                                                                                                     | $\frac{1}{2}$                 | 35     | sh.gr.     | 1          | ...   | 2         | *     | ...            | Fragments of Balani. <i>Serpulae</i> and broken bivalves in quantity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | "           |
| 1845. | Off Papa Stour.                                                                                                                                                          | 1 $\frac{1}{2}$               | 40     | sh.gr.     | 1          | 1     | 4         | ...   | 1              | (Ab.) <i>Venus fasciata</i> alive.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | "           |
| 1845. | Off Fitful Head, a tideway. The gravel here not always rounded.                                                                                                          | 2                             | 40     | gr.        | 3          | 5     | 5         | 6     | 1              | (Ab.) <i>Trochus tumidus</i> , <i>Psammobia tellinella</i> , <i>Venus fasciata</i> and <i>Cardium fasciatum</i> . <i>Cynthia tubularis</i> .                                                                                                                                                                                                                                                                                                                                                                                                   | "           |
| 1847. | Fair Island bearing south-west by south; bottom of coarse sand.                                                                                                          | 10—12                         | 45     | s.         | 4          | 18    | 8         | 18    | 1              | (Ab.) <i>Chiton cinereus</i> alive. Dead valves of <i>Pectunculus glycymeris</i> and <i>Venus cassina</i> . A single <i>Crania</i> .                                                                                                                                                                                                                                                                                                                                                                                                           | M.A.        |
| 1847. | Off Foula Island, bearing south.                                                                                                                                         | 4                             | 45     | s.&gr.     | 4          | 19    | 8         | 18    | 3              | No species abundant. <i>Cerithium metula</i> and <i>Fusus albus</i> taken. Dead <i>Crania</i> and <i>Terebratula Caput-serpentis</i> .                                                                                                                                                                                                                                                                                                                                                                                                         | "           |
| 1845. | Between Fair Island and Fitful Head. This locality was fertile in rare species, and several new Mollusks and Zoophytes were added to the British fauna on this occasion. | 12                            | 50     | gr. sh. C. | 6          | 10    | 9         | 9     | 4              | (Ab.) <i>Dentalium entalis</i> and <i>Maetra elliptica</i> alive.<br>(Ab.) <i>Dentalium entalis</i> and <i>Emergula Mulleri</i> ; dead single valves of <i>Tellina speciosa</i> , <i>Venus ovata</i> , <i>Maetra elliptica</i> and <i>Psammobia tellinella</i> . Dead specimens of <i>Pleurotoma purpurea</i> and <i>Natica Alderi</i> .<br>(M.) <i>Melibeia</i> and <i>Eolis</i> ; nine species of <i>Tubuligerous Annelides</i> ; two <i>Sponges</i> ; nine <i>Hydroid</i> and <i>Helianthoid Zoophytes</i> ; above fifteen <i>Bryozoa</i> . | M.A. & E.F. |

|                                                                               |       |       |                |     |     |     |     |     |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------|-------|-------|----------------|-----|-----|-----|-----|-----|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1845. Off Mousa Island, east coast.                                           | 1½    | 50    | gr. m. s. & f. | 5   | 12  | 9   | 11  | 3   | "           | (Ab.) Dentalium entalis, Chiton asellus and Natica Alderi alive. Dead valves of Venus striatula, Venus ovata, Pecten tigrinus, Anomise and Psammobia tellinella. Shelled Annelides abundant. Virgularia and Caryophyllia. Tubularia indivisa abundant.<br>No species particularly abundant; many rare forms; shelled Annelides numerous; Crania; a peculiar variety of Natica Alderi. Comastula and Cavertia squamata. Balani, Zoophytes, numerous. |
| 1845. On the Ling Bank, forty miles west of the mainland of Zetland.          | 40    | 50    | s. st.         | 15  | 11  | 13  | 11  | 7   | "           |                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1845. Fair Island, bearing south - east half east, ten miles.                 | 10    | 60    | hard.          | 2   | 2   | 6   | ... | ... | M.A.        | (Ab.) Modiola modiolus.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1845. St. Magnus Bay.                                                         | ...   | 60    | s.             | 6   | 4   | 6   | 8   | 1   | M.A. & E.F. | (Ab.) Dentalium entalis, Trophon turricula and Psammobia ferroensis alive. Cynthia tubularis.                                                                                                                                                                                                                                                                                                                                                       |
| 1847. Fishing-ground, west of Zetland.                                        | 20    | 60    | c. s. st. gr.  | 8   | 8   | 11  | 22  | 2   | M.A.        | (Ab.) Dentalium entalis; also many specimens of Crania and Aporthais pectinifera.<br>(A.) Ditrupa and Serpula serrulata here. Many rare species.                                                                                                                                                                                                                                                                                                    |
| 1845. Off west coast of mainland.                                             | 8     | 70    | m. s. & gr.    | 3   | 10  | 8   | 16  | 3   | M.A. & E.F. | Dentalium entalis alive, and dead valves of Lucina sinuata; most plentiful species. Also numerous dead valves of Venus striatula and ovata, Arctemisia exolata and Psammobia tellinella. Modiola nigra taken alive here, and Pecten danicus dead.                                                                                                                                                                                                   |
| 1847. East-south-east from Bressa.                                            | 21    | 70-80 | f. s.          | 3   | 2   | 4   | 8   | 3   | M.A.        | (Ab.) Dentalium entalis alive, and valves of Lucina borealis. Syndoemya intermedia, Nearea cuspidata, Cardium Loveni, all taken alive, and Aporthais pectinifera dead. Caryophyllia, Virgularia, and an Actinea alive.                                                                                                                                                                                                                              |
| 1847. East of the Noss, Zetland; bottom of sand with some small stones.       | 25    | 70-80 | s. st.         | ... | 1   | 3   | 3   | ... | "           | This and the next observation were made during a strong wind and heavy sea, and are consequently imperfect.                                                                                                                                                                                                                                                                                                                                         |
| 1847. East of the Noss, Zetland.                                              | 40    | 70-80 | s. st.         | 1   | ... | ... | 5   | ... | "           | The living Univalve was Chiton Hanleyi.                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1845. Off Burra Island, on west coast.                                        | 10    | 80    | m. s.          | 9   | 7   | 9   | 13  | 4   | M.A. & E.F. | (Ab.) Dentalium entalis alive; dead shells of Solen pellucida, and valves of Lucina borealis, spinifera and sinuosa, Venus striatula and ovata, Pecten opercularis, Hiatella rugosa, Montacuta oblonga and the fry of Cyprina sinuata, Pectinaria taken here.                                                                                                                                                                                       |
| 1845. Foula Island, bearing south-west. Papa Stour, south-east by south.      | 10?   | 80    | s.             | 3   | 2   | 4   | 11  | 1   | "           | (Ab.) Dentalium entalis alive, and the annelid Ditrupa coarctata, but dead. Three species of Alciaria, including the new Crebriostata all taken, but as dead valves. Cynthia tubularis.                                                                                                                                                                                                                                                             |
| 1845. West coast of Zetland; Foula, bearing N.N.W.; Somburgh Head, S.E. by S. | 10-12 | 80    | s. & gr.       | 1   | 3   | 1   | 9   | ... | "           | (Ab.) Dead shells of Dentalium entalis.                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1845. Off west coast of Zetland.                                              | 10    | 80    | m. s.          | 13  | 6   | 16  | 7   | 4   | "           | (Ab.) Dentalium entalis, Chiton asellus, Venus striatula, Lucina spinifera alive. Dead shells of Bulla cylindrica, Pleurotoma turricula and linearis; valves of Pecten opercularis, Venus ovata, Arctemisia lineata, Lucina borealis and sinuata, Montacuta oblonga, Astarte sulcata, Psammobia ferroensis and Nucula nucleus. Nodoceras taken alive.                                                                                               |

THE ZETLAND ISLES (continued).

| Date. | Locality.                               | Miles from shore. | Depth. | Ground.    | Univalves. |       | Bivalves. |       | Fossiliferous. | Remarks, especially noting the animals most abundant.                                                                                                                                                                                                                                                                       | Ob. server. |
|-------|-----------------------------------------|-------------------|--------|------------|------------|-------|-----------|-------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|       |                                         |                   |        |            | Alive.     | Dead. | Alive.    | Dead. |                |                                                                                                                                                                                                                                                                                                                             |             |
| 1845. | Between Foula Island and the Ling bank. | ...               | 80     | c.s. & st. | 4          | 8     | 5         | 3     | ...            | (Ab.) Venus ovata alive, and dead Ditrupae in vast quantities.                                                                                                                                                                                                                                                              | M.A. & E.F. |
| 1847. | East of Zetland.                        | 30                | 82     | s.         | 9          | 13    | 6         | 6     | 3              | Eulima subulata var. stenostoma, first taken. Pecten danicus, Syndosmya intermedia, Nema cuspidata, Cerithium metula, Aporrhais pes-carbonis, Ptilidium fulvum, Cernoria noachina, Bristus lyrifer and Plicostegus serrulatus give a character to this assemblage; also Echinus norvegicus. Two species of Cypridina taken. | "           |
| 1847. | East of Zetland.                        | 30                | 90     | s.         | 10         | 9     | 11        | 8     | 5              | Assemblage of the same character with the last.                                                                                                                                                                                                                                                                             | "           |
| 1847. | East of Noss.                           | 25                | 100    | s. & s. m. | 7          | 7     | 7         | 16    | 2              | The specimens of Venus ovata and striatula and of Turritella communis taken alive on this occasion were remarkably colourless. A single valve of Pecten islandicus was dredged. Several specimens of Aporrhais pes-carbonis.                                                                                                | "           |

TABLE V.

Enumeration of the depths, &c. at which species of Testaceous Mollusca were taken by the Dredge on the Northern and Western Coasts of Scotland.

| Species.                                | Clyde Province. |          | Hebrides. |          | North-Western Province. |          | Orkneys. |          | Zetlands. |           | Range.   |
|-----------------------------------------|-----------------|----------|-----------|----------|-------------------------|----------|----------|----------|-----------|-----------|----------|
|                                         | Alive.          | Dead.    | Alive.    | Dead.    | Alive.                  | Dead.    | Alive.   | Dead.    | Alive.    | Dead.     |          |
| GASTEROPODA.<br>Dentalium entalis ..... | fathoms.        | fathoms. | fathoms.  | fathoms. | fathoms.                | fathoms. | fathoms. | fathoms. | fathoms.  | fathoms.  | fathoms. |
|                                         | 5-10            | 15-20    | 15        | 25, 30   | 18, 20                  | s. m.    | s. m.    | 35       | 15-20     | 20, 45    | 5-100    |
|                                         | 30              | 30       | 20-25     | gr. s.   | s. m.                   | 60       | 50       | 70       | 50        | s. m. gr. |          |
|                                         | 40              | sh.      | 30        | s. m.    | 50                      | s. gr.   | 50-60    | 70       | 60        | gr.       |          |
|                                         | 40, 50          | m.       | 40        | m.       | 60                      | m.       | 70       | 80       | 80        | m. s.     |          |
|                                         |                 |          | 90-95     | s. m.    |                         |          | 70-80    | 82       | 90        | m. s.     |          |
|                                         |                 |          |           |          |                         |          |          | 82       | 90        | s. m.     |          |
|                                         |                 |          |           |          |                         |          |          | 100      | 100       | s. m.     |          |

|                                       |                                                                             |                                                                                       |              |                                        |                          |
|---------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------|----------------------------------------|--------------------------|
| <i>Chiton Hanleyi</i> .....           | 15<br>20, 30-40<br>25                                                       | st.                                                                                   | 15-80        | st.                                    | 15-80                    |
| <i>Chiton ruber</i> .....             | n.<br>20-25                                                                 | w.<br>gr. m.<br>gr. s.                                                                | 6<br>12<br>* | sh.<br>n.                              | 15-20<br>15-20<br>40     |
| <i>Chiton fasciolaris</i> .....       | *                                                                           | w.                                                                                    | 5-8          | s.                                     | 5-10                     |
| <i>Chiton cancellatus</i> .....       | 15<br>18                                                                    | m.                                                                                    | 10           | sh.                                    | 15-20                    |
| <i>Chiton albus</i> .....             | 20-25<br>10, 15<br>15-20                                                    | gr. s.                                                                                | 12<br>35     | n.<br>s.                               | 40<br>45, 50             |
| <i>Chiton asellus</i> .....           | gr.<br>12, 15-20<br>20, 25<br>30<br>20, 35<br>30-40                         | w.<br>n. sh.<br>gr. st.<br>gr.<br>gr. sh.                                             | 50           | 50<br>80<br>100?                       | m. gr.<br>m. s.<br>s. m. |
| <i>Chiton laevis</i> .....            | sh.<br>12-16<br>30-40                                                       | n. sh.                                                                                | 12           | n.                                     | 15-20                    |
| <i>Chiton marmoratus</i> .....        | n.<br>20-25                                                                 | s. & st.<br>st. sh.<br>gr. s.                                                         |              |                                        | 2-50                     |
| <i>Patella vulgata</i> .....          | 40                                                                          | 40                                                                                    |              | 7                                      | 1-20                     |
| <i>Patella pellucida</i> .....        | *                                                                           | w.                                                                                    | 12           | st.                                    | lit.                     |
| <i>Acmaea testudinalis</i> .....      | n.<br>5<br>*                                                                | w.<br>w.                                                                              | 4<br>4       | n.<br>s.                               | 0-15<br>0-12             |
| <i>Acmaea virginea</i> .....          | n.<br>sh.<br>gr.<br>5-10<br>15-20<br>15                                     | w.<br>gr. s.                                                                          | 5-8<br>12    | sh.<br>n.                              | 0-50                     |
| <i>Pilidium fulvum</i> .....          | st.<br>18<br>20-25<br>20-30<br>40<br>20-30<br>40<br>20-30<br>25<br>30<br>40 | m.<br>gr. s.<br>m. st.<br>st.<br>s. gr.<br>s. m.<br>gr. m.<br>m. st.<br>gr.<br>m. st. | 18           | 50<br>50<br>70<br>82<br>50<br>50<br>50 | 15-90                    |
| <i>Cemoria noachina</i> .....         | gr.<br>30<br>40<br>40                                                       | s. m.                                                                                 | 80           | st.                                    | 20-100                   |
| <i>Propilidium ancyrotoides</i> ..... | sh.<br>15-20                                                                | m.<br>gr.<br>s.                                                                       |              | 45<br>100                              | 15-100?                  |





| Species.                            | Clyde Province. |       | Hebrides.                    |       | North-Western Province. |          | Orkneys. |          | Zetlands. |                                  | Rang.  |
|-------------------------------------|-----------------|-------|------------------------------|-------|-------------------------|----------|----------|----------|-----------|----------------------------------|--------|
|                                     | Alive.          | Dead. | Alive.                       | Dead. | Alive.                  | Dead.    | Alive.   | Dead.    | Alive.    | Dead.                            |        |
| <i>GASTEROPODA.</i>                 |                 |       |                              |       |                         |          |          |          |           |                                  |        |
| <i>Lacuna crassior</i> .....        | *<br>fathoms.   |       | fathoms.                     |       |                         | fathoms. |          | fathoms. |           | fathoms.                         | 0-50   |
| <i>Lacuna fasciata</i> .....        | 15-20 sh.       |       | 12-16                        |       | w.                      |          |          |          |           | 5-10 s.                          | 0-15   |
| <i>Lacuna pallidula</i> .....       | *               |       | *                            |       | w.                      |          |          |          |           | 4-7 w.                           | 0-10   |
| <i>Turritella terebra</i> .....     | *               |       | 6, 12, 15<br>15-20,<br>15-24 |       | w.<br>s. m.             |          |          |          |           | 5-10 s.                          | 2-100  |
|                                     |                 |       | 15-20                        |       | st.                     |          |          |          |           | 80, 90 s.                        |        |
|                                     |                 |       | 20, 25                       |       | st. m.                  |          |          |          |           | 100 s. m.                        |        |
|                                     |                 |       | 20-30                        |       | m. gr.                  |          |          |          |           |                                  |        |
|                                     |                 |       | 30                           |       | st.                     |          |          |          |           |                                  |        |
|                                     |                 |       | 20, 45, 70                   |       | m.                      |          |          |          |           |                                  |        |
|                                     |                 |       | 90-95                        |       | gr. m.                  |          |          |          |           |                                  |        |
| <i>Cerithium reticulatum</i> .....  | 5-10            |       |                              |       |                         |          |          |          |           | 50 s.                            | 0-50   |
| <i>Cerithium metula</i> .....       |                 |       |                              |       |                         |          |          |          |           | 50, 45 s.<br>50-60 gr.           | 40-90  |
| <i>Cerithium adversum</i> .....     | 7               |       | 15-24                        |       | m.                      |          |          |          |           |                                  | ?      |
| <i>Aporrhais pes-pelecant</i> ..... | 15-20           |       | 25                           |       | s.                      |          |          |          |           | 4-7 w.<br>60 s. st.<br>80, 90 s. | 3-100  |
|                                     | 40              |       | 18-20                        |       | m. st.                  |          |          |          |           | 12                               |        |
|                                     |                 |       |                              |       |                         |          |          |          |           | 100 s. m.                        |        |
| <i>Aporrhais pes-carbonis</i> ..... | 30 gr.          |       |                              |       |                         |          |          |          |           | 90 s.<br>82                      | 70-100 |
| <i>Scalaria Turtoni</i> .....       | 15-20 sh.       |       | 12-16                        |       | s. st.                  |          |          |          |           | 100 s. m.                        |        |
| <i>Scalaria Treveliana</i> .....    |                 |       |                              |       |                         |          |          |          |           | 15 w.<br>40 st.                  | 30-100 |
|                                     |                 |       |                              |       |                         |          |          |          |           | 80 s.<br>82, 90 s.<br>100 s. m.  |        |
| <i>Scalaria groenlandica</i> .....  |                 |       |                              |       |                         |          |          |          |           |                                  | ?      |
| <i>Scalaria communis</i> .....      | 5-10 n.         |       |                              |       |                         |          |          |          |           |                                  | ?      |
| <i>Eulima polita</i> .....          | 20 gr.          |       | 25                           |       | gr. m.                  |          |          |          |           | 15-20 n.<br>35 gr. s.<br>45 s.   | 7-50   |
|                                     |                 |       |                              |       |                         |          |          |          |           | 15-20 n.<br>90 s.                | 10-90  |
| <i>Eulima distorta</i> .....        | *               |       |                              |       |                         |          |          |          |           |                                  |        |



|                                            |       |     |  |          |         |        |          |         |  |    |     |        |     |       |
|--------------------------------------------|-------|-----|--|----------|---------|--------|----------|---------|--|----|-----|--------|-----|-------|
| <i>Eulima subulata</i> .....               | *     |     |  |          |         |        |          |         |  | 12 | n.  | 5-10   | s.  | 5-100 |
| <i>Eulima</i> var. <i>stenostoma</i> ..... |       |     |  |          |         |        |          |         |  |    | m.  |        | s.  | ?     |
| <i>Eulima bilineata</i> .....              | *     |     |  |          |         |        |          |         |  |    |     | *      | s.  | ?     |
| <i>Aclis ascaris</i> .....                 | *     |     |  | 25       | n.      |        |          |         |  |    |     |        |     | ?     |
| <i>Aclis nitidissima</i> .....             | *     |     |  | 40       | m.      |        |          |         |  | 80 |     |        |     | ?     |
| <i>Chemnitzia elegantissima</i> .....      | *     | m.  |  | 15       | w.      | *      |          |         |  |    |     |        |     | ?     |
| <i>Chemnitzia fulvocincta</i> .....        | 40    | m.  |  | 15-30    | st.     | 18     | n.       | (20-50) |  |    | s.  | 80     | s.  | 0-15  |
|                                            |       |     |  | 8, 10-12 | w.      |        |          |         |  |    |     | 90     | s.  | 7-100 |
|                                            |       |     |  | 25, 30   | m. st.  | *      |          |         |  |    |     | 40     | s.  | ?     |
| <i>Chemnitzia rufescens</i> .....          |       |     |  | 25, 30   | m. st.  | *      |          |         |  |    |     | 40     | s.  | ?     |
| <i>Chemnitzia indistincta</i> .....        |       | gr. |  | 25       | m. st.  | 18     | sh.      |         |  |    |     | 40     | s.  | 15-60 |
| <i>Eulimella MacAndrewe</i> .....          | 30    | m.  |  | 20-30    | st. gr. | *      |          |         |  |    |     | 40     | s.  | ?     |
| <i>Eulimella affinis</i> .....             | *     |     |  | 30       | m.      |        |          |         |  |    |     | 40     | s.  | ?     |
|                                            |       |     |  | (70)     |         |        |          |         |  |    |     |        |     |       |
| <i>Odosstomia spiralis</i> .....           |       |     |  | *        |         |        |          |         |  |    |     | 5-10   | w.  | 1-40  |
| <i>Odosstomia unidentata</i> .....         |       |     |  | 20-30    | m. s.   | 52     | s. gr.   |         |  |    |     | 40     | s.  | ?     |
|                                            |       |     |  | 30       | m.      |        |          |         |  |    |     | 40     | s.  | ?     |
| <i>Odosstomia plicata</i> .....            | 7     | m.  |  | 20-30    | s.      | 18     | s. gr.   |         |  |    |     | 5-10   | w.  | ?     |
| <i>Odosstomia enlimoides</i> .....         |       |     |  | 40       | m.      |        |          |         |  | 40 | sh. | 40     |     | ?     |
| <i>Odosstomia notata</i> .....             |       |     |  | 15-24    | s.      | *      |          |         |  |    |     | 40     |     | ?     |
| <i>Odosstomia nitida</i> .....             |       |     |  | 20-30    | s.      |        |          |         |  |    |     | 40     |     | ?     |
| <i>Odosstomia dubia</i> .....              |       |     |  | *        |         |        |          |         |  |    |     |        |     |       |
| <i>Odosstomia albella</i> .....            |       |     |  | *        |         |        |          |         |  |    |     |        |     |       |
| <i>Odosstomia acuta</i> .....              | *     |     |  | 30       | m.      |        |          |         |  |    |     | 40     |     |       |
| <i>Odosstomia turrita</i> .....            | *     |     |  |          |         |        |          |         |  |    |     |        |     |       |
| <i>Odosstomia conoidea</i> .....           | *     |     |  | 10       | w.      |        |          |         |  |    |     |        |     |       |
| <i>Odosstomia obliqua</i> .....            | *     |     |  | *        |         |        |          |         |  |    |     | 40     |     |       |
| <i>Odosstomia insculpta</i> .....          | *     |     |  | *        |         | *      |          |         |  |    |     | 5      | r.  |       |
| <i>Odosstomia interstincta</i> .....       | *     |     |  | *        |         | *      |          |         |  |    |     | 5-40   |     |       |
| <i>Odosstomia decussata</i> .....          | *     |     |  | *        |         |        |          |         |  |    |     |        |     |       |
| <i>Cerithiopsis tuberculare</i> .....      | *     |     |  | *        |         |        |          |         |  |    |     |        |     |       |
| <i>Natica monilifera</i> .....             | *     |     |  | 4-5      | w.      |        |          |         |  | 4  | w.  |        |     | 0-5   |
| <i>Natica Montagu</i> .....                | 5-10  | n.  |  | 20-25    | m. st.  | 15, 18 | n. s. m. |         |  |    |     | 15-20  | n.  | 3-100 |
|                                            | 15-20 | sh. |  | 25       | st.     |        |          |         |  |    |     | 50, 60 | s.  |       |
|                                            | 30    | gr. |  | 20-30    | s. gr.  |        |          |         |  |    |     | 50-60  | gr. |       |
|                                            | 40    | m.  |  | 45       | sh.     | 50     | gr.      | 40-100  |  |    |     | 82     | s.  |       |



|                                      |      |             |            |                                   |                  |                                     |          |    |             |  |  |  |  |  |  |  |  |  |  |        |
|--------------------------------------|------|-------------|------------|-----------------------------------|------------------|-------------------------------------|----------|----|-------------|--|--|--|--|--|--|--|--|--|--|--------|
| <i>Fusus antiquus</i> .....          | 15   | 15-20<br>40 | sh.<br>sh. | 12-15, 25<br>15-20<br>20-30       | 10, 60<br>m. st. | s. st.<br>s. m.                     | *        |    |             |  |  |  |  |  |  |  |  |  |  | 10-80  |
| <i>Fusus decemcostatus</i> .....     |      |             |            |                                   |                  |                                     |          |    |             |  |  |  |  |  |  |  |  |  |  | ?      |
| <i>Fusus albus</i> .....             |      |             |            |                                   |                  |                                     |          |    |             |  |  |  |  |  |  |  |  |  |  | ?      |
| <i>Fusus propinquus</i> .....        |      |             |            |                                   | 50               | m.                                  |          |    |             |  |  |  |  |  |  |  |  |  |  | ?      |
| <i>Fusus islandicus</i> .....        |      |             |            |                                   |                  |                                     |          |    |             |  |  |  |  |  |  |  |  |  |  | 40-60  |
| <i>Buccinum undatum</i> .....        | 5-10 | 15-20       | n. sh.     | 4, 5, 12-16<br>25                 | 30, 40           | s. st.<br>st. m.                    | 25       | 80 | gr.         |  |  |  |  |  |  |  |  |  |  | 0-80   |
| <i>Buccinum Humphreysianum</i> ..... | 15   |             | gr.        | *                                 |                  |                                     | 18       |    | gr. s.      |  |  |  |  |  |  |  |  |  |  | ?      |
| <i>Nassa reticulata</i> .....        | 50   |             | m.         |                                   |                  |                                     | 15-20    | 18 | n.          |  |  |  |  |  |  |  |  |  |  | 0-15   |
| <i>Nassa incrassata</i> .....        | 15   | 15-20<br>30 | sh.<br>gr. | 20-25<br>25                       | 22, 45           | s. gr.<br>s. st.                    |          | 50 | gr.         |  |  |  |  |  |  |  |  |  |  | 0-60   |
| <i>Trophon Bamfium</i> .....         | 15   |             | gr.        | 12-16<br>15-20<br>20-30<br>20, 45 | 25               | s. st.<br>s. m.<br>m. st.<br>s. gr. |          | 50 | gr.         |  |  |  |  |  |  |  |  |  |  | 10-60  |
| <i>Trophon Barvicense</i> .....      | *    |             |            | 15-20<br>20-30<br>25              |                  | st.<br>m. st.<br>m. st.             | 18<br>20 |    | n.<br>s. m. |  |  |  |  |  |  |  |  |  |  | 15-100 |
| <i>Trophon muricatum</i> .....       | *    |             |            | 40                                | 15               | w.                                  |          |    |             |  |  |  |  |  |  |  |  |  |  | 15-70  |
| <i>Bela turricula</i> .....          | *    |             |            | 4, 5<br>10, 20-30<br>25           | 45               | s. gr.<br>w.                        |          | 50 | gr.         |  |  |  |  |  |  |  |  |  |  | 10-100 |
| <i>Bela Trevelyana</i> .....         | *    |             |            | 20-30                             | 10               | m. st.                              | 50       |    | gr.         |  |  |  |  |  |  |  |  |  |  | 10-60  |
| <i>Purpura lapillus</i> .....        | *    |             |            | 12-16                             | 45               | s. st.<br>r.                        | *        |    |             |  |  |  |  |  |  |  |  |  |  | 0-5    |



|                                          |       |     |                         |                |                           |          |                    |            |                |                |            |                         |                             |        |
|------------------------------------------|-------|-----|-------------------------|----------------|---------------------------|----------|--------------------|------------|----------------|----------------|------------|-------------------------|-----------------------------|--------|
| <i>Cyprea europea</i> .....              | 15    | gr. | 4-5<br>15               | 12-16<br>90-95 | w.<br>w.<br>gr. m.        | 15, 18   | n.                 | 7          | 50             | w.             | 15-20      | 45<br>50<br>20, 45, 60  | n.<br>s.<br>st.<br>s.<br>s. | 0-50?  |
| <i>Tornatella fasciata</i> .....         | 15-20 | st. |                         | 15-24          | m.                        |          | s. m.              |            | 15<br>35<br>40 | s.<br>s.<br>s. | 5-10<br>60 | 80, 82, 90<br>15-20     | s.<br>n.                    | 0-60   |
| <i>Bulla lignaria</i> .....              | 15-20 | sh. | *                       |                |                           | 20       | s. m.              |            | 40, 80         | m.             |            | 50                      | st.                         | 10-50  |
| <i>Bulla cylindrica</i> .....            | 40    | m.  | 7                       |                | w.                        | 18<br>18 | s. gr.<br>u. s. m. |            | 30, 40<br>80   | m.<br>m.       | 5-10<br>60 | 60, 80<br>90            | s.<br>s.                    | 5-90   |
| <i>Bulla umbilicata</i> .....            | *     |     | *                       |                |                           | 30       | m.                 |            | 7              | s.             |            | 5-10<br>15-20<br>80, 90 | s.<br>n.<br>s.              | 5-90   |
| <i>Bulla truncata</i> .....              | *     |     | *                       |                |                           | *        |                    |            |                |                |            |                         |                             | 2-15   |
| <i>Bulla obtusa</i> .....                | *     |     | *                       | 30             | m.                        |          |                    | 12<br>7-15 |                | n.<br>w.       |            | 5-10                    | s.                          | 2-30   |
| <i>Bulla hyalina</i> .....               | *     |     | *                       |                |                           |          |                    |            |                |                | 7          | 30                      | w.                          | 1-30   |
| <i>Bulla Cranchii</i> .....              | 50    | m.  |                         |                |                           | 18, 20   | s. m.              |            |                |                |            | 80, 90<br>100           | s.<br>s. m.                 | 20-100 |
| <i>Bulla akera</i> .....                 |       |     |                         |                |                           |          |                    | 10<br>15   |                | w.<br>n.       | 5-10       |                         | s.                          | 3-15   |
| <i>Bullæa quadrata</i> .....             |       |     |                         |                |                           |          |                    | 12         |                | n.             | 70         | 80                      | s.                          | 10-100 |
| <i>Bullæa punctata</i> .....             |       |     | *                       |                |                           |          |                    |            | 40             |                |            |                         | s. n.                       | ?      |
| <i>Bullæa pruinosa</i> .....             | *     |     | 70                      | 7              | m.                        | 18       | s. m.              |            |                |                | *          |                         |                             | ?      |
| <i>Bullæa scabra</i> .....               | *     |     | 30                      | 30             | m.                        | 20       |                    |            |                |                | *          |                         |                             | 5-40   |
| <i>Bulla mammillata</i> .....            | *     |     | 4, 5                    |                |                           | *        |                    |            |                |                | *          |                         |                             | ?      |
| <i>Aplysia punctata</i> .....            |       |     |                         |                | w.                        |          |                    | 5-10       |                | w.             |            |                         |                             | 0-10   |
| <i>Acephala</i> .....                    |       |     |                         |                |                           |          |                    |            |                |                |            |                         |                             |        |
| <i>Hiatella arctica and rugosa</i> ..... | 15    | gr. | 4-5<br>10, 25<br>30, 40 | 20<br>25       | s. w.<br>st. m.<br>s. gr. |          |                    |            |                |                | 7          |                         | w.                          | 0-100  |
|                                          |       |     |                         | 18             |                           | 50       | gr.                |            |                |                | 15-20      | 25                      | n.                          |        |
|                                          |       |     |                         |                |                           |          |                    |            |                |                | 80         | 100                     | st.<br>s. m.                |        |

| Species.                           | Clyde Province.        |                                    | Hebrides.                                  |                                       | North-Western Province.       |                       | Orkneys.                        |                                | Zetlands.                           |                                       | Range.                                     |                 |
|------------------------------------|------------------------|------------------------------------|--------------------------------------------|---------------------------------------|-------------------------------|-----------------------|---------------------------------|--------------------------------|-------------------------------------|---------------------------------------|--------------------------------------------|-----------------|
|                                    | Alive.                 | Dead.                              | Alive.                                     | Dead.                                 | Alive.                        | Dead.                 | Alive.                          | Dead.                          | Alive.                              | Dead.                                 |                                            |                 |
| ACEPHALA.                          |                        |                                    |                                            |                                       |                               |                       |                                 |                                |                                     |                                       |                                            |                 |
| <i>Mya truncata</i> .....          | fathoms. fathoms.<br>7 | fathoms. fathoms.<br>m. n.<br>5-10 | fathoms. fathoms.<br>12-14<br>20-25<br>4-5 | st. m.<br>gr. s.<br>s. w.<br>20<br>18 | fathoms. fathoms.<br>20<br>18 | m. s.<br>s. gr.<br>12 | fathoms. fathoms.<br>12<br>5-10 | fathoms. fathoms.<br>1<br>5-10 | fathoms. fathoms.<br>70-80<br>15-30 | s. gr.<br>s.<br>n.<br>100<br>82<br>80 | s. gr.<br>s.<br>n.<br>s. m.<br>s.<br>m. s. | fathoms.<br>0-? |
| <i>Panopea arctica</i> ?           | 7                      | m.                                 | 10, 15, 30                                 | m.                                    | 18                            | s. gr.                | 5-10                            | 5-10                           | 100                                 | s. m.                                 | s. m.                                      | 60-100?         |
| <i>Corbula nucleus</i> .....       | 20                     | sh.                                | 7, 12<br>20-30                             | s.                                    | 25, 18,<br>20                 | s. m.                 | 80                              | 80                             | 82                                  | s.                                    | s.                                         | 3-80            |
| <i>Poromya granulata</i> .....     | *                      |                                    | 20-30                                      | m.                                    | 18                            | gr.                   |                                 |                                | 50                                  | s.                                    | s.                                         | ?               |
| <i>Pandora obtusa</i> .....        | *                      |                                    | 25                                         | m. st.                                | 18                            | gr.                   |                                 |                                | 80                                  | s.                                    | s.                                         | 10-80?          |
| <i>Lyonsia norvegica</i> .....     | 40                     | s. m.                              | 30<br>25, 40<br>35                         | m.<br>s. gr.                          | 15-20                         | gr.                   | *                               |                                | 82                                  | s.                                    | s.                                         | 10-100          |
| <i>Neera cuspidata</i> .....       | 20                     | m.                                 | 30                                         | m.                                    |                               |                       |                                 |                                | 100                                 | s. m.                                 | s. m.                                      | 10-80           |
| <i>Neera abbreviata</i> .....      | 40                     | m.                                 | 15                                         | st. m.                                |                               |                       |                                 |                                | 80                                  | m. s.                                 | m. s.                                      | 10-80           |
| <i>Neera costellata</i> .....      | 40                     | s. m.                              |                                            |                                       |                               |                       |                                 |                                | 70-80                               | s.                                    | s.                                         | ?               |
| <i>Sphenia Binghami</i> .....      | *                      |                                    | 4-5                                        | m.                                    |                               |                       |                                 |                                |                                     |                                       |                                            | ?               |
| <i>Cochlodesma pretenu</i> .....   | 20                     | sh.                                | 4-5<br>4-5                                 | m.<br>s. st.<br>s. w.                 |                               |                       |                                 |                                | 12                                  | s.                                    | s.                                         | 0-80?           |
| <i>Thracia phascolina</i> .....    | ? 40<br>5-10           | s.<br>n.                           | 7                                          | s. w.                                 |                               |                       | *                               |                                | ? 80<br>20, 50<br>? 60              | s.<br>s.<br>s.                        | s.<br>s.<br>s.                             | 0-80?           |
| <i>Thracia villosiuscula</i> ..... | 15<br>? 20             | gr.<br>sh.                         | *                                          |                                       | *                             |                       |                                 |                                | 35                                  | s.                                    | s.                                         | 0-80?           |
| <i>Thracia convexa</i> .....       |                        |                                    | 15<br>20-25<br>20, 50,<br>70               | s. m.<br>gr. s.<br>m.                 | 25<br>20, 60                  | s.                    |                                 |                                | ? 5-10<br>? 70-80                   | s.<br>s.                              | s.<br>s.                                   | 10-70           |
| <i>Thracia distorta</i> .....      |                        | n.                                 | 35                                         | gr.                                   |                               |                       | *                               |                                | 15-20                               | n.                                    | n.                                         | 0-20            |
| <i>Solen ensis</i> .....           | *                      |                                    | 4-5                                        | s. w.                                 |                               |                       | *                               |                                | 5-10                                | s.                                    | s.                                         | 2-20            |
| <i>Solen siliqua</i> .....         | *                      |                                    | *                                          |                                       | *                             |                       | 12                              | 35-40                          | 5-10<br>4-7                         | s.<br>s.                              | s.<br>s.                                   | 0-12            |

|                                           |    |              |                   |            |                   |             |                 |             |              |          |                         |                               |                 |
|-------------------------------------------|----|--------------|-------------------|------------|-------------------|-------------|-----------------|-------------|--------------|----------|-------------------------|-------------------------------|-----------------|
| <i>Solen pellucidus</i> .....             | 20 | sh.          | 20                | 8          | m.<br>s.          | 18<br>30    | s. m.<br>m.     | 12          |              | s.       | 60, 70<br>80, 90<br>100 | s.<br>s.<br>s. m.<br>w.<br>s. | 7-100           |
| <i>Solecortus antiquatus</i> .....        | *  |              | 25                |            | m. st.<br>st. sh. | 18<br>20    | gr. n.<br>m. s. |             |              | s.       |                         |                               | 15-50           |
| <i>Solecortus candidus</i> .....          | *  |              | *                 | 7          | s.                | 18          | gr.             | 12<br>35-40 | 35-40<br>5-8 | s.<br>s. | 5-10<br>20              | s.<br>s.<br>s.                | 20-50<br>3-90   |
| <i>Psammobia ferroensis</i> .....         | *  |              |                   |            |                   |             |                 |             |              |          | 60, 70, 80<br>90        | gr.<br>gr.                    | 3-70            |
| <i>Psammobia tellinella</i> .....         |    | s. sh.       | 4-5               |            | s. w.             | 55          | s.              | 12          |              | s.       | 5-10                    | s. m.                         |                 |
| <i>Tellina crassa</i> .....               |    | sh. s.<br>n. | 4-5<br>40         |            | s. w.<br>s. gr.   | 8<br>18, 55 | gr.<br>s.       | 35-40<br>25 | 12           | s.       | 40                      | gr.<br>n.                     | 0-70?           |
| <i>Tellina proxima</i> .....              |    |              |                   |            |                   |             |                 |             |              |          |                         |                               |                 |
| <i>Tellina donacina and pygmaea</i> ..... |    |              |                   |            |                   |             |                 |             |              |          |                         |                               |                 |
| <i>Tellina fabula</i> .....               |    | n.<br>sh.    | *<br>20           | 40<br>4, 7 | s. m.<br>s.       | 5<br>8, 55  | gr.<br>s.       | 12<br>35-40 |              | s.<br>s. | 5-10<br>45              | s.<br>gr.                     | 50-100?<br>1-80 |
| <i>Tellina tenuis</i> .....               |    | n.<br>sh.    |                   |            | s.                |             |                 | *           |              |          |                         |                               | 0-7             |
| <i>Tellina balaustina</i> .....           | *  |              | *                 |            | m.                | *           |                 | 12          |              | s.       | 5-10                    | s.                            | 0-12            |
| <i>Diadonta fragilis</i> .....            |    |              |                   |            | m.                | *           |                 |             |              |          | 5-10                    | s.                            | ?               |
| <i>Syndosmya intermedia</i> .....         |    |              | 10, 15, 30,<br>70 |            | m.                | 30          | m.              |             |              |          | 4-7<br>35               | w.<br>s.                      | 15-100          |
|                                           |    | m.           | 20, 25<br>40      |            | m. s.<br>m.       | 18          | s. m.           |             |              |          | 70-80<br>90             | s.<br>s.                      |                 |
|                                           |    |              |                   | 50         |                   |             |                 |             |              |          | 100                     | s. m.                         |                 |

| Species.                          | Clyde Province. |              | Hebrides. |             | North-Western Province. |             | Orkneys. |         | Zetlands.    |        | Range. |               |
|-----------------------------------|-----------------|--------------|-----------|-------------|-------------------------|-------------|----------|---------|--------------|--------|--------|---------------|
|                                   | Alive.          | Dead.        | Ground.   | Dead.       | Ground.                 | Alive.      | Dead.    | Ground. | Alive.       | Dead.  |        | Ground.       |
| <i>ACEPHALA</i>                   |                 |              |           |             |                         |             |          |         |              |        |        |               |
| <i>Syndosmya alba</i> .....       | fathoms. 6, 7   | fathoms. 100 | m.        | fathoms. 15 | w. m.                   | fathoms. 18 | s. m.    |         | fathoms. 4-7 |        | W.     | fathoms. 3-40 |
| <i>Syndosmya prismatica</i> ..... | 50              |              | m.        | 20-30       | m.                      | 18          | s. gr.   |         | 20           | 5-10   | s.     | 5-100         |
|                                   |                 |              |           | 40          |                         |             |          |         | 80           | 45, 50 | s.     |               |
| <i>Maetra elliptica</i> .....     |                 | 40 s. s.     |           | 7.          | gr. s.                  | 50          | gr.      |         | 35-40        | 60     | s. m.  |               |
|                                   |                 | 15 gr.       |           | 12-16       | gr. s.                  | 58          | s.       |         | 12           | 28     | s.     | 5-80          |
|                                   |                 |              |           | 22          |                         |             |          |         | 40, 50       |        | s.     |               |
| <i>Maetra solida</i> .....        | *               |              |           | *           |                         | *           |          |         | 55, 60       | 80     | gr. s. | ?             |
|                                   |                 |              |           |             |                         |             |          |         |              |        |        |               |
| <i>Maetra subtruncata</i> .....   |                 | 12 s.        |           | *           |                         | *           |          | 35-40   | 4-7          |        | W.     | 0-12          |
| <i>Maetra stultorum</i> .....     | *               |              |           | *           |                         | *           |          |         | 4-7          |        | W.     | 0-7           |
| <i>Lutraria elliptica</i> .....   | *               |              |           | *           |                         | *           |          |         |              | 5-10   | s.     | 0-10          |
| <i>Tapes decussata</i> .....      | *               |              |           | *           |                         | 5-8         | W.       |         | 1            |        | s. gr. | 0-7           |
| <i>Tapes pullastra</i> .....      | *               |              |           | *           |                         | *           |          |         | 5-10         |        | s.     | 0-7           |
| <i>Tapes virginea</i> .....       |                 | 5-10 n.      |           | 4-5         | s. w.                   |             |          |         |              |        |        | 5-60          |
|                                   |                 | 15 gr.       |           | 15          | s. m.                   | 18          | gr.      | 12      | 35-40        | 4-7    | s. w.  |               |
|                                   |                 |              |           | 20-30       |                         |             |          |         |              |        |        |               |
| <i>Venus ovata</i> .....          | 12, 30          | 15           | gr.       | 4-5, 8      | s. w.                   | 18, 20      | s. gr.   |         | 25           | 15-20  | sh. n. |               |
|                                   | 40              |              |           | 10, 15      | s. m.                   |             |          |         | 45           | 35, 60 | s.     |               |
|                                   |                 |              |           | 20          | st.                     |             |          |         | 5-10         |        | s.     |               |
|                                   |                 | 40           | sh. s.    | 15-20       | s. w.                   | 35-40       |          |         | 15-20        |        | n.     |               |
|                                   |                 |              |           | 40          | gr. s.                  | 45          |          |         | 20           | 25     | s. sh. |               |
|                                   |                 |              |           | 22          | gr. s.                  |             |          |         | 50, 55,      | 60     | s. gr. |               |
|                                   |                 |              |           |             |                         |             |          |         | 60           |        | s.     |               |
|                                   |                 |              |           |             |                         |             |          |         | 70, 80,      |        | s.     |               |
|                                   |                 |              |           |             |                         |             |          |         | 82           |        | s.     |               |
|                                   |                 |              |           |             |                         |             |          |         | 90           |        | s. m.  |               |
|                                   |                 |              |           |             |                         |             |          |         | 100          |        | s. m.  |               |
| <i>Venus fasciata</i> .....       | 5-10            | 15           | n.        | 40          | s. gr.                  | 4, 8        |          |         | 12           | 15-20  | n.     |               |
|                                   | 40              |              | sh. s.    | 12-14       | m.                      | 18, 50      | gr.      |         | 16           | 28-35  | sh.    |               |
|                                   |                 |              |           | 20-25, 35   | gr. s.                  | 55          |          |         | 38-40        |        | s.     |               |
|                                   |                 |              |           | 4-5         | s.                      | 15          | n.       |         |              | 40, 55 | gr.    |               |



|                                |                        |                        |                            |                        |                     |                       |             |    |           |                                    |                            |       |
|--------------------------------|------------------------|------------------------|----------------------------|------------------------|---------------------|-----------------------|-------------|----|-----------|------------------------------------|----------------------------|-------|
| <i>Venus cassina</i> .....     | 5-10<br>40<br>15<br>30 | n.<br>sh. s.<br>gr. m. | 25-50<br>22,40,<br>35      | m. st.<br>s. gr. m.    | 18, 50<br>55        | s. gr.<br>s.          | 12          |    | s.<br>s.  | 80<br>15-20<br>25<br>35, 50,<br>70 | s.<br>n.<br>sh.<br>s.      | 5-70  |
| <i>Venus striatula</i> .....   | 15                     | s. m.                  | 12-16<br>70                | s. st.<br>m.<br>s. w.  | 18<br>70            | s. gr.<br>s.<br>s. m. | 12          |    | s.<br>s.  | 5-10<br>4-7<br>50, 60,<br>70, 80   | gr.<br>s.<br>w.<br>s.      | 0-100 |
| <i>Artemis lineta</i> .....    | 20                     | sh.                    | 20-30<br>10, 25,<br>30, 40 | gr.<br>st.<br>m.<br>s. | 18<br>70            | s. gr.<br>s.<br>s.    | 1<br>35, 40 |    | w.<br>s.  | 100<br>5-10<br>50, 60,<br>80       | s.<br>s. m.<br>s.<br>s.    | 0-80  |
| <i>Artemis exoleta</i> .....   | 20                     | sh.<br>m.              | 7, 20-30<br>4-5            | s.<br>s. w.            | *                   |                       | *           |    |           | 5-10<br>70                         | s.<br>s.                   | 0-70  |
| <i>Cyprina islandica</i> ..... | 20                     | sh. n.<br>gr.          | 7, 20-30<br>20, 38         | s.<br>m.               | 18<br>25, 18,<br>20 | s. gr.<br>s. m.       | (7-40)      | 12 | s.<br>s.  | 5-10<br>50, 80                     | n.<br>s.<br>d.<br>s.<br>s. | 0-100 |
| <i>Circe minima</i> .....      | 5-10                   | n.                     | 4, 15<br>20, 25<br>35, 40  | w.<br>m. st.<br>s. gr. | 18, 50<br>50        | gr.                   | 12<br>25    |    | s.<br>sh. | 15-30<br>25, 45<br>50<br>80        | n.<br>s.<br>s.<br>s.       | 3-80  |
| <i>Astarte compressa</i> ..... | 20                     | sh.                    | 20-25<br>12, 40,<br>25     | m.<br>s. gr.           | 8<br>15             | s.<br>n.              | 35-40       | 12 | s.        | 18-30<br>40                        | gr.<br>n.                  | 3-80  |
|                                |                        |                        | 4-5                        | s. w.                  |                     |                       |             |    |           | 50, 70,<br>80                      | s.                         |       |

| Species.                     | Clyde Province. |       |          |        | Hebrides. |         |           |        | North-Western Province. |        |          |        | Orkneys. |   |          |        | Zetlands. |     |          |       | Range.  |          |     |          |          |    |        |
|------------------------------|-----------------|-------|----------|--------|-----------|---------|-----------|--------|-------------------------|--------|----------|--------|----------|---|----------|--------|-----------|-----|----------|-------|---------|----------|-----|----------|----------|----|--------|
|                              | Alive.          |       | Dead.    |        | Ground.   |         | Alive.    |        | Dead.                   |        | Ground.  |        | Alive.   |   | Dead.    |        | Ground.   |     | Alive.   |       |         | Dead.    |     | Ground.  |          |    |        |
|                              | fathoms.        | gr.   | fathoms. | gr.    | w. m.     | m. st.  | fathoms.  | w. m.  | fathoms.                | gr.    | fathoms. | gr.    | fathoms. | * | fathoms. | gr.    | fathoms.  | gr. | fathoms. | gr.   |         | fathoms. | gr. | fathoms. | gr.      |    |        |
| <i>ACEPHELA.</i>             |                 |       |          |        |           |         |           |        |                         |        |          |        |          |   |          |        |           |     |          |       |         |          |     |          |          |    |        |
| <i>Astarte sulcata</i>       | 30, 15          | 40    | gr.      | s. m.  | 12, 15    | 25      | w. m.     | m. st. | 20                      | 50     | fathoms. | gr.    | *        |   | 70-80    | 80, 90 | fathoms.  | s.  | 100      | s. m. | 15-30   | n.       |     |          | fathoms. | s. | 10-100 |
| <i>Astarte elliptica</i>     | 20              | 30    | sh.      | gr.    | 22, 90-95 | 4-5, 15 | gr. s.    | w.     | 50                      | 50     | gr. s.   | gr. s. | *        |   |          | *      |           |     |          |       |         |          |     |          |          |    | 3-50   |
| <i>Astarte crebricostata</i> | 30              | 40    | gr.      | s. m.  | 30, 50    | 40      | m.        | s. gr. | 55                      |        |          |        | 35-40    |   | 5-10     | 45     |           |     | 5-10     | 60    |         |          |     |          | 80       |    | ?      |
| <i>Astarte arctica</i>       | 40              |       | sh. s.   |        | 40, 50    |         | m.        |        |                         |        |          |        |          |   | 5-10     | 45     |           |     | 5-10     | 60    |         |          |     |          | 80       |    | ?      |
| <i>Astarte triangularis</i>  | 40              |       | sh. s.   |        | 5         |         | w.        |        |                         |        |          |        |          |   | 40       | 55     |           |     | 40       | 55    |         |          |     |          | 40       |    | 5-60   |
| <i>Isocardia cor</i>         |                 |       |          |        | 24        |         | m.        |        |                         |        |          |        |          |   |          |        |           |     |          |       |         |          |     |          |          |    | 15-50? |
| <i>Cardium echinatum</i>     | 20              |       | sh.      |        | 15, 30,   |         | m.        |        |                         |        |          |        |          |   |          |        |           |     |          |       |         |          |     |          |          |    | 5-100? |
|                              | 5-10            | 20-25 | n.       | gr. s. | 40, 50    |         | s.        |        | 18                      | 20, 70 | s. gr.   | s. m.  | 60       |   | 5-10     | 80, 90 |           |     | 5-10     | 100   |         |          |     |          | 100      |    | 5-100? |
| <i>Cardium pygmeum</i>       | 6               |       | m.       |        |           |         |           |        | *                       |        |          |        |          |   | 5-10     | 4-7    |           |     | 5-10     | 4-7   |         |          |     |          |          |    | 3-15   |
| <i>Cardium fasciatum</i>     | 30              | 20    | gr.      | sh.    | 4, 10, 15 | 20-30   | w. m.     |        | 18                      | 50     | gr.      | s.     | 12       |   | 5-10     | 55     |           |     | 5-10     | 55    |         |          |     |          |          |    | 5-100  |
|                              |                 |       |          |        | 20, 40,   | 35      | s. gr.    |        |                         |        |          |        |          |   | 45, 50   |        |           |     | 45, 50   |       |         |          |     |          |          |    |        |
|                              |                 |       |          |        | 8         |         | s.        |        |                         |        |          |        |          |   | 60, 80   | 70     |           |     | 60, 80   | 70    |         |          |     |          |          |    |        |
| <i>Cardium norvegicum</i>    | 5, 20           |       | sh.      |        | 15-20     |         | st.       |        |                         | 18, 50 | gr.      | w.     | 7, 15    |   | 100      |        |           |     | 100      |       |         |          |     |          |          |    | 5-80   |
| <i>Cardium nodosum</i>       | 5-10            |       | sh.      |        | 4, 8      |         | s.        |        | 4                       |        |          |        |          |   |          |        |           |     |          |       | 50, 70, |          |     |          |          |    | 5-80   |
|                              |                 |       |          |        |           |         |           |        |                         |        |          |        |          |   |          |        |           |     |          |       | 80      |          |     |          |          |    | 5-100  |
| <i>Cardium succium</i>       | 30              | 50    | gr.      | m.     | 30        | 25-50   | m.        |        |                         | 50     | gr.      | s. m.  |          |   |          |        |           |     |          |       | 5-10    |          |     |          |          |    | 5-100  |
|                              | 100             |       | m.       |        | 30        |         | s. m. gr. |        |                         | 18     | s. m.    |        |          |   |          |        |           |     |          |       | 70-80   |          |     |          |          |    |        |
| <i>Cardium edule</i>         | *               |       |          |        | *         |         |           |        | *                       | 18     | s. gr.   |        |          |   |          |        |           |     |          |       |         |          |     |          |          |    | 0-1    |

|                                    |         |      |               |                        |                            |                  |                      |                           |       |    |                                    |                                    |     |                            |        |
|------------------------------------|---------|------|---------------|------------------------|----------------------------|------------------|----------------------|---------------------------|-------|----|------------------------------------|------------------------------------|-----|----------------------------|--------|
| <i>Lucina ferruginosa</i> .....    | 20      | 100  | m.            | 25, 30                 | m.                         | 25, 20,<br>30    | m. s.                | 15-40                     | 12    | s. | 25-30                              | ?                                  | 90  | s.                         | 0-100  |
| <i>Lucina borealis</i> .....       | 20      | 5-10 | st. n.        | 30-40                  | st. sh.<br>s. st.<br>s. w. | 12-16<br>4-5     | 18<br>70<br>15<br>50 | s. gr.<br>s.<br>n.<br>gr. | 5-8   | w. | 80, 90<br>70-80                    | 45, 50<br>70-80                    | 100 | n.<br>s.<br>s. m.          | 3-100  |
| <i>Lucina flexuosa</i> .....       | 6<br>20 | 5-10 | m.<br>sh.     | 4-5<br>30<br>20, 25    | s. w.<br>m.<br>gr. s.      | 40, 50<br>12-14  | 30<br>18, 70<br>15   | m.<br>s.<br>n.            | 40    | n. | 15-30<br>80<br>45, 50<br>4-7<br>70 | 15-30<br>80<br>45, 50<br>4-7<br>70 | 100 | n.<br>s.<br>w.<br>s.       | 10-100 |
| <i>Lucina spinifera</i> .....      |         | 20   | sh.           | 30, 40                 | m.                         | 12-14,<br>20, 70 | 18                   | s. gr.                    | *     |    | 15-30                              | 15-30                              | 100 | s. m.<br>n.                | 10-100 |
| <i>Lucinopsis undata</i> .....     |         | 40   | sh. s.        | 20, 90, 95             | gr. s.<br>m.               | 25<br>20         | 15<br>18             | s. m. n.<br>s. m.         | 1     | w. | 80                                 | 80                                 | 60  | s.                         | 1-40   |
| <i>Montacuta bidentata</i> .....   |         | 20   | sh.           | 15<br>4, 8             | st. m.<br>s.               |                  | 18                   | s. gr.<br>m.              | 15    |    | 5-10<br>80                         | 5-10                               |     | s.<br>s.                   | 1-80   |
| <i>Montacuta substriata</i> .....  | *       |      |               | 40                     | s. gr.                     |                  |                      |                           |       |    | 45, 80,<br>90                      | 45, 80,<br>90                      |     | s.                         | 5-60   |
| <i>Montacuta ferruginosa</i> ..... | 30      | 5-10 | gr. n.        |                        | s.                         | 10               |                      |                           | 5-8   | w. | *                                  | *                                  |     |                            | 1-30   |
| <i>Kellia suborbicularis</i> ..... |         | 40   | sh.<br>s. sh. | 4-5                    | s. w.                      |                  | 18                   | gr. n.                    | 7     | w. | 5-10<br>15-30<br>60, 82            | 5-10<br>15-30<br>60, 82            |     | s.<br>n.<br>s.             | 0-90   |
| <i>Lepton squamosum</i> .....      |         | 15   | gr.           | *                      |                            |                  |                      |                           |       |    | 70?                                | 70?                                |     |                            | ?      |
| <i>Pinna pectinata</i> .....       | 5-10    |      | n.            |                        | v. sm.                     |                  | 18                   | s. gr.                    | 12    | s. | 1                                  | 1                                  |     | w.                         | 0-100  |
| <i>Modiola modiolus</i> .....      | 15, 30  | 40   | gr.<br>sh. s. | 4, 15, 30<br>25, 90-95 | gr. s.                     |                  | 20                   | m. s.                     | 35-40 | s. | 4-7<br>15-30<br>45, 50,<br>60      | 4-7<br>15-30<br>45, 50,<br>60      |     | w.<br>w.<br>n.<br>s.<br>r. | 0-100  |
| <i>Modiola tulipa</i> .....        | 15      |      | gr.           | 12-14                  | s. m.                      |                  |                      |                           |       |    |                                    |                                    |     |                            | 10-50  |
| <i>Modiola phaseolina</i> .....    | *       |      |               | 20-30                  | s.                         |                  | 50                   | gr.                       | *     |    |                                    |                                    |     |                            | 10-50  |

| Species.                      | Clyde Province. |           | Hebrides. |            | North-Western Province. |          | Orkneys. |          | Zetlands. |          | Range.   |
|-------------------------------|-----------------|-----------|-----------|------------|-------------------------|----------|----------|----------|-----------|----------|----------|
|                               | Alive.          | Dead.     | Alive.    | Dead.      | Alive.                  | Dead.    | Alive.   | Dead.    | Alive.    | Dead.    |          |
| <i>ACEPHALA.</i>              |                 |           |           |            |                         |          |          |          |           |          |          |
| <i>Crenella decussata</i>     | fathoms.        | fathoms.  | fathoms.  | fathoms.   | fathoms.                | fathoms. | fathoms. | fathoms. | fathoms.  | fathoms. | fathoms. |
|                               | 15              | 4, 5      | 4, 5      | 20, 50     | 55                      | 20, 50   | 4        | 7-15     | 5-10      | 15-30    | 0-80     |
|                               |                 | gr.       | w.        | s. m.      | gr.                     | s.       | s.       | 12       | n.        | sh.      |          |
| <i>Crenella discrepans</i>    |                 | gr.       | s. m.     |            |                         |          | *        | *        | 40        | 45, 50,  | 0-20     |
| <i>Crenella marmorata</i>     |                 | 12-14     | gr. s.    |            |                         |          |          |          | 60        | 80       | 0-40     |
|                               | *               | 30, 20-25 | gr. s.    |            |                         |          | *        | *        |           |          |          |
| <i>Crenella nigra</i>         |                 | 15, 18    | w.        |            |                         |          |          |          | 70, 90    |          | 10-100   |
| <i>Arca raridentata</i>       |                 | 22, 30-40 | m.        | 30         | 50                      | gr.      |          | 35-40    | 45, 60    |          | 20-60    |
|                               |                 | 20-25     | gr. s.    |            |                         |          |          |          |           |          |          |
| <i>Arca tetragona</i>         |                 | 30        | s. gr.    | 25-50      | 20, 58                  | s.       |          | 12       | 50        |          | 10-60    |
|                               |                 |           | s. gr.    |            | 18                      | gr.      |          | 17       | 60        |          |          |
| <i>Pectunculus glycimeris</i> |                 | 4-5       | s. w.     |            |                         |          |          |          |           |          |          |
|                               |                 | 25, 40    | s. gr.    | 35         | 55                      | s.       | *        | *        | 45        | 60, 80   | 5-80     |
|                               |                 | 15        | gr.       |            | 50                      | gr.      |          |          | 50        | 50       |          |
| <i>Nucula decussata</i>       | *               |           | m.        | 15, 45     |                         | m.       |          |          |           | 40, 55   | 15-100?  |
|                               |                 |           |           | 11, 50,    | 30                      | m.       |          |          |           |          |          |
|                               |                 |           |           | 70         |                         |          |          |          |           |          |          |
| <i>Nucula nitida</i>          | 5-10            | n.        | s.        | 25-50      |                         | s.       |          |          | 60        |          | 5-60     |
|                               | 20              | sh. gr.   | s. w.     | 4-5        | 18, 50                  | gr.      |          |          | 80        |          | 5-100    |
|                               | 40              | 5-10      | s. m. n.  |            | 18, 25                  | s. m.    | 40       |          |           |          |          |
| <i>Nucula tenuis</i>          | 50              | m.        |           |            | 25, 30                  | m.       |          |          |           |          |          |
|                               | 100             | m.        |           |            |                         |          |          |          |           |          |          |
| <i>Nucula radiata</i>         | *               | w.        | w. m.     | 10, 15     | *                       |          |          |          |           |          |          |
| <i>Nucula nucleus</i>         | 7               | s. m.     | st.       | 20, 25     |                         |          |          |          | 15-30     |          | 5-100    |
|                               | 15              | sh.       | m.        | 20, 30, 40 |                         |          | *        |          | 60        |          |          |
|                               | 20              | gr.       | gr.       | 40-80      |                         |          |          |          | 80        |          |          |
|                               | 30              | m.        | gr. s.    | 90-95      | 7, 35                   | gr. s.   |          |          | 100       |          |          |
|                               | 100             | m.        |           |            |                         |          |          |          |           |          |          |

|                                 |                              |                      |                            |                  |                    |         |             |  |  |  |                                  |                   |                |
|---------------------------------|------------------------------|----------------------|----------------------------|------------------|--------------------|---------|-------------|--|--|--|----------------------------------|-------------------|----------------|
| <i>Leda pygmaea</i> .....       | 30, 40, 50<br>30-40<br>20-25 | m.<br>st.            | 50                         | 18               | gr.<br>m. s.       |         |             |  |  |  | 60<br>90                         | s.<br>s.          | 15-90          |
| <i>Leda caudata</i> .....       | 30<br>40<br>50, 100          | gr.<br>sh. s.<br>m.  | 50<br>70<br>15             | 20<br>20         | gr.<br>s.<br>n.    | *       |             |  |  |  | 70<br>82<br>100                  | s.<br>s.<br>s. m. | 15-100         |
| <i>Lima hians</i> .....         | 5-10                         | n. sh.<br>sh. s.     | 20<br>40                   |                  | gr. s.<br>r.<br>s. |         | 15          |  |  |  | 45                               | s.                | 5-50           |
| <i>Lima Loscombi</i> .....      | 15                           | gr. sh.<br>sh. s.    | 20<br>40                   |                  | gr.<br>s.          | *       |             |  |  |  | 15-20<br>55                      | n.<br>gr.         | 15-80          |
| <i>Lima subauriculata</i> ..... | 50<br>100                    | m.<br>m.             | 4, 15<br>10, 15, 50        |                  | w.<br>m.           | *       |             |  |  |  | 45, 50<br>70, 80                 | s.<br>s.          | 4-100          |
| <i>Ostrea edulis</i> .....      | 15                           | gr.<br>sh. s.<br>gr. | 20-30<br>22, 30<br>15      |                  | s.<br>gr. s.<br>w. |         |             |  |  |  | 55                               | gr.               |                |
| <i>Pecten striatus</i> .....    |                              | gr.<br>gr.           | 20-30<br>30                | 20<br>50         | s.<br>m.           |         |             |  |  |  | 70, 82<br>25                     | s.<br>sh.         | 0-20<br>10-70  |
| <i>Pecten similis</i> .....     | 30<br>20                     | gr.<br>sh.           | 15-20<br>20-30             | 18, 50<br>20, 70 | gr.<br>s.          | 2       |             |  |  |  | 30-38<br>35<br>45, 60<br>80      | sh.<br>s.         | 2-80           |
| <i>Pecten maximus</i> .....     | 20                           | s. m.<br>n.          | 25, 30<br>18, 20<br>28, 30 | 50<br>18         | gr.<br>s. m.       | 4, 7-15 |             |  |  |  | 25<br>60                         | sh.<br>s.         | 2-40           |
| <i>Pecten niveus</i> .....      |                              | n.                   | 40                         |                  | s. gr.<br>m.       |         |             |  |  |  | 60                               | r.                |                |
| <i>Pecten danicus</i> .....     |                              | gr.                  | 15<br>20-25                | *                | gr.<br>s.          |         |             |  |  |  | 82                               | s.                | 1-15<br>10-100 |
| <i>Pecten tigrinus</i> .....    | 15, 20                       | gr. sh.              | 15<br>20-30<br>30          | 18, 50<br>80, 70 | s. m.<br>s.        |         | 14<br>35-40 |  |  |  | 100                              | s. m.             | 5-80           |
|                                 |                              |                      | 25, 40                     |                  | s. gr.             |         |             |  |  |  | 25<br>40<br>45, 50, 57, 80<br>60 | sh.<br>gr.<br>s.  |                |

| Species.                                 | Clyde Province.     |                     | Hebrides.      |                                 | North-Western Province. |                             | Orkneys.              |             | Zetlands.           |                                 | Range.       |                          |
|------------------------------------------|---------------------|---------------------|----------------|---------------------------------|-------------------------|-----------------------------|-----------------------|-------------|---------------------|---------------------------------|--------------|--------------------------|
|                                          | Alive.              | Dead.               | Ground.        | Alive.                          | Dead.                   | Ground.                     | Alive.                | Dead.       | Ground.             | Alive.                          |              | Dead.                    |
| <i>ACEPHALA</i>                          |                     |                     |                |                                 |                         |                             |                       |             |                     |                                 |              |                          |
| <i>Pecten opercularis</i> .....          | fathoms, 5-10<br>40 | fathoms, 5-10<br>15 | n.<br>sh.s.gr. | fathoms, 15<br>20               | fathoms, 18, 50,<br>70  | gr.<br>st.                  | fathoms, 5-8<br>25    | fathoms, 12 | r.<br>s.            | fathoms, 15-30<br>45, 60,<br>80 | fathoms, 100 | n.<br>s.<br>gr.<br>s. m. |
| <i>Pecten pusio</i> .....                | 20                  | 40                  | sh.<br>gr.     | 15<br>20-30<br>40               | 90-95<br>30-40          | w.<br>gr. s.<br>gr. st.     | (2-40)<br>15<br>7, 15 | 12          | s.<br>st. sh.<br>c. | 50<br>60                        | 20           | s.<br>r.<br>sh.          |
| <i>Pecten varius</i> .....               | 15                  | 15                  | gr.            | *                               | 30-40                   | gr. st.                     |                       |             |                     | *                               |              | s.<br>sh.                |
| <i>Anomia eplippium</i> .....            | 15                  | 15                  | gr.            | 15-16                           |                         | s.                          |                       |             |                     |                                 |              | s.<br>sh.<br>st. gr.     |
| <i>Anomia undulata</i> .....             | *                   |                     |                | 15-20, 30<br>25, 40<br>50       |                         | st.<br>s. gr.<br>m.         |                       | 12          | s.                  | 25<br>50                        | 55<br>70     | s.<br>st. gr.<br>s.      |
| <i>Anomia squamula</i> .....             | 20                  | 40                  | sh.            | 15<br>10                        |                         | w.<br>m.                    |                       |             |                     |                                 |              | s.<br>w.                 |
| <i>Anomia striata</i> .....              | 30                  | 50                  | gr.            | *                               |                         | w.<br>st. gr.               |                       |             |                     |                                 |              | st.<br>s.                |
| <i>Terebratula Caput-serpentis</i> ..... | 30                  | 50                  | m.             | 15, 30, 50<br>15, 20,<br>25, 40 |                         | m.                          |                       |             |                     |                                 |              | st.<br>s.                |
| <i>Megathyris cistellula</i> .....       | 20                  | 30                  | st.            | 30, 40<br>15, 20, 30            |                         | m.                          |                       |             |                     |                                 |              | 80?<br>40<br>50          |
| <i>Crania norvegica</i> .....            | 30<br>50, 80        | 35<br>40            | gr.<br>m.      | 25, 35,<br>40<br>90-95          | 55<br>50                | gr.<br>st.<br>gr.<br>gr. s. |                       |             |                     |                                 |              | gr.<br>st.<br>s.         |

TABLE VI.—Enumeration of the depths, &amp;c. at which species of Echinodermata were taken by the Dredge on the Northern and Western Coasts of Scotland.

| Species.                                 | Clyde Province. |          | Hebrides.  |          | North-Western Province. |          | Orkneys. |           | Zetlands. |          | Range.   |
|------------------------------------------|-----------------|----------|------------|----------|-------------------------|----------|----------|-----------|-----------|----------|----------|
|                                          | Alive.          | Dead.    | Alive.     | Dead.    | Alive.                  | Dead.    | Alive.   | Dead.     | Alive.    | Dead.    |          |
| <i>Comatula europea</i> .....            | fathoms.        | fathoms. | fathoms.   | fathoms. | fathoms.                | fathoms. | fathoms. | fathoms.  | fathoms.  | fathoms. | fathoms. |
|                                          | 20-25           | 30-40    | 20-25      | 30-40    | 8                       | w.       | 7-15     | 7         | w.        | sh.      | 5-50     |
| <i>Comatula petasus</i> ?                |                 |          | m.         |          | 50                      | s.       |          | 25        | sh.       |          | 25-50    |
| <i>Ophiura texturata</i> .....           | 7               | w.       | 15         |          | 18                      | n.       |          |           |           |          | 5-40     |
|                                          | 20              | sh.      | 25         |          | gr. m.                  |          |          |           |           |          |          |
| <i>Ophiura albida</i> .....              | 20              | sh.      | 40         |          | m.                      |          |          | 4-7       | w.        |          | 4-90     |
|                                          |                 |          | 15         |          | w.                      |          |          | 25        | sh.       |          |          |
| <i>Ophiocoma neglecta</i>                |                 |          | 22, 90     |          | gr. s.                  |          |          |           |           |          |          |
| <i>Ophiocoma filiformis</i>              |                 |          | 30, 40     |          | sh. m.                  |          |          | 80        |           |          |          |
| <i>Ophiocoma chiagii</i> .....           | 7               |          | 20         |          | s. m. m.                |          |          | 4         | w.        |          | 0-10?    |
|                                          | 30              | m.       | 10, 12, 15 |          | m.                      |          |          | 20, 70    |           |          | 5-100    |
| <i>Ophiocoma granulata</i> .....         | 50, 100         | gr.      | 40, 70     |          | m.                      |          |          | 80        | s.        | m. s.    | 5-100    |
|                                          | 7               | m.       | 4-5, 15    |          | w.                      |          |          | 20        | s.        | sh.      | 5-50     |
|                                          | 20              | sh.      | 10, 30     |          | s. m.                   |          |          | 50        |           | st.      |          |
| <i>Ophiocoma bellis</i> .....            | 7               | w.       | 22         |          | gr. s.                  |          |          | 20        | sh.       |          | 5-50     |
|                                          | 20              | sh.      | 4-5        |          | w.                      |          |          | 50        | st.       |          |          |
|                                          |                 |          | 25, 30     |          | st.                     |          |          |           |           |          |          |
|                                          |                 |          | 30-40      |          | st.                     |          |          |           |           |          |          |
| <i>Ophiocoma Goodsiri</i>                |                 |          | 20-25      |          | gr.                     |          |          | 50        | gr.       |          | ? 10-30  |
| <i>Uraster glacialis</i> .....           | 7               | w.       | 40         |          | m.                      |          |          |           |           |          | 0-50     |
| <i>Uraster rubens</i> .....              | 20, 45          | sh.      | 25, 30     |          | s.                      |          |          |           |           |          | 0-40     |
|                                          |                 |          | 20-25      |          | gr.                     |          |          | 1         | w.        |          | 0-60     |
| <i>Cribrella oculata</i> .....           |                 |          | 15-20      |          | n.                      |          |          | 20, 60    | st.       |          | 5-90     |
|                                          |                 |          | 30, 90     |          | gr. m.                  |          |          |           | s. sh.    |          |          |
| <i>Solaster endeca</i> .....             |                 |          | gr. s.     |          | gr. s.                  |          |          |           |           |          | 5-50     |
| <i>Solaster papposa</i> .....            |                 |          | 30-40      |          | sh.                     |          |          | 35-40     | s.        |          | 15-50    |
| <i>Palmyres cartilagineus</i>            |                 |          | 25         |          | gr. m.                  |          |          |           |           |          | 15-50    |
| <i>Goniaster pulvillus</i> (Templetoni). | 20              | sh.      | 30-40      |          | sh.                     |          |          | 5-10      | sh.       |          | 5-80     |
|                                          |                 |          | 25         |          | gr. m.                  |          |          | 15        | s.        |          |          |
| <i>Asterias aurantiaca</i> .....         |                 |          |            |          |                         |          |          | 20, 15-30 |           |          |          |
|                                          |                 |          |            |          |                         |          |          | 70-80     |           |          |          |

| Species.                           | Clyde Province. |       | Hebrides. |           | North-Western Province. |        | Orkneys. |       | Zetlands.  |         | Range. |
|------------------------------------|-----------------|-------|-----------|-----------|-------------------------|--------|----------|-------|------------|---------|--------|
|                                    | Alive.          | Dead. | Alive.    | Dead.     | Alive.                  | Dead.  | Alive.   | Dead. | Alive.     | Dead.   |        |
| <i>Luidia fragilissima</i> .....   | 20              | 40    | 4-5, 15   | 20-25, 25 | 50                      | 18     | 15       | 5-8   | 5-45       | 15-30   | 5-50   |
| <i>Echinus sphaera</i> .....       | 40              | 40    | 30, 30-40 | 30, 30-40 | 15-20                   | 15     | 15       | 15    | 15-30      | 25      | 0-40   |
| <i>Echinus miliaris</i> .....      | 40              | 40    | 4-5, 15   | 20-25     | 8, 20                   | 18     | 8, 20    | 18    | 15-30      | 15-30   | 0-40   |
| <i>Echinus norvegicus</i> .....    | 40              | 40    | 25        | 25        | 18                      | 18     | 18       | 18    | 40, 50     | 45, 70  | 40-100 |
| <i>Echinus neglectus</i> .....     | 40              | 40    | 12-14     | 22, 90    | 18                      | 18     | 7        | 7     | 45, 70     | 82, 100 | 0-10?  |
| <i>Echinocyamus pusillus</i> ..... | 40              | 40    | 25        | 25        | st. m.                  | gr. s. | 7-15     | 70    | 5-10       | 15-30   | 5-80   |
| <i>Spatangus purpureus</i> .....   | 40              | 40    | sh.       | sh.       | gr. m.                  | gr. m. | 35-40    | 5-8   | 45, 60, 80 | 50, 60  | 7-90   |
| <i>Amphidetus roseus</i> .....     | 40              | 40    | sh.       | sh.       | s. m.                   | st.    | 35-40    | 35-40 | 45, 70,    | 90      | 6-100  |
| <i>Brissus lyrifer</i> .....       | 6, 7, 15        | 100   | m.        | m.        | 100                     | 100    | 30       | 30    | 80         | 80      | ?      |
| <i>Cucumaria pentactes</i> .....   | 9               | 9     | m.        | m.        | 15                      | 15     | 15       | 15    | 7          | 7       | Lam.   |
| <i>Cucumaria frondosa</i> .....    |                 |       |           |           |                         |        |          |       | 7          | 7       | Lam.   |
| <i>Cucumaria pellucida</i> .....   |                 |       |           |           |                         |        |          |       | 7          | 7       | ?      |
| <i>Ocnus lacteus</i> .....         | 20              | 20    | sh.       | sh.       |                         |        |          |       | 7          | 7       | ?      |
| <i>Ocnus brunneus</i> .....        | 7               | 7     | m.        | m.        |                         |        |          |       | 40         | 40      | 0-40   |
| <i>Thyone papillosa</i> .....      |                 |       |           |           |                         |        |          |       | 45         | 45      | 20-50  |
| <i>Thyone raphanus</i> .....       | 40              | 40    | s. m.     | s. m.     |                         |        |          |       | 60         | 60      | ?      |
| <i>Fistularia, sp.</i> .....       |                 |       |           |           |                         |        |          |       | 7          | 7       | ?      |
| <i>Sipunculus Bernhardus</i> ..... | 20              | 20    | sh.       | sh.       |                         |        |          |       | 7          | 7       | ?      |
| <i>Sipunculus, sp.</i> .....       | 20              | 20    | sh.       | sh.       |                         |        |          |       | 7          | 7       | ?      |
| <i>Priapulus caudatus</i> .....    |                 |       |           |           |                         |        |          |       | 7          | 7       | Lam.   |



*Record of Classes and Tribes partially observed.*

The enumeration of species in each dredging paper is complete so far as the Testaceous Mollusca are concerned, and usually, also, the Echinodermata. Other tribes of animals, as well as plants, in consequence, in most cases, of the impossibility of determining all the species at the time, and partly from the great amount of labour required to register completely the tribes above noted, did not receive the same degree of attention. In most instances they were, however, carefully collected; and in the works of Bell and Johnston especially, many records of depths and localities will be found which were derived from specimens collected and transmitted to those eminent naturalists during the course of these researches. In the majority of the dredging papers, there are, however, memoranda of various extent, noting the more remarkable instances of every tribe found, and often their comparative abundance. These I shall now proceed to abstract.

*Mollusca Nudibranchiata.*

The small number of these beautiful creatures recorded in the dredging papers is not to be attributed to their having been unobserved, but rather to their absence from the ground usually examined. The majority of species inhabited the shallower parts of the Laminarian zone, and very numerous forms are littoral—hence living without the region assigned for this inquiry. In the magnificent work of Alder and Hancock on the British Nudibranchia, published by the Ray Society, the distribution and localities of this tribe have been most carefully attended to.

Those noted in the papers are,—

*Melibcea coronata*, Dorset, in 15–20 f. s. gr.

— *fragilis*, Isle of Man, 20–25 sh. Cornwall, 25 sh. s. Dorset, 20–25 s.

*Tritonia*, sp., Dorset, in 15–20 gr.

— *Hombergi*, Isle of Man, in 25 sh.

— *plebeia*, Isle of Man, in 28 sh.

*Folidia*, Isle of Man, in 18–25 f. Clyde, in 20 f. Zetland, in 7 f.

*Polycera*, Hebrides, in 4–5 f.

*Idalia*, Zetland, in 35 f. s.

*Mollusca Cephalopoda.*

Cephalopods are difficult to take with the dredge on account of the rapidity of their motions. The following instances are recorded:—

*Sepiolo*, 15–20 f. gr. and 40 m. Hebrides; and its spawn, in 25 s. s. Cornwall.

*Octopus*, 30 f. gr. Hebrides, and 25 f. sh. Isle of Man.

*Mollusca Ascidia.*

These are rarely recorded in detail, because the difficulty of determining the species in the present state of our knowledge of the tribe is very great. Such records however as are given are important:—

*Cynthia microcosmus* is recorded from 10 f. s. m. and 25 f. st. s. in the Hebrides.

— *echinata*, from 50 f. m. in the Hebrides, and 80 f. sand in Zetland, where it also occurs among weed in 7 f.

—, a new species from 30 f. gr. Croulin Island.

— *aggregata*, from 7–12 f. st. gr. Dartmouth.

— *tessellata* and *morus*, Devon, in 20–25 f. Localities for other members of this genus may be found in the 'British Mollusca,' vol. i. part 1 and 2.

- Ascidia grossularia*, Devon, in 12 f. Clyde, in 30 gr., 40 m. Hebrides, in 20 gr.  
 — *prunum*, Devon, 20–25 f. Hebrides, 25 gr. m. and 30 gr.  
 — *intestinalis*, Dorset, in 15–20 gr. Hebrides, in 30–40 sh. Orkneys, in 7 w.  
 — *communis*, Dorset, in 7 w. and 15–20 gr. Isle of Man, in 15–18 m. Clyde, in 30 gr. Hebrides, in 15 w., 25 gr. n., 30 gr., 30–40 sh., 50 m.  
 — *scabra*?, Dorset, in 15–20 gr.  
 — *vitrea*, Clyde, in 30 gr. Hebrides, in 30–40 sh., 25 gr. m. Orkneys, in 35–40 sh.  
 — *rosea*, Hebrides, in 30 gr. Zetlands, in 4–7 w.  
 — *canina*, Orkneys, in 7–18 weed.  
*Molgula tubularis*, Clyde, in 9 and 18 m. Zetlands, in 20 s., 40 gr., 60 and 80 m. s. Hebrides also.  
 — *oculata*.  
*Pelonia glabra*, in 9 m. Clyde.  
*Syntethys hebridicus*, 30 f. Croulin Island.  
 Compound Ascidiæ in all depths of the Laminarian zone, rarely lower.

#### *Mollusca Bryozoa.*

So many of the specimens of these curious pseudo-zoophytes procured during these researches were transmitted to Dr. Johnston for publication in his most valuable 'History of British Zoophytes,' that the few memoranda made in the dredging papers of the more striking species at the time of capture, can give but little insight into their distribution. The following notes of depth may serve as contributions to future histories of them.

- Diastopora obelia*, 14 f. st. Anglesey; 40 f. Clyde district.  
*Tubulipora patina*, 20, 27 f. Cornwall; 50 f. gr. Zetland.  
 — *truncata*, 50, 80 f. st. Zetland.  
 — *serpens*, 15–20 gr. Dorset; 20–25 and 27 sh. Cornwall. Clyde, 40. Zetland, 7 w., 50 gr.  
 — *hispida*, Clyde, 40.  
*Idmonea atlantica*, Zetland, 50 gr., 80 s.  
*Pustulipora proboscidea*, Zetland, 50 gr.  
 — *deflexa*, Cornwall, 20–25 sh. s.  
*Alecto major*, Clyde, 40.  
*Crisia*, sp., Dorset, 12 s. gr., 15–20 gr. Anglesey, 14 st., 30 gr. Clyde, 40. Zetland, 50 gr.  
*Hippothoa*, sp., Cornwall, 20–25 sh. s. Anglesey, 14 st. Zetland, 40 gr., 50 gr.  
*Cellepora pumicosa*, Dorset, 15–20 gr. Devon, 20–25 gr. s. Cornwall, 20–25 sh. s. Anglesey, 7 st., 30 gr. Isle of Man, 18 n., 25 sh. Clyde, 40 sh. Hebrides, 10 s. m., 28 gr. s. Zetland, 50 gr.  
 — *ramulosa*, Dorset, 25 gr. Clyde, 40 sh. Zetland, 50 gr., 80 m. s.  
 — *skenei*, Dorset, 18–20 gr. Cornwall, 20–25 sh. s. Zetland, 25 sh., 80 m. s.  
 — *cervicornis*, Hebrides, 15–20 st., 25 gr. n., 30 st. Zetlands, 50 gr.  
*Lepralia*, sp., Dorset, 15–20 gr. Devon, 12 s. gr. Cornwall, 20–25 sh., 27 s. Devon, 20–25 gr. s. Isle of Man, 15–18 n. &c.  
*Flustra foliacea*, Dorset, 15–20 gr., 25 gr. Anglesey, 12 st., 30 gr. Isle of Man, 15–18 n. Clyde, 40 st. Hebrides, 15–20 st. Zetland, 50 gr.

- Flustra truncata*?, Dorset, 15–20 gr. Devon, 7–12 st. gr. Clyde, 40 sh. Hebrides, 20 gr., 35 gr., 15–20 st. Orkneys, 35–40 st.  
 — *avicularis*?, Dorset, 15–20 gr.  
 — *Murrayana*, Hebrides, 15–20 st. Zetland, 50 gr.  
 — *coriacea*, Isle of Man, 25 sh.  
*Membranipora pilosa*, 7 gr.  
*Eschara foliacea*, Dorset, 15–20 gr. Cornwall, 20–25, 27 sh.  
 — *bidentata*, Cornwall, 20–25 sh.  
*Retepora Beaniana*, Hebrides, 50 m. Zetlands, 50 gr., 70 s., 80 sh.  
*Salicornaria furcimioides*, Dorset, 15–20 gr. Devon, 12 st. Devon, 20–25 gr. s. Cornwall, 20–25. Isle of Man, 25 sh. Clyde, 40 sh. Hebrides, 15–20 s. Outer Hebrides, 20 m. s. Zetlands, 50 gr.  
*Alcyonidium*, Dorset, 12 s. gr. Anglesey, 20. Orkneys, 35–40 s. Zetlands, 20 s.  
*Sertularia lendigera*, Dorset, 7 m. Anglesey, 7 sh. s., 12 st.  
*Beania mirabilis*, Cornwall, 20–28.

#### Crustacea.

In Professor Bell's 'History of British Crustacea,' numerous localities derived from the dredging expeditions which furnished the matter for this Report are inserted. And in the volume of the British Association Reports for the Meeting at Southampton in 1846, there is an abstract of a paper read by Professor Bell, in the Natural History Section, containing an account of the Crustacea procured by Mr. MacAndrew and the reporter during their voyages. These need not be here repeated. A few notes of localities contained in the papers themselves, may, however, be indicated with advantage.

- Stenorhynchus phalangium*, Anglesey, 7–9½–12 gr. s. Dorset, 12 m., 15–20 gr. Hebrides, 15 m. Isle of Man, 25 sh.  
*Inachus Dorsettensis*, Dorset, 7 m., 12 m., 15–20 gr. Anglesey, 7–12 gr. Isle of Man, 25 sh.  
*Pisa tetraodon* or *Gibbsii*, Isle of Man, 25 sh.  
*Hyas araneus*, Dorset, 12 m.  
 — *coarctatus*, Isle of Man, 28 sh.  
*Eurynome aspera*, Dorset, 12 m., 15–20 gr. Isle of Man, 25 st. Loch Fyne.  
*Pilumnus hirtellus*, Dorset, 7 w., 15–20 gr. Isle of Man, 18, 25 sh.  
*Perimela denticulata*?, Dorset, 12 m., 15–20 gr. Cornwall, 25 sh.  
*Portunus*, sp., Dorset, 15–20 gr. Cornwall, 20–25 sh. Isle of Man, 25 sh.  
*Pinnotheres*, Isle of Man, 18, 25 sh., &c.  
*Ebalia*, sp., Dorset, 12 m., 15–20 gr. Devon, 10 s., 27 s. Anglesey, 12 s. Isle of Man, 25 sh. Mull, 25 st. m.  
*Atecyclus heterodon*, Cornwall, 20–28 n.  
*Pagurus Forbesii*?, Dorset, 20–25.  
 — *laevis*?, Dorset, 20–25.  
 — *Prideauxii*, Clyde, 25, 30. Isle of Man, 25.  
 — *Bernhardus*, Anglesey, 7, 12, 12 gr. Dorset, 15–20 gr. Cornwall, 20–25 sh. Devon, 27 s. Orkneys, 5–8. Shetland, 50 gr., 80 s.  
*Porcellana longicornis*, Dorset, 7–12 s., 15–20 gr. Anglesey, 7, 12 gr.  
*Galathea strigosa*, Dorset, 20 n.  
 —, sp., Dorset, 7 w., 15–20 gr. Cornwall, 20–28 sh. Zetland, 50 gr.  
*Calocaris MacAndrewae*, Loch Fyne, 100 m. Mull, 30 mud.  
*Crangon vulgaris*, Anglesea, 7 w.  
*Pandalus annulicornis*, Dorset, 7 w., 15–20 gr. Anglesey 7.

- Arcturus*, sp., Hebrides, 15 m.  
*Pycnogonum*, large species, Zetlands, 50 gr.  
*Cypridina MacAndrei*, Hebrides, 70 f.  
 — *Brenda*, Zetland, 80 f.

#### *Cirripedes.*

Until Mr. Darwin's researches on the Cirripedes be published, there can be no certainty in the determination of the species of this difficult group. The leading forms, however, are usually noted in the dredging papers.

- Balanus scoticus*, Anglesey, 25 gr. Isle of Man, 25 sh. Clyde, 15 gr.  
*Balanus sulcatus*, Dorset, 7 w., 12. Cornwall, 28 sh. Milford, 8 w. Anglesey, 9½, 12 gr. Isle of Man, 18 n., 28 sh. Clyde District, 15 gr., 30 gr., 20 sh. Zetlands, 25 st. Hebrides, 10 s. m., 15–20 st., 15 sh., 25 gr. s., 30, 35 gr., 90 st. Outer Hebrides, 18 s. gr., 15–20 gr.  
*Clitia verruca*, Dorset, 15–20 gr. Devon, 7–12 s. gr. Anglesey, 30 gr. Isle of Man, 25 st. Hebrides, 15 w., 15–20 w. gr., 25 gr. s., 90 gr. s. Zetlands, 50 gr.  
*Adna anglica*, Cornwall, 12 gr., 25 sh. s.  
*Scalpellum vulgare*, Dorset, 15–20 gr. Cornwall, 27. Devon, 20–25. Isle of Man, 25 sh.

#### *Annelida.*

This department of the British Fauna is the one requiring most elucidation. The researches of Dr. Johnston have done much, and those of Dr. Williams promise much; but until we have some available manual of species, the progress will not be sufficient to bring it up to a level with the other sections of British marine zoology. The entries of worms in the dredging papers are, except for the more striking species, only occasional.

- Michelia trilineata*, Clyde dist. 20 st. Hebrides, 25 gr. n.  
*Planaria rosea*, Anglesey, 12 gr. Zetland, 60 s., 80 m. s.  
 —, sp., Dorset, 12 m.  
*Pontobdella muricata*, Isle of Man, 28 sh.  
*Trophonia Goodsi*, Zetlands, 7 w.  
*Pectinaria belgica*, Anglesey, 7 w. Clyde, 30 gr., 50 m. Hebrides, 90 gr. s. Stornoway, 18 s. m. Zetland, 50 gr., 80 m. s., 80 s.  
 — (large species), Hebrides, 15 m.  
*Sabellaria alveolata*, Anglesey, 12 s., 14 gr., 25, 30. Hebrides, 8 s. Clyde district, 15, 20 sh.  
*Terebella conchilega*, Cornwall, 20–25 sh. Devon, 20–25 s. Hebrides, 15 w. Zetlands, 50 gr.  
 — *compressa*, Cornwall, 20–25. Devon, 20–25 s. Zetlands, 50 gr. 60 s., 80 m. s.  
 — (convoluted sp.), Hebrides, 12–14 st. m.  
*Pomatoceros tricuspis*, Dorset, 7 w., 15–20 gr. Devon, 20–25 s., 27 s. Anglesey, 12 st., 14 s., 20 gr., 25 gr. Isle of Man, 28 sh. Clyde district, 5–10 n., 20 sh. Hebrides, 15 w., 25 s. gr., 18 n., 30–40 sh., 90 gr. Zetland, 50 gr., 60 gr., 70 s.  
*Eupomatus*, sp., Dorset, 7 w., 15–20 gr. Cornwall, 27. Devon, 25–27. Clyde district, 30 gr., 20 sh. Hebrides, 15 w., 15–20 s., 25 gr. s., 90 gr. Zetlands, 50 gr., 60 s., 70 s.  
*Serpula vermicularia*, and *tubularia*, Dorset, 15–20 gr. Anglesey, 25 gr., 12 s. Isle of Man, 25 sh. Clyde district, 5–10 n., 18 m., 20 st., 30 gr. Hebrides, 30–40 sh., 28 s., 15 m., 18 n., 90 gr. Zetlands, 50 gr.  
*Spirorbis*, Dorset, 15–20 gr. &c.

- Placostegus vitreus*, Clyde district, 30 gr., 40 st. Hebrides, 15–20 st., 25 st., 25 gr. m., 30 st., 30–40 sh., 90 gr. Zetlands, 50 st.
- Filograna implexa*, Isle of Man, 28 sh. Hebrides, 25 gr. m. Zetlands, 80 s.
- Ditrupea subulata*, Zetland, 50 gr., 60 s.
- Onuphis tubicola*, Clyde, 20 sh. Stornoway, 18 gr. Zetlands, 50 gr. 60 s., 80 m. s.
- Siphostoma?* (Lancelet-like worm), Clyde district, 9 m., 6 m., 60 m. Zetlands, 50 gr.
- Aphrodite aculeata*, Isle of Man, 18 n. Hebrides, 15 w.
- *histrix?*, Dorset, 12 m. South Wales, 10 m. Isle of Man, 25 sh.
- , sp., Hebrides, 15 w., 25 gr. m.
- Polynoe*, sp., Anglesey, 12 s. Dorset, 7 w. Clyde, 50 m.

### Zoophyta.

This department is in the same position as some of the preceding, so far as our lists are concerned, but the accumulation of authentic localities in Dr. Johnston's History is such as fully to remedy any deficiencies. In the supplement of that work, a most valuable paper on the distribution of Zoophytes in depth, on the north and east coasts of Britain, by Lieut. Thomas, R.N., should be consulted and taken in connection with the following record of localities.

- Hydractinia echinata*, South Wales, 10 gr. Anglesey, 12 s. gr. Isle of Man, 25 sh.
- Eudendrium rameum*, Clyde, 20 sh.
- Tubularia indivisa*, Dorset, 15–20 gr. Clyde, 40 st., 7 m. Hebrides, 30 m., 40 m. Zetlands, 50 gr.
- *larynx*, Anglesey, 12.
- Corymorpha nutans*, Orkneys, 10 f. Zetlands.
- Halecium halecinum*, Dorset, 15–20 gr.
- Sertularia polyzonias*, Anglesey, 12 gr. Devon, 7–12 gr. Clyde, 40 sh.
- *rosacea*, Dorset, 15–20 gr. Hebrides, 90 gr. s., 15, 20 gr. m. Zetlands, 50 gr.
- *pinaster*, Clyde district, 40 sh.
- *abietina*, Devon, 10–12 gr. Anglesey, 12 f. gr. Clyde, 40 sh. Hebrides, 12–14 s. m., 15–20 st. Orkneys, 35–40 sh. Zetlands, 50 gr.
- *argentea*, Dorset, 15–20 gr. Anglesey, 7 gr., 12 s., 20 gr., 20 m., 30 gr. Isle of Man, 25 sh. Zetlands, 80 s.
- *cupressina*, Dorset, 15–20 gr. Devon, 7–12 m. s.
- Thuiaria articulata*, Clyde, 40 sh. Isle of Man, 25 sh.
- Antennularia antennina*, Dorset, 15–20 gr. Cornwall, 27 st. Devon, 20–25 s.
- *ramosa*, Anglesey, 12 gr. Isle of Man, 15–18 n., 25 sh. Clyde, 40 sh. Hebrides, 25 s. st., 25 gr. m., 20 gr., 15–20 gr. m. Stornoway, 18 n. Zetlands, 50 gr.
- Plumularia falcata*, Devon, 7–12 st. Anglesey, 7 s. s., 12, 14 st., 20 gr. Clyde, 40 sh. Zetlands, 50 gr., 80 m. s.
- *cristata*, Hebrides, 10 m., 20 gr., 15–20 sh., 30 gr. Dorset, 15–20 gr. Cornwall, 20–25. Devon, 27 s.
- *catherina*, Clyde, 40 sh. Isle of Man, 25 sh.
- *myriophyllum*, Cornwall, 20–25 sh. Dorset, 15–20 gr. Isle of Man, 25 sh. Clyde, 40 sh. Hebrides, 12–14 st. m., 15 m., 15–20 sh., 90 gr.
- Laomedea*, sp., Dorset, 15–20 gr.

- Campanularia volubilis*?, Dorset, 15–20 n. Clyde, 40 sh.  
 — *verticillata*, Clyde, 15 m.  
 — *dumosa*, Devon, 20–25 sh. Isle of Man, 25 sh. Hebrides, 25 sh. Zetlands, 50 gr.  
*Pennatula phosphorea*, Clyde, 9 m. Hebrides, 15 m. Zetlands, 80 m. s.  
*Virgularia mirabilis*, Clyde, 9 m. Zetlands, 70–80 s. Hebrides, 28 m.  
*Pavonaria quadrangularis*, Hebrides, 12–14 st. m., 15 m., 20–30 m.  
*Gorgonia verrucosa*, Cornwall, 20–25 sh.  
 — *pinnata*; Hebrides, 30 st.  
*Alcyonium digitatum*, Dorset, 15–20 gr., 21 sh. Devon, 7–124. Cornwall, 20–25 sh. Anglesey, 12 gr. Isle of Man, 18 n., 25 sh. Clyde, 30 gr. Hebrides, 25 st.  
*Sarcodictyon catenata*, Clyde, 20 st. Hebrides, 20 st., 15–20 sh., 25 gr. n., 25 st., 20–30 st.  
 — *agglomerata* (new), Hebrides, 30 st.  
*Turbinolia milletiana*, Cornwall, 20–28.  
*Caryophyllia Smithii*, Cornwall, 20–25 sh., 27 gr. Hebrides, 7 s., 10 s., 25 gr. s., 40 gr., 30 st. Outer Hebrides, 18 n., 15–20 gr. Zetlands, 50 gr., 70–80 s.  
*Zoanthus Couchii*, Dorset, 15–20 gr. Cornwall, 20–25 st. Devon, 20–25 gr. Outer Hebrides, 18 n.  
*Capnea sanguinea*; 18 n. Isle of Man.  
*Adamsia maculata*, Anglesey, 12 gr. Isle of Man, 15–18 n., 25 sh. Hebrides, 15–20 st. Outer Hebrides, 25 s.  
*Actinea vermicularis*, Zetlands, 50, 80 sh.  
 — *crassicornis*, Anglesey, 16 st., 20 m. Isle of Man, 18 n.  
 — *bellis*, Isle of Man, 18 n.  
 — *dianthus*, Anglesey, 12 s. gr.  
 — other species, Anglesey, 7 s. Dorset, 7 m.  
*Iluanthos scoticus*, Clyde region, 4 m.  
*Lucernaria fascicularis*, Zetlands, 4–7 w.

#### Amorphozoa.

- Halichondria oculata*, Dorset, 7 w.  
 — *cervicornis*, Zetland, 80 st.  
 — *infundibuliformis*, Clyde district, 40 st.  
 — *ventilabrum*, Hebrides, 30, 40 st.  
 — *suberea*, Dorset, 15–20 gr. Isle of Man. 25 sh. Hebrides, 10 s. m.  
 — *ficus*, Isle of Man, 25 sh.  
 — *hispidia*, Cornwall, 20–25 sh.  
*Cliona celata*, Anglesey, 12 s. South Wales, 12 gr. Isle of Man, 18, 25 st. Hebrides, 18 n. and m.  
*Spongia pulchella*, Isle of Man, 25 st.  
*Grantia ciliata*, Devon, 7–12 m. st. Cornwall, 20–25 st. Anglesey, 9½ gr. Isle of Man, 15–18 n. Hebrides, 25 gr. s.? Zetlands, 50 gr.  
*Duseidea fragilis*, Isle of Man, 25 sh.

#### Plants.

The greater part of these dredgings are beyond the region of the majority of algæ. Between 0 and 10 fathoms, numerous fuci were taken, olivaceous species prevailing in the lesser depths, red ones in the greater. *Delesseria* and *Desmarestia* are the genera of which species were met with at most considerable depths, *i.e.* at 15 and 18 fathoms (Hebrides). A straggling *Laminaria* was once taken as deep as 18 fathoms in the Zetlands. Beyond

15 fathoms, and between that depth and 20 fathoms, we have the region of *Nullipora*. Below 20 fathoms, unless it be an occasional straggling *Nullipora*, no decided algæ were met with.

*Traces of Vertebrata and land animals.*—Had we no other evidence of the inhabitants of the sea than that afforded by the contents of the dredge, we might be tempted to infer a great rarity, almost amounting to an absence, of vertebrate marine animals within our area. Possibly such an inference would be quite as warrantable as the negative conclusions assumed from comparable observations by many palæontologists and geologists, who sometimes go so far as to infer an entire absence of terrestrial creatures during some of the more ancient geological epochs, because no traces of them can be found in sedimentary strata of marine origin, and announce the laws which regulated the order of creation of animated beings accordingly. During the 145 detailed observations which form the bases of this Report, fishes were taken by the dredge not half-a-dozen times, and in three instances the fish taken was one of the rarest and most curious of British vertebrata, the *Amphioxus lanceolatus*. Although always carefully looked for and noted, the bones of fishes were never observed among the contents of the dredge above three times, and in two of those instances (at a depth of 40 and 50 fathoms mud in the western coast of Scotland) the remains consisted of otolites only, reminding us of similar relics in the crag of the east of England. Of terrestrial vertebrata I have never seen a trace; and though no small number of the human race have diffused their bodies over our seabed, no human bone has occurred to me in dredging; when very near shore and in the immediate neighbourhood of a town, broken bottles and old shoes have strewn the sea-bed, affording unquestionable evidence of the presence of man on the neighbouring shores. Doubtless by dredging close to towns, in harbours and in estuaries, like the Mersey, where there are great cities on the banks, numerous relics of such a description, as well as the bones of animals, might be taken, but immediate proximity to towns is avoided by the dredger.

On one occasion, recorded in the dredging papers from the Anglesey coast, the shell of a common snail (*Helix aspersa*) was dredged at some distance from shore in the entrance of the Menai Straits. It was covered by *Balanus* and *Serpulæ*, and inhabited by a hermit crab. Naturalists familiar with the active movements of the *Paguri*, can readily conceive to what a distance a land shell may be transported under such circumstances, and at length become imbedded along with the remains of creatures of very different origin and habits.

*Fossil remains taken in the dredge.*—In no instance have we taken the remains of fossil vertebrata when dredging on the western shores of Britain, but many times have met with fossil testacea. These are of the pleistocene epoch, and often it requires a practised eye to distinguish between them and the dead shells of existing mollusca associated with them; indeed there are some species, as *Astarte crebricostata*, *Natica grænlandica*, *Panopæa norvegica*, *Tellina proxima* and *Scalaria grænlandica* enumerated in the preceding pages, which, whilst from various considerations we hold the weight of evidence to be in favour of their presence as living species in our seas, are yet under suspicion, and are not admitted by all British conchologists. In several localities among the Hebrides, especially in the Kyles of Bute, and in the sea between Raza and Applecross, quantities of pleistocene fossils may be dredged; at the former place, *Panopæa norvegica* is common, as pointed out by Mr. Smith; and in the latter there occur numerous fossil valves of *Pecten islandicus* and *danicus*, the large sulcated variety of *Saxicava rugosa*, *Astarte elliptica*, *Leda truncata* and *oblonga*, and very lately *Leda thracica*.

*formis*: of these, *Pecten danicus* and *Astarte elliptica* are living inhabitants of the Scottish seas, the latter in places still abundant, the former very rarely taken alive, though the dead shells occur in such vast quantities, that we cannot but regard it as a species which has lived on since the glacial epoch, though gradually becoming reduced in numbers, and now very nearly extinct. These shells often occur at considerable depths, and almost always on a bottom of dark pleistocene sand. *Pecten islandicus* is enumerated in Hebridian and Zetland dredging papers from depths of 30, 40, 50 and 90 fathoms. That this remarkable species is extinct in our seas we can scarcely doubt, but I have good reasons for surmising that its extinction has taken place at a period considerably later than that of several of its glacial companions. The colours of this *Pecten*, as well as of some other pleistocene fossils, are beautifully preserved, and the general aspect of the shells is very deceptive.

Occasionally, fossils of older date, but in such a condition of petrification as can lead to no mistake respecting their origin, are brought up in the dredge. Thus Mr. MacAndrew has dredged the loose joints of Liassic pentacrinites off the Shiant Islands, and we have seen Oolitic testacea dredged in the sound between Scalpa and Raza.

#### GENERAL CONSIDERATIONS.

*Numerical distribution of species in depth.*—Of the species of Testaceous Mollusca enumerated in the preceding tables, I have assigned a range to 188 in the Scottish, and 183 in the English sections. Of the 188 Scottish sublittoral species, whose range in depth I venture to state, 96 are Gasteropodous Testacea, and 92 Acephala. Of these, 17 univalves and 11 bivalves inhabit the region between low-water mark and 15 fathoms, *i. e.* the Laminarian zone; 8 univalves and 7 bivalves extend their range from within the Laminarian zone to a depth between 15 and 30 fathoms; 26 univalves and 11 bivalves from the Laminarian zone to between 30 and 60 fathoms; and 25 univalves and 53 bivalves, from the Laminarian zone to a depth between 60 and 100 fathoms: 3 univalves and 4 bivalves are confined in their range between 15 and 30 fathoms, *i. e.* to the Coralline zone; 1 univalve to between 30 and 60 fathoms; 4 univalves and 1 bivalve to between 30 and 100 fathoms; and 1 univalve and 1 bivalve to between 60 and 100 fathoms.

Of the 183 in the English tables, 19 univalves and as many bivalves are from the Laminarian zone only; 45 univalves and 46 bivalves range from some point within the Laminarian zone to between 20 and 30 fathoms; 16 univalves and 28 bivalves extend their range from the same region to between 30 and 60 fathoms.

It is evident that the capacity of bivalves to enjoy a great bathymetrical range exceeds considerably that of univalves. This power of enduring many conditions of depth, implies the power of adapting themselves to varying circumstances, which cannot be supposed to exist without considerable variation in the features of the individuals of such wide-ranging species. The rules which should guide us in determining the selection of diagnostic characters from the shells of Acephalous mollusks, must consequently be less strict than those which should determine our selection of characters for the majority of Gasteropoda, and in the determination of fossil species this should constantly be borne in mind. The difference of power to range presented by univalves as compared with bivalves, has a further important bearing on palæontological inquiries, for it would indicate the probability of our not unfrequently finding geological formations connected together by the fossils of the one class of mollusca, whilst those of the other are altogether distinct, even in strata proximate in time. It is possible also, that by a careful de-



termination of the relative proportions of bivalves to univalves in ancient sea-beds, all mineral indications of the nature of the sea-bed being at the same time noted, we may get at an additional clue to the determination of the depth of the ancient sea in which such animals lived.

The distribution of the sub-littoral forms of testacea, as shown by our dredging papers, may be illustrated by the following examples :—

*Certain species are common to the Laminarian, Coralline and Deep-sea Coral Zones, as—*

|                        |                         |
|------------------------|-------------------------|
| Psammobia ferroensis.  | Turritella communis.    |
| Syndosmya intermedia.  | Cerithium reticulatum.  |
| Venus striatula.       | Natica Alderi.          |
| Venus cassina.         | Natica montacuti.       |
| Venus ovata.           | Nassa incrassata.       |
| Venus fasciata.        | Aporrhais pes-pelecani. |
| Cardium suecicum.      | Buccinum undatum.       |
| Cardium fasciatum.     | Fusus antiquus.         |
| Lucina borealis.       | Fusus gracilis.         |
| Lucina flexuosa.       | Trophon Barvicense.     |
| Kellia suborbicularis. | Clavatula linearis.     |
| Crenellæ.              | Trichotropis borealis.  |
| Nuculæ.                | Eulima distorta.        |
| Pinna ingens.          | Eulima subulata.        |
| Pecten similis.        |                         |

Some of them, under rare circumstances, as in a few localities (Skye and the lochs of Ross-shire) in the West Highlands, are found occasionally living at low-water. I have before called attention to this fact, and to the circumstance that on the neighbouring shore in such localities the alpine plants descend from the mountains and are distributed along the water's edge. I am strongly impressed with the suspicion that this curious phenomenon, so far as I have observed it, always seen in connexion with the neighbourhood of outliers of the glacial submarine fauna, has a relation, as yet unexplained, with the history of the changes in the configuration and elevation of land at the close of the glacial epoch.

*Certain species are common to Laminarian and Coralline Zones, and indifferently inhabit both, as—*

|                    |                    |
|--------------------|--------------------|
| Cypræa europæa.    | Tellina donacina.  |
| Natica helicoides. | Lucinopsis undata. |
| Eulima polita.     | Lepton squamosum.  |
| Velutina lævigata. | Lima hians.        |
| Mactra elliptica.  | Lima Loscombi.     |
| Artemis exoleta.   | Modiola modiolus.  |
| Artemis lineta.    | Ostrea edulis.     |
| Circe minima.      | Pecten varius.     |

*Certain species commence their range in the Coralline Zone, as—*

|                      |                     |
|----------------------|---------------------|
| Rissoa abyssicola.   | Cerithium metula.   |
| Pleurotoma teres.    | Trochus alabastrum. |
| Cemoria noachina.    | Fusus islandicus.   |
| Propilidium fulvum.  | Næra costellata.    |
| Pilidium ancyloides. | Næra abbreviata.    |
| Nucula tenuis.       | Leda pygmæa.        |
| Arca raridentata.    |                     |

And it is curious to observe that all these are members of the Scandinavian fauna.

*A few species appear to be confined to the region of deep-sea corals; as Apor-*

*rhaiis pes-carbonis*, *Poromya granulata*, *Tellina proxima*, probably *Terebratula cranium*, and a few Echinoderms and Zoophytes.

*Certain species which enjoy a great vertical range in the north, extending through the second, third, and in part the fourth regions of depth, are in the south found only within limited tracts of deep-sea, as—*

*Cardium suecicum.*

*Syndosmya intermedia.*

*Nucula polii.*

*Terebratula Caput-serpentis.*

*Pecten fuci.*

*Scalaria Trevelyana?*

These species are essentially members of the boreal or glacial fauna, and their presence in the south is dependent, if my views be correct, on the former spread of the glacial sea, and the preservation of its inhabitants at the existing epoch in many isolated and distant localities, where they live usually at considerable depths in the midst of, and mixed up with an assemblage of creatures of a Celtic and often a much more southern character.

*How far the nature of the sea-bottom determines the number and diffusion of species.*—In the preceding tables, the nature of the sea-bed is expressed by letters representing the several mineral characters of the bottom, whether sand, sandy mud, mud, rock, stones, gravel, muddy gravel, shelly, shell-sand, or nullipore; the last kind of bottom being that commonly called "coral" in the charts of the European seas.

Now, though our evidence certainly goes to show that the range of species in depth and distance from shore is often considerably extended by a continuity, whether vertical or horizontal, of the same kind of ground, yet assuredly ground alone will not determine the extension of any species; for otherwise we should have the stone- and gravel-inhabiting species of the Littoral zone carried in many places into the Laminarian and Coralline zones, and the peculiar inhabitants of the muddy and sandy tracts in the Laminarian zone carried far into the depths of the sea, since in very many places these kinds of sea-bed range without interruption from shallows to great depths. But this is not the case; no continuity of mud, for instance, enables *Scrobicularia* to live beyond its bounds, or the characteristic *Rissoa* of the gravelly parts of the Laminarian zone to extend themselves into the deep sea.

The conditions of the sea-bottom which are most favourable to variety of species may best be illustrated by referring to those dredging papers in which the number of species of either univalve or bivalve testacea taken alive exceeded ten. In the southernmost of the districts within the area under consideration, out of eighteen papers ten come under this category. Three of these belong to the Laminarian zone, five to the Coralline region, and two to the upper region of deep-sea corals. The three first-mentioned are all from a muddy and stony or gravelly bottom with weed, and within two miles of the shore; their number of univalves exceeds that of bivalves; in all three the number of living univalves is very high, being 15 and above; and in two of them the numbers of living bivalves are respectively 10 and 19, and of dead 9 and 12. Of the five papers from the Coralline zone, four are within three miles from the shore; three of these are from bottoms more or less stony and gravelly; in one instance mingled with nullipore; and one is from a floor of shell sand. They are also very prolific; one in dead and living univalves, one in dead and living bivalves, and two equally so in bivalves and univalves. The fifth of these coralline papers is from a depth of 30 fathoms and under, and a bottom of sand and gravel at a distance of 11 miles from shore; it exhibits a great preponderance of bivalves, and an equal number of species taken dead and alive. The two deep-sea papers are from a depth of 50 fathoms, on a sandy bottom, 60 miles from land; they scarcely come under the head of prolific papers, since few living species were taken,

though many dead, the number of dead univalves predominating in the one instance, and of dead bivalves in the other, respectively 17 and 20, both high numbers.

Twenty-six papers from the Irish sea relate to a sufficiently limited range in depth to admit of a similar inquiry. Of these, eight included more than 10 species of univalves and bivalves, or both. Two are from the Laminarian zone, and within 2 miles from shore; in the one instance, where the bottom was gravelly and stony, univalves prevail, and those alive; in the other, where it was sandy, bivalves prevail, and those mostly dead. The remaining five papers are from the Coralline zone; in three of them, where the bottom was a scallop bank several miles from shore, the number of both bivalves and univalves taken alive was very considerable, reaching in one instance respectively to 21 and 27. In one, from a nullipore bottom one mile from shore, univalves prevail, but bivalves are also abundant. In one, on a gravelly and stony bottom near shore, bivalves prevail (the numbers being 24 living and 25 dead), but univalves are also plentiful.

Among sixty-four dredging papers from the Clyde district and the Hebrides, twenty-two exhibit numbers either of bivalves or univalves above 10; of these three come within the Laminarian division, and one from depths very close to shore; in two of these the number of species of living univalves prevails; in one, of the bivalves. From the upper part of the Coralline zone there are eleven papers, in six of which the bivalves prevail, all from muddy or sandy bottoms, sometimes mixed with stones, close to shore; in two, univalves prevail over bivalves, in gravelly and stony bottoms near shore; and in two, the numbers are nearly equal on stony and mixed bottoms near to shore. From depths between 40 and 60 fathoms, there are six prolific papers, all richer in bivalves than in univalves, and all from sandy, gravelly or muddy beds, varying from two to ten miles from shore. A bottom of gravel and sand in 90 fathoms, close to shore, is richest in bivalves.

Of thirty papers from the Zetlands, sixteen are rich in species; one only is from the Laminarian zone, on a sandy bottom, especially rich in living bivalves (30), and having many (15) univalves also. Of two, from the upper part of the Coralline zone close to shore, one, with a nullipore and stony bottom, is richest in univalves; the other, from a shelly bed, in bivalves. Of the thirteen remaining papers from depths between 40 and 100 fathoms, eight present considerable numbers of both univalves and bivalves, and in five (all from depths below 60 fathoms) bivalves prevail. The numbers of species of bivalves are high in the depths at a considerable (30 to 100 miles) distance from shore. The bivalves are also predominant at these great depths on more or less muddy bottoms, and at the farther distances; the univalves most numerous alive where the bottom is more or less stony.

*Gregarious and prolific species.*—Many of our littoral mollusca, as the shore-living species of *Littorina*, *Purpura*, *Trochus*, *Cardium*, *Donax*, *Scrobicularia*, *Mya*, *Pholas*, &c., are truly gregarious, and the individuals of each are constantly found assembled together in considerable numbers. This is not so commonly the habit among sub-littoral species; among them, however, there are some habitually gregarious (as *Ostrea edulis*, *Pecten opercularis*, *Corbula nucleus*, *Syndosmyna alba*, *Pectunculus glycimeris*, *Modiola modiolus*, and *Turritella terebra*; and among radiata, *Ophiura rosula*, *Uraster rubens*, *Comatula europæa*, *Echinus sphaera*), though with this difference as compared with most littoral gregarious forms, that whereas the individuals of the latter are always assembled together, the sub-littoral species are gregarious in some zones of depth, and under certain conditions of sea-bottom, whilst they are at the same time diffused in small numbers, or even

as solitary individuals in situations where the conditions do not seem so favourable to fecundity. Many species also, not at all gregarious in the true sense of the word, having a very wide range in depth, are not equally prolific throughout that range, but are developed in much greater numbers in one region than in another, or in different parts of the same region according to the conditions of the sea-bed. Climatal differences also have a considerable effect in determining the prolific or non-prolific character of a species, and this may be observed clearly, even in such a limited area as that under review. Hence, when we state of many species that they are diffused throughout all the provinces of that area, it is not to be understood that they are equally abundant, so far as their individuals are concerned in all. Thus, for example, *Dentalium entalis* is distributed throughout the British seas; but, whilst it is so abundant as to be almost gregarious in the northern provinces, it becomes scarce and solitary in the southern. Many examples of this may be seen by consulting the analysis of dredging papers in the preceding tables, and afterwards comparing them with the tables of enumeration of localities of species.

In the Littoral region, as mentioned already, the species of *Littorina*, *Trochus*, *Patella* and *Purpura* are most abundant, and among bivalves, *Mytilus edulis*, *Cardium edule* and *Kellia rubra*. These, with many other animals, and with peculiar marine plants, which it is not the province of this Report to enumerate, give a character to the sea-belt between tide-mark\*.

In the Laminarian region, extending from low-water mark to 15 fathoms or thereabouts, *Lacunæ* and *Rissoæ* are abundant. The species observed to be most prolific within this region during the dredging researches on the English shores, were *Rissoa parva* and *interrupta*; in Laminarian shallows, *Lacuna puteolus*, *Rissoa labiosa* and *Phasianella pullus*, where *Zostera* prevailed; *Trochus cinereus*, *Magus* and *Ziziphinus*, *Acmea virginea*, *Modiola modiolus*, *Nucula nucleus* on muddy gravelly bottoms; *Turritella*, *Corbula nucleus*, *Syndosmya alba*, *Dentalium tarentinum*, *Ophiocoma rosula* in sandy and muddy places; *Solen pellucidus* and *Maetra subtruncata* where sand prevailed; *Chiton asellus* everywhere where shells or stones were present; *Echinus miliaris* on many bottoms; *Ascidia* and *Crustacea* everywhere.

On the Scottish shores in like depths, most of the above-named forms (except the *Rissoa labiosa*, *Phasianella*, *Lacuna* and *Dentalium tarentinum*) were equally prolific, whilst others seldom observed in great numbers in the south became very plentiful, as *Dentalium entalis*, *Lucina flexuosa*, *Lima hians*, *Venus striatula*, *Ophiocoma chiagii*; and in places, *Cardium pygmaeum*, *Crenella decussata* and *Bulla ahera*.

Between 15 and 25 fathoms in the upper part of the Coralline zone, *Trochus ziziphinus* and *tumidus*, *Chiton asellus*, *Acmea virginea*, *Nassa reticulata*, *Turritella*, *Venus ovata* and *V. fasciata*, *Pecten opercularis*, *Modiola modiolus*, *Crenella*, *Pectunculus*, *Nucula nucleus*, abound in individuals on the English shores. The same species, with the addition of *Astarte sulcata* and *A. elliptica*, *Syndosmya intermedia*, *Lima subauriculata*, *Leda caudata*, *Cardium fasciatum* and *Lucina sinuata*, mark the same region in the Scottish seas. In both north and south *Echinus sphaera* and *Ophiocoma* are very prolific in this belt.

Between 25 and 40 fathoms, in the middle and lower sections of the Coralline region, the species observed most prolific in individuals on the English coast were few, comprehending *Solen pellucidus*, *Pecten varius*, *Modiola modiolus* and *Dentalium tarentinum*.

\* For a tabulated view of the subdivisions and inhabitants of this zone, see the first volume of the Memoirs of the Geological Survey of Great Britain.

On the Scottish coast this region is remarkable for prolific and peculiar species. Great numbers of Brachiopoda (*Terebratula Caput-serpentis*, and *Crania norvegica*) are found in gravelly and stony places. *Dentalium entalis*, *Nucula nucleus*, *Astarte sulcata*, *Leda caudata*, and (in places) *L. pygmaea*, *Maetra elliptica* and *Modiola modiolus*, are all very prolific.

Between 40 and 60 fathoms, on the verge of the region of deep-sea corals, we have too little experience on the English coast to judge. *Cardium suecicum*, however, essentially a northern form, was noted as abundant at a depth of 50 fathoms between Cornwall and Ireland.

In the Scottish seas between these depths, besides most of the species noted as prolific in the last region, we find *Nucula tenuis*, *Cardium suecicum*, *Nucula decussata* (locally) and *Venus fasciata* abundant; also *Turritella* in places. Below that depth, *Leda caudata*, *Syndosmya intermedia*, *Venus ovata* and *striatula* (var.), *Lucina spinifera*, *Dentalium entalis*, *Turritella*, *Ditrupa* and *Echinus norvegicus*, have been taken in considerable numbers in several Scottish localities. Widely diffused species of *Turritella*, *Dentalium*, *Modiola*, *Nucula*, *Venus* and *Astarte*, appear to be most prolific throughout the range of their distribution.

*Generic and subgeneric groups confined to particular zones in depth.*—In the Littoral and Laminarian zones, we find all the species of certain well-marked natural groups assembled, but very few, if any, of those which are distributed in the regions of corallines and of deep-sea corals are peculiar, the species of mollusks in the lower zones especially, being members of genera which have representatives in the Laminarian or in both Littoral and Laminarian zones. Within the two higher zones we find all the British species of *Patella*, *Purpura*, *Littorina*, *Otina*, *Conovulus*, *Truncatella*, *Calyptrea*, *Lacuna* (except *L. crassior*), *Aplysia*, *Scrobicularia* and *Donax*. Almost, though not entirely confined to them, are also the genera *Phasianella*, *Mya*, *Lutraria*, *Mytilus*, *Pholas* and *Cytherea*. Some important genera, such as *Rissoa*, *Chiton*, *Trochus*, *Maetra*, *Venus*, *Bulla* and *Cardium*, are mainly developed in the Laminarian zone. In the genus *Patella* we have one section, that of *Patella* proper, confined to the Littoral zone, and another, *Patina*, confined to the Laminarian zone. The subgenus *Hydrobia* of *Rissoa* is almost wholly littoral. Very rarely do we find instances of a species strictly littoral descending far into the Laminarian zone or below it; on the west coast of Anglesey *Purpura lapillus* was dredged in 10 fathoms, and three specimens taken at that depth were remarkable for the development and perfection of the crenulated laminæ of growth on the surface of the shell. *Rissoa Barleii* of Jeffreys appears to be a variety of the littoral *Rissoa ulva*, descending below its usual level. More frequently do we find mollusks and radiata of the Laminarian zone and the upper part of the region of Corallines ascending into the littoral belt. This is especially the case in certain localities on the Hebrides, as in Skye and on the west coast of Argyshire; and very generally is it to be observed, as the registrar pointed out to the Natural History Section in 1836, in the immediate neighbourhood of those localities where alpine plants, such as *Silene acaulis* &c., are found abundantly near the water's edge.

Certain genera, such as *Neera*, *Crania*, *Pilidium*, *Cemoria* and *Propilidium*, have, so far as the area under review is concerned, a range in depth entirely confined to the Coralline region and that of deep-sea corals. But elsewhere species of these genera ascend into the Laminarian, and possibly some of them into the Littoral zones, so that great stress cannot be laid upon their distribution as genera indicative of depth. Very important, however, are the facts stated with regard to the Laminarian and Littoral genera; and the geolo-

gist will do well to bear in mind that *entire well-marked generic groups of testacea are confined to, and indicate with certainty, the space between tide-marks and the sea-bed to a depth of about 15 fathoms below low-water mark.*

*Relation of colour to distribution.*—Although the extent and depth of our seas scarcely afford sufficient data for illustrating the influence of light in the colouring of marine animals, yet some facts bearing on this subject may be gathered from the papers before us. In the horizontal diffusion of species, several, as some of the *Trochi* and *Veneridæ*, exhibit a distinct influence of light upon the brightness of their hues, in the south, as compared with the dull aspect of specimens from the north, and this in individuals of the same species. It is easy for the practised conchologist to distinguish specimens of most painted shells, gathered on the southern coasts of England, from those taken on other parts of our shores. We have evidence also of the distinct effect of depth in the defacing of the hues of the same species, when it has a great bathymetrical range. Thus the examples of *Venus striatula*, *Venus ovata* and *Turritella terebra* (all having a range from the Laminarian zone to the deepest recesses of the British seas), taken alive at a depth of 100 fathoms off the Zetland Isles by Mr. MacAndrew, were colourless; whilst those from more moderate and shallow depths are almost always conspicuously coloured. Between 60 and 80 fathoms in the Scottish seas, dirty white, dull red, yellow or brown, rarely broken into stripes or bands, are the prevailing hues of the testacea; though at 50 fathoms, shells painted in patterns and vividly coloured (as *Natica Alderi* and *Clavatulæ purpurea*), exhibit their hues unimpaired. At the same time it must not be forgotten that the vividly painted animal of the coral *Caryophyllia* thrives at a depth of 80 fathoms. A curious phænomenon apparently connected with depth is the blindness of the crustacean *Calocaris*.

*Condition of the exuvia of marine invertebrata taken in the dredge.*—In the great majority of instances and places, the dead shells of mollusca are taken nearly entire, or, in the case of the bivalves, with the valves disunited but not broken. This applies especially to all localities of a considerable depth, and where strong currents are not in action. Very near the shore, broken shells are not uncommon; and in current-ways, even at the depth of 30 fathoms, the bottom may be composed in great part of triturated shells. Lieut. Thomas, R.N., observes, when communicating his lists of Testacea dredged around the Orkney Islands, that “between Fair Island and the Orkneys, the bottom near the latter islands is either rocky or composed of large pieces of *Modiola modiolus* or *Pectunculus glycimæris*. I make no doubt,” he remarks, “that these are broken by some large species of Crustacea (?); their freshness of fracture is astonishing, as if the creature feeding had been disturbed at his meal.” Among bivalves, besides those mentioned, the shells of *Thracia*, *Cyprina*, *Isocardia*, and the larger species of *Cardium* are most frequently found broken; among univalves, those of *Buccinum* and *Fusus*. Some few bivalves are frequently dredged dead, yet with their valves united; such are *Lucina radula*, the *Næææ*, *Maetra elliptica*, *Psammobia*, *Venus ovata* and *striatula*, *Tapes virginea*, *Tellina donacina*, *Thracia phaseolina*, *Lucinopsis*, *Nucula pygmæa*, *Solens*, *Syndosmyæ* and *Pectunculus pilosus*, this last open and gaping. The monomyarious bivalves are often found dead in quantities, but almost always with valves disunited; and this may be said of the great majority of dimyariou bivalves also. Echinoderms fall to pieces when dead, or if taken entire have lost their spines.

*Phænomena of the horizontal distribution of species on the western shores of Great Britain.*—In the older accounts of British marine animals, the phrase “from Devon to Zetland” was frequently given as marking their range, and

the natural inference from such statement was that such species were universally diffused through our seas. The researches embodied in this Report, however, put beyond question the fact that there are marked peculiarities in the distribution of British marine animals, and that though there are numerous species common to the whole area, there are also numerous species peculiar to parts of that area. We have clear evidence of more elements than one contributing to the composition of our submarine population, of a southern element, derived from the Lusitanian provinces of the European seas, of a northern element introduced from the Scandinavian seas, of a Celtic element having its centre within our own region, of an oceanic element manifested by the floating Gasteropoda and the Pteropoda that reach our shores, and of an arctic element due to causes which were in action before the British Isles had assumed their present conformation\*. The following statements, founded mainly on the data contained in the preceding tables, will serve to illustrate the phænomena, so far as this Report is concerned.

*The northern and southern provinces of the western coast of Great Britain may be distinguished by certain Mollusca of the Littoral Zone.*—Thus, in the extreme south, along the shores of the English Channel, we find *Truncatella truncatula*, and there only. *Trochus lineatus* commences its range to the west of Portland Island, and is found around the coasts of Devon, Cornwall and the Bristol Channel, until it ceases in Cardigan Bay or a little higher up; a similar cessation of its diffusion taking place on the opposite shores of Ireland. *Acmæa testudinalis*, on the other hand, appears in the Orkneys (its presence in the Zetlands is doubtful), and ranges through the Hebrides and the Clyde region until it reaches the northern shores of Ireland and the northern coast of the Isle of Man; but it is not found on coasts southwards of those points. *Chiton marmoreus* ceases sooner; *Littorina petraea* is abundant in the British Channel, and equally plentiful in the Hebrides, but rare in the central part of the Irish sea. All the other *Littorinæ*, *Chiton marginatus*, *Rissoa parva* and *cingillus*, *Patella vulgata*, *Trochus cinerarius*, *Purpura lapillus*, *Skenea planorbis*, *Mytilus edulis* and *Kellia rubra*, are common throughout the area, even as they are all round the shores of the British Isles. *Trochus umbilicatus* is equally abundant throughout the area, whilst on the other hand it is entirely absent from the eastern coast of Britain.

*The differences between the northern and southern provinces are equally shown by the sublittoral testacea.*—These are evident,—1st, in the presence of a number of species in the south which are not found in the north, and *vice versa*; and 2nd, in the greater frequency of the individuals and localities of certain species as we proceed from south to north, and *vice versa*; thus—

1. The following testacea are confined to the extreme south; they are all Spanish or Mediterranean species:—

|                               |                          |
|-------------------------------|--------------------------|
| <i>Trochus striatus.</i>      | <i>Pholas parva.</i>     |
| <i>Trochus exiguus.</i>       | <i>Ervilia castanea.</i> |
| <i>Chemnitzia fenestrata.</i> | <i>Cardium rusticum.</i> |
| <i>Volva patula.</i>          | <i>Crenella rhombea.</i> |
| <i>Pholadidea papyracea.</i>  |                          |

2. The following species are peculiarly southern, but more general than the former; they are also species of the Mediterranean and Lusitanian type:—

\* See the Memoir on the British Fauna and Flora, in the first volume of the Memoirs of the Geological Survey.

|                               |                               |
|-------------------------------|-------------------------------|
| <i>Dentalium tarentinum.</i>  | <i>Modiola barbata.</i>       |
| <i>Emarginula rosea.</i>      | <i>Arca lactea.</i>           |
| <i>Adeorbis subcarinatus.</i> | <i>Cytherea chione.</i>       |
| <i>Calyptrea sinensis.</i>    | <i>Cardium aculeatum.</i>     |
| <i>Scalaria clathratulus.</i> | <i>Diplodonta rotundata.</i>  |
| <i>Nassa varicosa.</i>        | <i>Venus verrucosa.</i>       |
| <i>Chemnitzia scalaris.</i>   | <i>Gastrochæna modiolina.</i> |

3. The following species increase in frequency of occurrence as we proceed from north to south:—

|                             |                                   |
|-----------------------------|-----------------------------------|
| <i>Chiton fascicularis.</i> | <i>Cerithiopsis tubercularis.</i> |
| <i>Trochus granulatus.</i>  | <i>Clavatula rufa.</i>            |
| <i>Rissoa crenulata.</i>    | <i>Modiola tulipa.</i>            |
| <i>Scalaria clathrus.</i>   | <i>Mactra subtruncata.</i>        |
| <i>Cerithium adersum.</i>   | <i>Pecten varius.</i>             |

4. On the other hand, a greater number of species become more frequent in proceeding from south to north, showing thereby the more powerful influence of the Scandinavian element in our fauna:—

|                                |                              |
|--------------------------------|------------------------------|
| <i>Dentalium entalis.</i>      | <i>Tapes pullastra.</i>      |
| <i>Chiton cancellatus.</i>     | <i>Cyprina islandica.</i>    |
| <i>Emarginula Mulleri.</i>     | <i>Astarte danmoniensis.</i> |
| <i>Trochus millegranus.</i>    | <i>Astarte compressa.</i>    |
| <i>Lacuna crassior.</i>        | <i>Lucina borealis.</i>      |
| <i>Chemnitzia fulvocincta.</i> | <i>Lucina flexuosa.</i>      |
| <i>Eulimella MacAndrei.</i>    | <i>Modiola vulgaris.</i>     |
| <i>Natica Montagui.</i>        | <i>Leda caudata.</i>         |
| <i>Fusus gracilis.</i>         | <i>Lima subauriculata.</i>   |
| <i>Trophon Bamfium.</i>        | <i>Pecten tigrinus.</i>      |
| <i>Bela turricula.</i>         |                              |

5. The power of the Scandinavian element is still more strongly shown in the number and character of species, which are peculiarly northern:—

|                               |                               |
|-------------------------------|-------------------------------|
| <i>Chiton Hanleyi.</i>        | <i>Bulla akera?</i>           |
| <i>Acmæa testudinalis.</i>    | <i>Bullæa quadrata.</i>       |
| <i>Propilidium ancyloide.</i> | <i>Bullæa scabra.</i>         |
| <i>Scissurella crispata.</i>  | <i>Pecten danicus.</i>        |
| <i>Chemnitzia rufescens.</i>  | <i>Pecten striatus?</i>       |
| <i>Natica grœnlandica.</i>    | <i>Crenella decussata.</i>    |
| <i>Velutina plicatilis.</i>   | <i>Crenella nigra.</i>        |
| <i>Trichotropis borealis.</i> | <i>Pecten niveus.</i>         |
| <i>Trophon Barvicense.</i>    | <i>Astarte elliptica.</i>     |
| <i>Bela decussata.</i>        | <i>Astarte crebricostata.</i> |
| <i>Mangelia brachystoma.</i>  | <i>Lucina ferruginosa.</i>    |
| <i>Mangelia Boothii.</i>      | <i>Poromya anatinoides.</i>   |
| <i>Bulla hyalina.</i>         | <i>Neæra costellata.</i>      |
| <i>Bulla Cranchii.</i>        | <i>Neæra abbreviata.</i>      |

To which may be added certain species found in the southern part of the British seas only in a few isolated patches, spaces which I regard as "glacial outliers," as—

|                                     |                              |
|-------------------------------------|------------------------------|
| <i>Pilidium fulvum.</i>             | <i>Nucula decussata.</i>     |
| <i>Emarginula crassa.</i>           | <i>Nucula tenuis.</i>        |
| <i>Rissoa abyssicola.</i>           | <i>Leda pygmæa.</i>          |
| <i>Scalaria Trevelyana.</i>         | <i>Neæra cuspidata.</i>      |
| <i>Terebratula Caput-serpentis.</i> | <i>Syndosmya intermedia.</i> |
| <i>Crania norvegica.</i>            | <i>Cardium suecicum.</i>     |
| <i>Arca raridentata.</i>            |                              |



6. There are also a number of species confined to the extreme north ; as—

|                         |                      |                      |
|-------------------------|----------------------|----------------------|
| Trochus alabastrum.     | Natica helicoides.   | Astarte arctica.     |
| Cerithium metula.       | Fusus albus.         | Tellina proxima.     |
| Aporrhais pes-carbonis. | Fusus decemcostatus. | Terebratula cranium. |
| Scalaria groenlandica.  |                      |                      |

7. A few, of which *Rissoa vitrea*, *Isocardia cor* and *Ostrea edulis* are examples, are very local in various degrees of abundance, the cause of their localization being obscure.

8. Certain species are more or less common at *both ends* of the area under exploration, though very rare or not found at all in the Irish sea ; they can, most of them, however, be tracked making their way northwards along the western coast of Ireland.

|                        |                      |                   |
|------------------------|----------------------|-------------------|
| Rissoa costata.        | Marginella lævis.    | Cardium pygmæum.  |
| Rissoa zetlandica.     | Psammobia costulata. | Lucina spinifera. |
| Cerithium reticulatum. | Diodonta fragilis.   | Pinna pectinata.  |
| Mangelia teres.        | Tapes decussata.     | Arca tetragona.   |
| Mangelia costata.      | Circe minima.        | Pecten similis.   |
| Mangelia attenuata.    |                      |                   |

9. Not a few species appear to be equally diffused everywhere throughout our area ; of these, there may be cited as examples,—

|                         |                         |                       |
|-------------------------|-------------------------|-----------------------|
| Chiton asellus.         | Mangelia linearis.      | Tellina crassa.       |
| Acmæa virginea.         | Cypræa europæa.         | Tellina donacina.     |
| Trochus cinerarius.     | Crenella discrepans.    | Syndosmya alba.       |
| Trochus tumidus.        | Crenella marmorata.     | Mactra elliptica.     |
| Trochus ziziphinus.     | Pectunculus glycimiris. | Tapes virginea.       |
| Rissoa parva.           | Nucula nucleus.         | Venus ovata.          |
| Rissoa striata.         | Lima hians.             | Venus fasciata.       |
| Turritella terebra.     | Lima Loscombi.          | Venus cassina.        |
| Aporrhais pes-pelecani. | Pecten maximus.         | Venus striatula.      |
| Natica Alderi.          | Pecten pusio.           | Artemis exoleta.      |
| Buccinum undatum.       | Pecten opercularis.     | Artemis lincta.       |
| Fusus antiquus.         | Solen pellucidus.       | Cardium fasciatum.    |
| Trophon muricatum.      | Psammobia ferroensis.   | Kellia suborbicularis |

*The harder Echinodermata exhibit similar phenomena of distribution.*—Thus, *Cidaris histrix*, *Echinus norvegicus*, *Echinus neglectus* and *Euryale verrucosa*, are peculiarly and extreme northern species, and all of Scandinavian origin.

*Brissus lyrifer* (which occurs also in glacial outliers in the south), *Ophiocoma filiformis*, *Comatula petasus*, *Goniaster Templetoni* (i. e. *pulvillus*), and *Uraster rosea* (= *Cribella rosea*), are peculiarly northern.

*Echinus Flemingii* is northern and southern, but deficient in the interval.

*Echinus sphaera* and *Echinus miliaris*, with many of our starfishes, are general throughout the area.

*Echinus Melo* and the extra-limital *Echinus lividus* are peculiarly southern.

Similar peculiarities of distribution are shown by the soft Echinoderms, by the soft Mollusca and by the Zoophytes.

*Numerical comparisons of the Testacea and hard Echinodermata inhabiting the regions explored, with the total number of British species.*—In the following table, one of the striking features is the small number of testacea and hard echinoderms inhabiting the British seas, which do not live upon the western shores of Great Britain ; such as are beyond their limits, are either of excessively southern and scarcely British character, as *Haliotis tuberculata*,

*Jeffreysia opalina*, *Rissoa lactea* and *Murex corallinus*; or oceanic forms of *Ianthina*, *Hyalæa* and *Spirialis*; or species probably of arctic origin, extending only to our north-eastern coasts, as *Fusus norvegicus* and *Turtoni*, *Natica Kingii*, *Hypothyris psittacea* and *Goniaster equestris*. The number of doubtful or not sufficiently investigated forms is also very small. A considerable number of genera have no, or few, representative members in the Scottish and English columns of western sublittoral species; these are either extra-littoral, as *Hyalæa*, *Haliotis* and *Hypothyris*; or excessively rare in our seas, as *Avicula*, *Stylifer*, *Cidaris* and *Astrophyton*; or oceanic, as *Ianthina* and *Spirialis*; or wholly or mainly littoral, as *Littorina*, *Otina*, *Conovulus*, *Truncatella*, *Jeffreysia*, *Skenea* (proper), *Patella*, *Pleurobranchus*, *Teredo*, *Xylophaga*, *Petricola*, *Venerupis*, *Ceratisolen*, *Turtonia*, *Galeomma*, *Mytilus*, *Asterina*. In *Odostomia* we have a genus which is not fairly represented on account of the excessively critical character of its species. Five genera of Gasteropoda, three of Lamellibranchiate acephala, three of Palliobranchiate acephala, and three of hard Echinodermata, all having members in the Scottish portion of the regions explored, are without representatives in the English western and southern provinces. On the other hand, seven genera of Gasteropoda and eight of Lamellibranchiate acephala having English representatives, are altogether wanting on the western and northern coasts of Scotland. All our brachiopods found within the area explored are Scottish species; the number of monomyarious Lamellibranchiata is slightly in favour of Scotland over England, which, however, shows a considerable majority of dimyaria. The proportion of Gasteropoda in the Scottish seas is, however, so great, that the total number of testacea is in favour of the north. This is to be attributed partly to the greater variety of depths and ground, and partly to the presence in the north of isolated colonies of arctic forms which swell the ranks of the inhabitants of those regions to beyond their natural proportions.

This table shows the total number of species of each genus of British testacea and hard Echinodermata, compared with the number of species recorded in the following tables of depths; the Scottish and English regions of the areas to which this Report is devoted, having the number of their species dredged in separate columns. In order to facilitate the comparison, and to show cause for the differences between the latter or district columns and the first or general enumeration, columns showing the number of species normally living in the Littoral and Laminarian zones, of obscure forms said to live within the area explored, and of British species found only beyond the limits of these areas, are inserted between. I have added for general comparison a column showing the number of species identical with existing British forms, of which we find fossil remains in the later British tertiaries, taking my data from the valuable monographs by Mr. Searles Wood. In two other columns, I have inserted in the one the total number of Scandinavian species of each genus in the British list, irrespective of identity, founding the list on Löven's researches; and in the other, the total number in like manner of Mediterranean species, founding the list on the works of Phillippi, on my Ægean lists, and on the dredging papers of Mr. MacAndrew. These two columns, when compared with the others, will afford not a few indications of the respective influences of the northern and southern elements in the British marine fauna. The numbers of the Scandinavian Echinodermata are taken from the excellent memoir by Duben and Koren.

| British genera.    | Total of British species. | Species inhabiting the Littoral zone. | Inhabiting the Laminarian zone. | Obscure species within described area. | British, without the limits of area. | No. of species in English papers. | No. of species in Scotch papers. | British later tertiary fossils identified with living British species. | Scandinavian species of these genera. | Mediterranean species of these genera. |
|--------------------|---------------------------|---------------------------------------|---------------------------------|----------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|------------------------------------------------------------------------|---------------------------------------|----------------------------------------|
| TEST. MOLLUSCA.    |                           |                                       |                                 |                                        |                                      |                                   |                                  |                                                                        |                                       |                                        |
| LAMELLIBRANCHIATA. |                           |                                       |                                 |                                        |                                      |                                   |                                  |                                                                        |                                       |                                        |
| Teredo             | 6                         | 6                                     | ...                             | ...                                    | ...                                  | *                                 | *                                | 1                                                                      | 2                                     | 3                                      |
| Xylophaga          | 1                         | 1                                     | ...                             | ...                                    | ...                                  | *                                 | *                                | 0                                                                      | 1                                     | 0                                      |
| Pholas             | 4                         | 4                                     | 4                               | ...                                    | ...                                  | 3                                 | 0                                | 1                                                                      | 3                                     | 2                                      |
| Pholadidea         | 1                         | 1                                     | 1                               | ...                                    | ...                                  | 1                                 | 0                                | 1                                                                      | 0                                     | 0                                      |
| Gastrochaena       | 1                         | ...                                   | ...                             | ...                                    | ...                                  | 1                                 | 0                                | 1                                                                      | 0                                     | 1                                      |
| Saxicava           | 2                         | ...                                   | 2                               | ...                                    | ...                                  | 2                                 | 2                                | 2                                                                      | 2                                     | 2                                      |
| Petricola          | 1                         | 1                                     | 1                               | 1                                      | ...                                  | *                                 | 0                                | 0                                                                      | 0                                     | 1                                      |
| Venerupis          | 1                         | 1                                     | 1                               | ...                                    | ...                                  | *                                 | 0                                | 1                                                                      | 0                                     | 2                                      |
| Mya                | 2                         | 2                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 2                                                                      | 2                                     | 0                                      |
| Panopæa            | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 0                                 | 1                                | 1                                                                      | 1                                     | 1                                      |
| Corbula            | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                      | 2                                     | 2                                      |
| Sphæria            | 2                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 2                                                                      | 0                                     | ?                                      |
| Næra               | 3                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                      | 5                                     | 4                                      |
| Poromya            | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 0                                 | 1                                | 1                                                                      | 1?                                    | 1                                      |
| Pandora            | 2                         | 0                                     | 1                               | 1                                      | ...                                  | 1                                 | 1                                | 2                                                                      | 0                                     | 3                                      |
| Lyonsia            | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 0                                                                      | 1                                     | 1                                      |
| Thracia            | 5                         | 0                                     | 5                               | ...                                    | ...                                  | 5                                 | 4                                | 2                                                                      | 3                                     | 5                                      |
| Cochlodesma        | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                      | 1                                     | ?                                      |
| Solen              | 4                         | 2                                     | 3                               | ...                                    | ...                                  | 3                                 | 3                                | 2                                                                      | 3                                     | 5                                      |
| Ceratisolen        | 1                         | 1                                     | ?                               | ...                                    | ...                                  | *                                 | 0                                | 0                                                                      | 0                                     | 1                                      |
| Solecurtus         | 2                         | 0                                     | 0                               | ...                                    | ...                                  | 2                                 | 2                                | 0                                                                      | 1                                     | 2                                      |
| Psammobia          | 4                         | 1                                     | 4                               | ...                                    | ...                                  | 4                                 | 2                                | 3                                                                      | 3                                     | 3                                      |
| Diodonta           | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 0                                                                      | 0                                     | 1                                      |
| Tellina            | 9                         | 4                                     | 7                               | ...                                    | ...                                  | 8                                 | 7                                | 6                                                                      | 5                                     | 13                                     |
| Syndosmya          | 4                         | 1                                     | 4                               | ...                                    | ...                                  | 4                                 | 3                                | 3                                                                      | 3                                     | 3                                      |
| Scrobicularia      | 1                         | 1                                     | 1                               | ...                                    | ...                                  | 1                                 | *                                | 1                                                                      | 1                                     | 2                                      |
| Donax              | 2                         | 2                                     | 1                               | ...                                    | ...                                  | 1                                 | *                                | 2                                                                      | 1                                     | 4                                      |
| Ervilia            | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 1                                 | 0                                | 0                                                                      | 0                                     | 1                                      |
| Mactra             | 6                         | 5                                     | 6                               | 1                                      | ...                                  | 4                                 | 4                                | 6                                                                      | 3                                     | 5                                      |
| Lutraria           | 2                         | 2                                     | 2                               | ...                                    | ...                                  | 2                                 | 1                                | 1                                                                      | 0                                     | 1                                      |
| Tapes              | 4                         | 3                                     | 4                               | ...                                    | ...                                  | 2                                 | 3                                | 3                                                                      | 3                                     | 6                                      |
| Cytherea           | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 0                                | 1                                                                      | 0                                     | 3                                      |
| Venus              | 5                         | 2                                     | 5                               | ...                                    | ...                                  | 5                                 | 4                                | 3                                                                      | 4                                     | 6                                      |
| Artemis            | 2                         | 0                                     | 2                               | ...                                    | ...                                  | 2                                 | 2                                | 2                                                                      | 2                                     | 2                                      |
| Lucinopsis         | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 0                                                                      | 1                                     | 1                                      |
| Cyprina            | 1                         | 1                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                      | 1                                     | 0                                      |
| Circe              | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                      | 0                                     | 1                                      |
| Astarte            | 6                         | 0                                     | 4                               | ...                                    | ...                                  | 2                                 | 6                                | 6                                                                      | 4                                     | 4                                      |
| Isocardia          | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                      | 1                                     | 1                                      |
| Cardium            | 8                         | 1                                     | 3                               | ...                                    | ...                                  | 8                                 | 7                                | 3                                                                      | 7                                     | 17                                     |
| Lucina             | 6                         | 0                                     | 3                               | ...                                    | ...                                  | 5                                 | 4                                | 4                                                                      | 4                                     | 12                                     |
| Diplodonta         | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 0                                | 1                                                                      | 0                                     | 2                                      |
| Montacuta          | 3                         | 1                                     | 3                               | ...                                    | ...                                  | 3                                 | 3                                | 3                                                                      | 2                                     | 1                                      |
| Turtonia           | 1                         | 1                                     | 0                               | ...                                    | ...                                  | *                                 | *                                | 0                                                                      | 1                                     | ?                                      |
| Kellia             | 3                         | 1                                     | 2                               | 1                                      | ...                                  | 2                                 | 1                                | 2                                                                      | 1                                     | 3                                      |
| Lepton             | 2                         | 0                                     | 2?                              | ...                                    | 1                                    | 2                                 | 1                                | 2                                                                      | 0                                     | 1                                      |
| Galeomma           | 1                         | 1                                     | 1                               | ...                                    | ...                                  | 1                                 | 0                                | 0                                                                      | 0                                     | 1                                      |
| Mytilus            | 1                         | 1                                     | 1                               | ...                                    | ...                                  | *                                 | *                                | 1                                                                      | 1                                     | 2                                      |
| Modiola            | 4                         | 1                                     | 4                               | ...                                    | ...                                  | 1                                 | 3                                | 3                                                                      | 1                                     | 4                                      |
| Crenella           | 6                         | 3                                     | 6                               | ...                                    | ...                                  | 4                                 | 4                                | 4                                                                      | 5                                     | 4                                      |
| Nucula             | 5                         | 0                                     | 3                               | ...                                    | ...                                  | 3                                 | 5                                | 3                                                                      | 4                                     | 5                                      |
| Leda               | 2                         | 0                                     | 1                               | ...                                    | ...                                  | 4                                 | 2                                | 2                                                                      | 4                                     | 2                                      |
| Arca               | 3                         | 0                                     | 2                               | ...                                    | ...                                  | 1                                 | 2                                | 3                                                                      | 3                                     | 9                                      |
| Pectunculus        | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 2                                 | 1                                | 1                                                                      | 0                                     | 2                                      |
| Avicula            | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 1                                 | 0                                | 1                                                                      | 0                                     | 1                                      |

| British genera.           | Total of British species. | Species inhabiting the Littoral zone. | Inhabiting the Laminarian zone. | Obscure species within described area. | British, without the limits of area. | No. of species in English papers. | No. of species in Scotch papers. | British later tertiary fossils identical with living British species. | Scandinavian species of these genera. | Mediterranean species of these genera. |
|---------------------------|---------------------------|---------------------------------------|---------------------------------|----------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|-----------------------------------------------------------------------|---------------------------------------|----------------------------------------|
| <b>TEST. MOLLUSCA.</b>    |                           |                                       |                                 |                                        |                                      |                                   |                                  |                                                                       |                                       |                                        |
| <b>LAMELLIBRANCHIATA.</b> |                           |                                       |                                 |                                        |                                      |                                   |                                  |                                                                       |                                       |                                        |
| Pinna .....               | 1                         | 1                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 0                                     | 2 or 3                                 |
| Lima .....                | 3                         | 0                                     | 2                               | ...                                    | ...                                  | 3                                 | 3                                | 3                                                                     | 5                                     | 7                                      |
| Pecten .....              | 9                         | 1                                     | 7                               | ...                                    | ...                                  | 7                                 | 9                                | 7                                                                     | 13                                    | 17                                     |
| Ostrea .....              | 1                         | 1                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 1                                     | 6                                      |
| Anomia .....              | 4                         | 3                                     | 3                               | 1                                      | ...                                  | 3                                 | 4                                | 4                                                                     | 4                                     | 4                                      |
| <b>PALLIOBRANCHIATA.</b>  |                           |                                       |                                 |                                        |                                      |                                   |                                  |                                                                       |                                       |                                        |
| Hypothyris .....          | 1                         | 0                                     | 0                               | ...                                    | 1                                    | 0                                 | 0                                | 1                                                                     | ?                                     | 0                                      |
| Terebratula .....         | 2                         | 0                                     | 1                               | ...                                    | ...                                  | 0                                 | 1                                | 1                                                                     | 3                                     | 2                                      |
| Megathyris .....          | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 0                                 | 1                                | 1                                                                     | 1                                     | 6                                      |
| Crania .....              | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 0                                 | 1                                | 1                                                                     | 1                                     | 1                                      |
| <b>PTEROPODA.</b>         |                           |                                       |                                 |                                        |                                      |                                   |                                  |                                                                       |                                       |                                        |
| Hyalæa .....              | 1                         | 0                                     | 0                               | ...                                    | 1                                    | 0                                 | 0                                | 0                                                                     | 0                                     | 4                                      |
| Spiralis .....            | 3                         | 0                                     | 0                               | ...                                    | 1                                    | *                                 | *                                | 0                                                                     | 1                                     | 2                                      |
| <b>GASTEROPODA.</b>       |                           |                                       |                                 |                                        |                                      |                                   |                                  |                                                                       |                                       |                                        |
| Chiton .....              | 10                        | 5                                     | 8                               | ...                                    | ...                                  | 5                                 | 7                                | 1                                                                     | 11                                    | 8                                      |
| Patella .....             | 3                         | 2                                     | 1                               | ...                                    | ...                                  | 1                                 | 2                                | 2                                                                     | 2                                     | 3                                      |
| Acmæa .....               | 2                         | 2                                     | 2                               | ...                                    | ...                                  | 1                                 | 2                                | 1                                                                     | 2                                     | 1                                      |
| Pilidium .....            | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 0                                 | 1                                | 1                                                                     | 2                                     | 0                                      |
| Propilidium .....         | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 0                                 | 1                                | 0                                                                     | 1                                     | 0                                      |
| Dentalium .....           | 2                         | 0                                     | 2                               | ...                                    | ...                                  | 2                                 | 1                                | 2                                                                     | 1                                     | 8                                      |
| Pileopsis .....           | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 1                                     | 1                                      |
| Calyptræa .....           | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 0                                | 1                                                                     | 0                                     | 1                                      |
| Fissurella .....          | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 0                                     | 3                                      |
| Puncturella .....         | 1                         | 0                                     | 0                               | ...                                    | ...                                  | 0                                 | 1                                | 1                                                                     | 1                                     | 0                                      |
| Emarginula .....          | 3                         | 2                                     | 2                               | ...                                    | ...                                  | 2                                 | 2                                | 2                                                                     | 2                                     | 5                                      |
| Haliotis .....            | 1                         | 1                                     | 0                               | ...                                    | 1                                    | 0                                 | 0                                | 0                                                                     | 0                                     | 1                                      |
| Trochus .....             | 16                        | 5                                     | 11                              | ...                                    | 1                                    | 10                                | 10                               | 9                                                                     | 8                                     | 28                                     |
| Phasianella .....         | 1                         | 1                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 0                                                                     | 0                                     | 3                                      |
| Adeorbis .....            | 1                         | 1?                                    | 1                               | ...                                    | ...                                  | 1                                 | 0                                | 1                                                                     | 0                                     | 1                                      |
| Scissurella .....         | 1                         | 1?                                    | 1?                              | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 2                                     | 2                                      |
| Ianthina .....            | 3                         | 0                                     | 0                               | ...                                    | 1                                    | *                                 | 0                                | 0                                                                     | 0                                     | 3                                      |
| Littorina .....           | 4                         | 4                                     | 0                               | ...                                    | ...                                  | *                                 | *                                | 3                                                                     | 4                                     | 1                                      |
| Lacuna .....              | 4                         | 0                                     | 4                               | ...                                    | ...                                  | *                                 | 3                                | 2                                                                     | 6?                                    | 0                                      |
| Rissoa .....              | 29                        | 10                                    | 14                              | 1                                      | 3                                    | 13                                | 13                               | 8                                                                     | 18                                    | 37?                                    |
| Jeffreysia .....          | 2                         | 2                                     | 0                               | ...                                    | 1                                    | *                                 | 0                                | 0                                                                     | 0                                     | ?                                      |
| Skenea .....              | 1                         | 1                                     | 0                               | ...                                    | ...                                  | *                                 | *                                | 0                                                                     | 1                                     | 0                                      |
| Skenea? .....             | 4                         | 0                                     | 4?                              | ...                                    | ...                                  | *                                 | 0                                | 0                                                                     | ?                                     | 1                                      |
| Turritella .....          | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 1                                     | 3                                      |
| Cœcum .....               | 2                         | 0                                     | 2                               | ...                                    | ...                                  | 2                                 | 2                                | 2                                                                     | ?                                     | 1                                      |
| Aporrhais .....           | 2                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 2                                | 1                                                                     | 1                                     | 2                                      |
| Cerithium .....           | 3                         | 1                                     | 2                               | ...                                    | ...                                  | 2                                 | 3                                | 1                                                                     | 3                                     | 10                                     |
| Scalaria .....            | 5                         | 0                                     | 3                               | ...                                    | ...                                  | 4                                 | 4                                | 3                                                                     | 4                                     | 6                                      |
| Aclis .....               | 4                         | 0                                     | 3?                              | ...                                    | ...                                  | 1                                 | 2                                | 2                                                                     | 1                                     | 1                                      |
| Stylifer .....            | 1                         | 0                                     | 1?                              | ...                                    | ...                                  | *                                 | 0                                | 0                                                                     | 1                                     | ?                                      |
| Eulima .....              | 4                         | 0                                     | 4?                              | ...                                    | ...                                  | 3                                 | 4                                | 2                                                                     | 3                                     | 5                                      |
| Chemnitzia .....          | 8                         | 0                                     | 6?                              | ...                                    | 1                                    | 4                                 | 4                                | 4                                                                     | 2                                     | 8                                      |
| Odostomia .....           | 22                        | *                                     | *                               | *                                      | 1                                    | ?                                 | 15                               | 3                                                                     | 6                                     | 2                                      |
| Eulimella .....           | 4                         | 0                                     | 2                               | ...                                    | ...                                  | 1                                 | 2                                | 1?                                                                    | 3                                     | 3                                      |
| Truncatella .....         | 1                         | 1                                     | 0                               | ...                                    | ...                                  | *                                 | 0                                | 0                                                                     | 0                                     | 1                                      |
| Otina .....               | 1                         | 1                                     | 0                               | ...                                    | ...                                  | *                                 | 0                                | 0                                                                     | 0                                     | 0                                      |
| Natica .....              | 7                         | 1                                     | 4                               | ...                                    | 1                                    | 3                                 | 6                                | 5                                                                     | 7                                     | 9                                      |
| Lamellaria .....          | 2                         | 1?                                    | 2                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 4                                     | 1                                      |
| Velutina .....            | 2                         | 0                                     | 1                               | ...                                    | ...                                  | 1                                 | 2                                | 1                                                                     | 2                                     | 0                                      |
| Cerithiopsis .....        | 2                         | 0                                     | 2                               | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 0                                     | 1                                      |
| Trichotropis .....        | 1                         | 0                                     | 1                               | ...                                    | ...                                  | 0                                 | 1                                | 1                                                                     | 1                                     | 0                                      |

| British genera.        | Total of British species. | Species inhabiting the Littoral zone. | Inhabiting the Lamarian zone. | Obscure species within described area. | British, without the limits of area. | No. of species in English papers. | No. of species in Scotch papers. | British later tertiary fossils identical with living British species. | Scandinavian species of these genera. | Mediterranean species of these genera. |
|------------------------|---------------------------|---------------------------------------|-------------------------------|----------------------------------------|--------------------------------------|-----------------------------------|----------------------------------|-----------------------------------------------------------------------|---------------------------------------|----------------------------------------|
| <b>TEST. MOLLUSCA.</b> |                           |                                       |                               |                                        |                                      |                                   |                                  |                                                                       |                                       |                                        |
| <b>GASTEROPODA.</b>    |                           |                                       |                               |                                        |                                      |                                   |                                  |                                                                       |                                       |                                        |
| Purpura .....          | 1                         | 1                                     | (1)                           | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 1                                     | 1                                      |
| Murex .....            | 3                         | 2                                     | 2                             | ...                                    | 1                                    | 2                                 | 1                                | 1                                                                     | 1                                     | 8                                      |
| Fusus .....            | 9                         | 0                                     | 2                             | ...                                    | 3                                    | 2                                 | 6                                | 4                                                                     | 6                                     | 3                                      |
| Buccinum .....         | 4                         | 1                                     | 1                             | ...                                    | 1                                    | 1                                 | 2                                | 2                                                                     | 2                                     | 0                                      |
| Nassa .....            | 3                         | 2                                     | 3                             | ...                                    | ...                                  | 3                                 | 2                                | 1                                                                     | 2                                     | 11                                     |
| Trophon .....          | 3                         | 0                                     | 1                             | ...                                    | ...                                  | 2                                 | 3                                | 3                                                                     | 3                                     | 1                                      |
| Mangelia .....         | 15                        | 0                                     | 9                             | ...                                    | ...                                  | 11                                | 13                               | 11                                                                    | 13                                    | 34                                     |
| Marginella .....       | 1                         | ?                                     | 1                             | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 0                                     | 5                                      |
| Volva .....            | 2                         | 0                                     | 0                             | ...                                    | ...                                  | 2                                 | (1)*                             | 1                                                                     | 0                                     | 4                                      |
| Cypræa .....           | 1                         | 1                                     | 1                             | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 1                                     | 7                                      |
| Tornatella .....       | 1                         | 1                                     | 1                             | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 2                                     | 3                                      |
| Bulla .....            | 11                        | 0                                     | 7                             | ...                                    | ...                                  | 3                                 | 8                                | 4                                                                     | 13                                    | 13                                     |
| Bullæa .....           | 6                         | 0                                     | 2                             | ...                                    | ...                                  | 1                                 | 4                                | 3                                                                     | 4                                     | 3                                      |
| Pleurobranchus .....   | 2                         | ?                                     | 2?                            | ...                                    | ...                                  | *                                 | *                                | 0                                                                     | 1                                     | 6                                      |
| Aplysia .....          | 1                         | 0                                     | 1                             | ...                                    | ...                                  | *                                 | 1                                | 0                                                                     | 1                                     | 6                                      |
| Conovulus .....        | 2                         | 2                                     | 0                             | ...                                    | ...                                  | *                                 | *                                | 1                                                                     | ?                                     | 3                                      |
| <b>ECHINODERMATA.</b>  |                           |                                       |                               |                                        |                                      |                                   |                                  |                                                                       |                                       |                                        |
| Comatula .....         | 2                         | 0                                     | 1                             | ...                                    | ...                                  | 1                                 | 2                                | 1?                                                                    | 2                                     | 1                                      |
| Ophiura .....          | 2                         | 0                                     | 2                             | ...                                    | ...                                  | 2                                 | 2                                | 0                                                                     | 1                                     | 3                                      |
| Ophiocoma .....        | 11                        | 2                                     | 5                             | ...                                    | 1                                    | 5                                 | 6                                | 0                                                                     | 10                                    | 11                                     |
| Euryale .....          | 1                         | 0                                     | 0                             | ...                                    | ...                                  | 0                                 | *                                | 0                                                                     | 3                                     | 1                                      |
| Uraster .....          | 4                         | 3                                     | 4                             | ...                                    | ...                                  | 2                                 | 3                                | 1                                                                     | 3                                     | 3                                      |
| Cribella .....         | 2                         | 1                                     | 1                             | ...                                    | ...                                  | 1                                 | 1                                | 0                                                                     | 2                                     | 1                                      |
| Solaster .....         | 2                         | 0                                     | 2                             | ...                                    | ...                                  | 1                                 | 2                                | 0                                                                     | 3                                     | ?                                      |
| Palmipes .....         | 1                         | 0                                     | 0                             | ...                                    | ...                                  | 1                                 | 1                                | 0                                                                     | 0                                     | 1                                      |
| Asterina .....         | 1                         | 1                                     | 0                             | ...                                    | ...                                  | *                                 | *                                | 0                                                                     | 0                                     | 3                                      |
| Goniaster .....        | 2                         | 0                                     | 0                             | ...                                    | 1                                    | 1                                 | 1                                | 0                                                                     | 4                                     | 1                                      |
| Asterias .....         | 1                         | 0                                     | 1                             | ...                                    | ...                                  | 1                                 | 1                                | 0                                                                     | 4                                     | 4                                      |
| Luidia .....           | 1                         | 0                                     | 1                             | ...                                    | ...                                  | 1                                 | 1                                | 0                                                                     | 1                                     | 1                                      |
| Echinus .....          | 7                         | 2                                     | 3                             | ...                                    | 1                                    | 2                                 | 4                                | 1                                                                     | 6                                     | 7                                      |
| Cidaris .....          | 1                         | 0                                     | 0                             | ...                                    | ...                                  | 0                                 | *                                | 0                                                                     | 1                                     | 1                                      |
| Echinocyamus .....     | 1                         | 0                                     | 1                             | ...                                    | ...                                  | 1                                 | 1                                | 1                                                                     | 1                                     | 1                                      |
| Brissus .....          | 1                         | 0                                     | 1                             | ...                                    | ...                                  | 0                                 | 1                                | 0                                                                     | 2                                     | 2                                      |
| Amphidetus .....       | 2                         | 1                                     | 2                             | ...                                    | ...                                  | 1                                 | 1                                | ?                                                                     | 2                                     | 2                                      |
| Spatangus .....        | 1                         | 0                                     | 1                             | ...                                    | ...                                  | 1                                 | 1                                | ?                                                                     | 1                                     | 1                                      |

*Causes which seem to determine or to have determined the peculiarities of the horizontal distribution of Species on the western coast of Great Britain.*

These seem to be mainly,—first, the influence and distribution of existing oceanic currents; and secondly, the geological changes which the region has undergone since the tertiary epoch, and during the last term of that epoch. The first is the climatal influence, acting by its regulation of the temperature of the sea; the second, a geological influence, the action of which, so far as the present epoch is concerned whilst under review, has passed away.

Along the southern coast of England, the upper portion of the Coralline zone (18–30 fathoms) has a wide extension from the shore towards the eastern extremity of the English channel, occupying its whole breadth and gradually narrowing along the coasts of Devon and Cornwall, where the deeper portion of the same region approaches the land more nearly than elsewhere on the western English coast\*. To the extension and connection of lands

\* The naturalist, besides consulting the usual hydrographical charts, cannot do better than study the interesting Map of the English Channel by Mr. Austen, published in the Geological Journal.

across the eastern channel, ancient but not anterior to the existing population of the British seas, we may ascribe some of the peculiarities of our southernmost marine fauna, especially the presence there of southern forms of mollusks, inhabitants of the Littoral or Laminarian zones, and undoubtedly colonists from a more southern assemblage, such as we now see in the Channel Islands. The inhabitants of greater depths taken off the Cornish coast at considerable distances from shore, we have seen to be species of a different climatal character, boreal instead of southern; and when the distribution of animals on the Nymph Bank and off the southernmost coast of Ireland shall have been more fully explored, we shall find—at least, so the facts already made known indicate—that there is a large tract of considerable depth in the southern part of St. George's Channel, of the great deep-sea fishing-grounds, characterized by this boreal fauna, bearing a close relationship with the extinct fauna of the northern drift of the south-eastern districts of Ireland and parts of the coast of Wales. A great part of the Irish sea is very shallow, rarely sufficiently deep to affect the character of its fauna; parts of its floor, as between the Isle of Man and Lancashire, barely emerging from the Coralline zone, and its deepest portions of any extent scarcely infringing on the region of deep-sea corals. Between the Isle of Man and the Mull of Galloway, it is true, there is the deep and narrow ravine, 150 fathoms in its deepest part, discovered by Captain Beechey and dredged by him. But the results of his valuable research, carefully investigated by a most able naturalist, Mr. W. Thompson of Belfast, have shown that we have no fauna in that limited gulf at all corresponding to its depth, and that its contents are normally inhabitants of shallower regions. For this reason, the absence of the assemblage of subarctic or boreal species met with in all the older British submarine areas of considerable depth, and the curious interruption in the distribution of the smaller terrestrial quadrupeds which occurs in this quarter, reaching, as many of them do, the extreme parts of the south of Scotland, yet not inhabiting the nearest portions of Ireland opposite or any part of that island, I am induced to hazard the conjecture, that the great ravine in question dates its origin from a period later than the close of the glacial epoch, yet before that of the general spread of the greater part of the Germanic fauna and flora over these islands—of that part which, from causes varying in different species of animals and plants, was the more tardy in its progress. In the regions of the Clyde and along the inner Hebrides we have a great variety of depths; but the phenomenon most striking is the great depth of many of the lochs, often of considerable dimensions, whilst the entrances to them are exceedingly shallow; and in some cases the seas without them for a considerable distance are very shallow also. The fauna of these isolated deeps is very different from that of the Gallovegian ravine, for in the former we find assembled and imprisoned creatures which are characteristic of very deep regions of the sea, and which are mainly of a marked Scandinavian character. Sometimes, as in the neighbourhood of the Croulin islands, between Skye and the Ross-shire coast, we find a deep area of the sea thronged with Scandinavian species, living on the remains of the ancient glacial sea-bed and mingled with the exuviae of their extinct ancestors, and of other creatures, now wholly extinguished within our seas, of an equally boreal or even arctic complexion. We have to sail a long way from the islands before we come to the edge of the permanently 100-fathom line, which, as we go northwards, must be sought for considerably to the west of St. Kilda and north of the desolate rocks of Sulisker and Rona. Around the Zetland Isles is the region in which the British explorer has the best opportunity of inquiring into the features of the fauna of the greater abysses of our seas, though of these depths we can scarcely claim more than the 100-fathom region as coming within the com-

pass of British natural history. The soundings for a degree and a half north of Unst do not reach 300 fathoms; and from the Naze of Norway to the coast of Scotland there is a line of soundings not reaching to 100 fathoms, quite sufficient, as may be seen from an examination of the tables here given, to keep up a considerable communication and interchange with the Scandinavian marine fauna.

That the diffusion of Lusitanian forms along our southern shores and for some distance up St. George's Channel is due to the action of southern currents and their climatal influence, must be evident to any person who will compare the range of those species with the course and extension of Rennell's current, which, striking towards our shores from the coast of Spain, impinges on our south-western English provinces and diffuses its influence over an area exactly corresponding with the extension of our marine creatures of southern types. The extension, more or less powerful in different years, of the Gulf-stream towards the Irish coast, and the combined influence of it and its branch-current already mentioned, affects an area extending from our south-western English province round the western coast of Ireland and impinging on the western shores of Scotland in its northern portion, sufficient to account for the curious curve of distribution taken by those animals which range in that line almost from Devon to Zetland, but are rare or absent in the central portions of the Irish sea. The setting-in of the arctic current from the centre will account for the transmission to our northern shores of numerous Scandinavian forms. But no action of currents, as at present maintained, can account for the isolated patches and imprisoned assemblages of glacial animals to which I have more than once alluded in this Report. To account for them we must trace the physical conformation of the British seas in an epoch anterior to the present, and by doing so, shall find that the causes similar to those now in action differently disposed, will give us a clear insight into the origin of these phænomena. I have elsewhere theorized fully on this subject\*, and have only to add, that all subsequent researches, a great mass of which is embodied in this Report, go in the strongest manner to confirm the views I had ventured to advance.

*Desiderata within this area.*—A great deal may yet be done for the exploration of the part of the British seas which has furnished the subject of this Report. Although little that is new, if anything, can be expected from the coasts of Hants, Sussex and Kent, yet it would be satisfactory to have a well-filled series of dredging papers relating to those counties. The central portion of the English channel and its entrance have yet to be systematically explored, and the depths of the Cornish coast and around the Scilly Isles should be sedulously examined. Off the entrance of the Bristol channel are isolated, or nearly so, patches of 60 fathoms and thereabouts which require to be carefully explored. The deeper portions of the Irish sea should be looked to more minutely. A more difficult task, and one which can be hardly hoped for fulfilment without the help of a steam-vessel and continued calm weather, is the dredging of the deeps off the Hebrides in the open ocean. Much of the deep sea area around the Zetlands is sure to reward the explorer. The lochs of Sutherlandshire have not as yet been systematically examined. And lastly, though I fear the consummation, however devoutly wished for, is not likely soon to be effected, a series of dredgings between the Zetland and the Faroe Isles, where the greatest depth is under 700 fathoms, would throw more light on the natural history of the North Atlantic and on marine zoology generally, than any investigation that has yet been undertaken.

\* Memoirs of Geological Survey, vol. i.









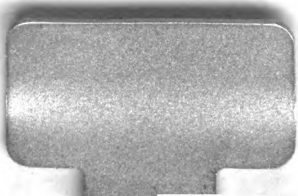


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