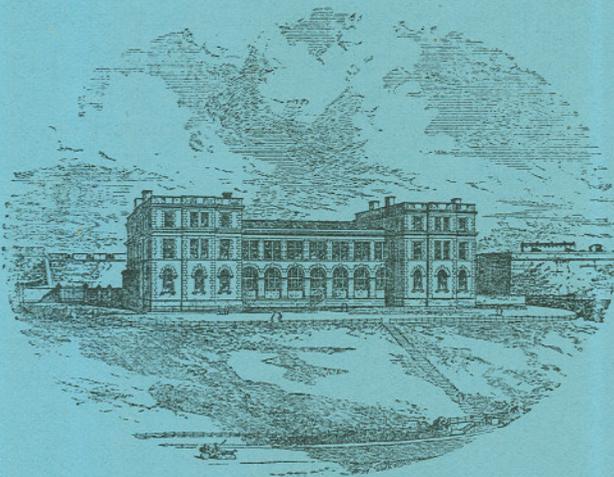


**Journal**  
OF THE  
**MARINE BIOLOGICAL ASSOCIATION**  
OF  
**THE UNITED KINGDOM.**



THE PLYMOUTH LABORATORY.

PLYMOUTH:

PRINTED FOR THE MARINE BIOLOGICAL ASSOCIATION BY W. BRENDON & SON, LTD.,  
AND

PUBLISHED BY THE ASSOCIATION AT ITS OFFICES ON THE CITADEL HILL.

SENT FREE BY POST TO ALL MEMBERS OF THE MARINE BIOLOGICAL ASSOCIATION:  
ANNUAL SUBSCRIPTION FOR MEMBERSHIP, ONE GUINEA.

Agents in London:—Messrs. DULAU & Co., 37, Soho Square, W.

**PATRON.**  
HIS MAJESTY THE KING.

**OFFICERS AND COUNCIL.**

*President.*

Prof. E. RAY LANKESTER, LL.D., F.R.S.

*Vice-Presidents.*

The Duke of ABERCORN, K.G., C.B.

The Duke of BEDFORD, K.G.

The Earl of ST. GERMANS.

The Earl of DUCIE, F.R.S.

Lord AVEBURY, F.R.S.

Lord TWEEDMOUTH, P.C.

Lord WALSINGHAM, F.R.S.

The Right Hon. A. J. BALFOUR, M.P.,  
F.R.S.

The Right Hon. JOSEPH CHAMBER-  
LAIN, M.P.

Sir EDWARD BIRKBECK, Bart.

Sir MICHAEL FOSTER, K.C.B., F.R.S.

A. C. L. GÜNTHER, Esq., F.R.S.

Sir JOHN MURRAY, F.R.S.

Prof. ALFRED NEWTON, F.R.S.

Rev. Canon NORMAN, D.C.L., F.R.S.

EDWIN WATERHOUSE, Esq.

**COUNCIL.**

**Elected Members.**

G. L. ALWARD, Esq.

Prof. T. W. BRIDGE, D.Sc., F.R.S.

F. DARWIN, Esq., F.R.S.

Sir CHARLES ELIOT, K.C.M.G.

G. HERBERT FOWLER, Esq., Ph.D.

J. STANLEY GARDINER, Esq., M.A.

S. F. HARMER, Esq., sc.D., F.R.S.

E. W. L. HOLT, Esq.

J. J. LISTER, Esq., F.R.S.

H. R. MILL, Esq., D.Sc.

Prof. E. A. MINCHIN, M.A.

Prof. D'ARCY W. THOMPSON, C.B.

R. N. WOLFENDEN, Esq., M.D.

**Governors.**

G. P. BIDDER, Esq., M.A.

Sir RICHARD B. MARTIN, Bart. (Prime  
Warden of the Fishmongers' Com-  
pany).

E. L. BECKWITH, Esq. (Fishmongers'  
Company).

G. C. BOURNE, Esq., D.Sc. (Oxford  
University).

A. E. SHIPLEY, Esq., F.R.S. (Cambridge  
University).

Prof. W. A. HERDMAN, D.Sc., F.R.S.  
(British Association).

*Chairman of Council.*

A. E. SHIPLEY, Esq., F.R.S.

*Hon. Treasurer.*

J. A. TRAVERS, Esq., Tortington, Arundel.

*Hon. Secretary.*

E. J. ALLEN, Esq., D.Sc., The Laboratory, Citadel Hill, Plymouth.

**PERMANENT STAFF.**

*Director*—E. J. ALLEN, Esq., D.Sc.

*Naturalist in charge of Fishery Investigations.*

W. GARSTANG, Esq., M.A., D.Sc.

*Assistant Naturalist*—L. R. CRAWSHAY, Esq., M.A.

*Assistant Naturalists for the International Investigations—*

W. WALLACE, Esq., D.Sc.

J. O. BORLEY, Esq., M.A.

R. A. TODD, Esq., D.Sc.

W. BYGRAVE, Esq., B.A.

A. E. HEFFORD, Esq., B.Sc.

*Hydrographer (International Investigations)*—D. J. MATTHEWS, Esq.

# Marine Biological Association of the United Kingdom.

---

## Report of the Council, 1905-6.

### The Council and Officers.

The Council have met on five occasions during the year, and the average attendance at the meetings has been ten. The meetings have been held in the Rooms of the Royal Society, and the Council have again to express their thanks to the Royal Society for their hospitality.

Committees of the Council, as in previous years, have visited the Laboratories at Plymouth and Lowestoft and inspected the work which is being carried on.

The Council have to record with regret the deaths of Sir J. Burdon Sanderson, Bart., F.R.S., the representative of the University of Oxford on the Council; of Rear-Admiral Sir W. J. L. Wharton, K.C.B., F.R.S., a Vice-President of the Association; and of Professor W. F. R. Weldon, F.R.S., a Member of Council since 1888.

### The Laboratories.

A somewhat simpler system of circulating the sea water through the tanks at the Plymouth Laboratory with a new pattern of pump has been in operation during the greater part of the year and has proved successful. It is hoped that some saving in the expenses for repairs will result. Experiments on the rearing of marine organisms under laboratory conditions have been continued with success.

For the North Sea work in connexion with the International Fishery Investigations, new and larger premises have been rented at Lowestoft, which allow of the researches being carried on with much greater convenience than in the old establishment.

### The Boats.

The Association's steamer *Oithona* continues to work successfully in the English Channel, and is in excellent condition both as regards efficiency and seaworthiness. The sailing boat *Anton Dohrn*, which carries on the collecting work during the winter, is also in good repair.

The steam trawler *Huxley*, which was chartered from Mr. G. P. Bidder in the first instance for a period of three years, has been retained for the further period of two years, during which the Association has been asked by His Majesty's Government to continue the International Investigations. Mr. Bidder has, with great generosity, undertaken to return to the Association each year, for the purposes of the investigations, the sum of £500 from the amount due to him for the hire of the vessel.

### The Staff.

Mr. L. R. Crawshay, M.A., has been appointed Assistant Naturalist for Invertebrates at the Plymouth Laboratory in succession to Mr. S. Pace, who has become Director of the Marine Biological Laboratory at Millport. Mr. A. E. Hefford has been appointed an additional assistant on the Lowestoft staff.

### Occupation of Tables.

The following Naturalists have occupied tables at the Laboratory during the year:—

- E. T. BROWNE, M.A., London (Medusæ).
- G. E. BULLEN, St. Albans (Hydrozoa and Plankton).
- A. D. COTTON, Kew (Algæ).
- W. DE MORGAN, London (Crustacea).
- Sir CHARLES ELIOT, K.C.M.G. (Nudibranchiata).
- R. ELMHIRST, Leeds (Nudibranchiata).
- Col. G. M. GILES, Plymouth (Anatomy of Insects).
- G. H. GROSVENOR, B.A., Oxford (General Zoology).
- F. W. HEADLEY, Haileybury (General Zoology).
- C. G. HEWITT, B.Sc., Manchester (Isopoda).
- T. V. HODGSON, Plymouth (Pycnogonida).
- J. J. LISTER, F.R.S., Cambridge (Foraminifera).
- KEITH LUCAS, M.A., Cambridge (Physiology of Tunicata).
- Prof. E. W. MACBRIDE, F.R.S., Montreal (Echinoderma).
- Miss M. ROBINSON, London (Crustacea).
- D. J. SCOURFIELD, Birmingham (Crustacea).
- C. SHEARER, D.Sc., Cambridge (Polychæta).
- J. STUART THOMSON, Cape Town (Crustacea).
- J. LLOYD WILLIAMS, Bangor (Algæ).

Twelve students attended a course of study in Marine Biology conducted at the Laboratory during the Easter vacation by Mr. G. H. Grosvenor.

### General Work at the Plymouth Laboratory.

A commencement has been made in extending the investigations on the distribution of the fauna, which have been previously carried on in the immediate neighbourhood of Plymouth, to the deeper waters of the English Channel, and it is hoped during the coming year still further to enlarge the area the fauna of which is being mapped out. Mr. L. R. Crawshaw is now associated with the Director in these researches.

Great attention has been paid to perfecting the methods of rearing marine organisms under laboratory conditions, and very promising progress has been made in this direction. A report upon the experiments which have been carried out will, it is expected, be published during the coming year.

With the assistance of special donations given for the purpose by Dr. G. H. Fowler and Mr. J. J. Lister, an investigation has been commenced into the food of the migratory fishes, especially the mackerel and pilchard, frequenting the mouth of the English Channel, with a view to ascertaining what relation exists between changes of the temperature and density of the sea water or of the floating organisms which it contains, and the fluctuations in the movements of these fishes from season to season and from year to year. Mr. G. E. Bullen has been engaged at somewhat irregular intervals in this work; but although promising progress has been made, the investigation is much hampered owing to the fact that the funds available do not permit of his being continuously employed upon it.

Regular collections are being made of young fishes found in the western part of the Channel, for which purpose a young-fish trawl on the Danish pattern has been constructed, and has been found very efficient.

Mr. T. V. Hodgson has occupied a table in the Laboratory throughout the year, for the purpose of working out material which he collected on the British Antarctic Expedition.

A collection of specimens illustrating the development and rate of growth of fishes, and containing a collection of marine invertebrates, has been sent to the Oceanographical Exhibition at Marseilles.

The supply of marine animals and plants for museums and for

teaching purposes has considerably increased during the last two or three years; and although the collection, identification, and preservation of the specimens absorb a great deal of time and attention, which is by no means adequately compensated for by the amount of money received from the sale of the specimens, the work in itself appears to be of sufficient importance to justify the Association in continuing it, more particularly as it makes regular and constant collecting necessary and is some assistance to the general finances.

### The Library.

The thanks of the Association are due for the following books and current numbers of periodicals presented to the Library during the past year:—

- Académie Imp. des Sciences de St. Pétersbourg. Bulletin.
- American Microscopical Society. Transactions.
- American Museum of Natural History. Bulletin.
- Memoirs.
- Report.
- American Philosophical Society. Proceedings.
- Australian Museum. Records.
- Bergens Museum. Aarbog.
- An Account of the Crustacea of Norway, etc.; by G. O. Sars.
- Bernice Pauahi Bishop Museum, Honolulu. Occasional Papers.
- Board of Agriculture and Fisheries. Annual Report of Proceedings under the Salmon and Freshwater Fisheries Acts.
- Annual Report of Proceedings under Acts relating to Sea Fisheries.
- Report of Meeting of Fisheries Representatives.
- Bristol Museum and Art Gallery. Reports of Committee.
- Bristol Naturalists Society. Proceedings.
- The British Museum. Catalogue of Madreporarian Corals in the British Museum. Vol. V.
- Brooklyn Institute of Arts and Sciences. Cold Spring Harbor Monographs.
- Science Bulletin.
- Bryn Mawr College. Monographs, Reprint Series.
- Bulletin Scientifique de la France et de le Belgique.
- The Carnegie Institution. Publications.
- La Cellule.
- Ceylon Marine Biological Laboratory. Report.
- College of Science, Tokyo. Journal.
- College voor de Zeevisscherijen. Verslag van den Staat der Nederlandsche Zeevisscherijen. 1904.
- Colombo Museum. Spolia Zeylanica.
- The Commissioners of Fisheries, N. S. Wales. Report.
- Conchological Society of Great Britain and Ireland. Journal of Conchology.
- Conseil perm. internat. pour l'Exploration de la Mer. Bulletin des Résultats acquis pendant les Courses Périodiques.
- Publications de Circonstance.
- Rapports et Procès-Verbaux des Réunions.

- Cuerpo de Ingenieros de Minas del Peru. Boletín.  
 Danish Biological Station. Report to the Board of Agriculture.  
 Kgl. Danske Videnskabernes Selskab. Oversigt.  
 — Skrifter.  
 Dept. of Agriculture, etc., Ireland. Reports.  
 Dept. of Marine and Fisheries, Canada. Annual Report.  
 Deutsche Zoologische Gesellschaft. Verhandlungen.  
 Deutscher Fischerei Verein. Zeitschrift für Fischerei.  
 Deutscher Seefischerei Verein. Mitteilungen.  
 La Feuille des Jeunes Naturalistes.  
 Field Columbian Museum. Publications.  
 Imp. Fisheries Bureau, Tokyo. Journal.  
 Fisheries Society of Japan. Journal.  
 The Fisherman's Nautical Almanack; by O. T. Olsen.  
 Fishery Board for Scotland. Annual Report.  
 The Fishing Gazette.  
 The Government Biologist, Cape of Good Hope. Report.  
 Government Museum, Madras. Report.  
 Illinois State Laboratory of Natural History. Bulletin.  
 Illustrations of the Zoology of the Royal Indian Marine Survey ship *Investigator*.  
 Internationale Meeresforschung. Die Beteiligung Deutschlands an der Internationalen Meeresforschung. Jahresbericht.  
 R. Irish Academy. Proceedings.  
 — Transactions.  
 Italy. Ministero di Agricoltura, Industria e Commercio. Annali di Agricoltura.  
 Johns Hopkins University Circulars.  
 Kaiserliche Marine. Deutsche Seewarte. Vierteljahrskarte für die Nordsee und Ostsee.  
 Kommission zur wissenschaftlichen Untersuchung der Deutschen Meere, etc. Wissenschaftliche Meeresuntersuchungen.  
 Kommissionen for Havundersøgelser, Copenhagen. Meddelelser, series Fiskeri, Hydrografi, Plankton.  
 — Skrifter.  
 Laboratoire Biologique de St. Petersburg. Bulletin.  
 Lancashire Sea Fisheries Laboratory. Report.  
 Lancashire and Western Sea Fisheries. Superintendent's Report.  
 Leicester Corporation Museum and Art Gallery. Report.  
 Liverpool Biological Society. Proceedings and Transactions.  
 Liverpool Marine Biology Committee. Annual Report.  
 Manchester Microscopical Society. Annual Report and Transactions.  
 Marine Biological Association of the West of Scotland. Annual Report.  
 Marine Biological Laboratory, Woods Holl. Biological Bulletin.  
 Mededeelingen over Visscherij.  
 Meteorological Office. Monthly Pilot Charts, North Atlantic and Mediterranean.  
 — The Beaufort Scale of Wind Force.  
 R. Microscopical Society. Journal.  
 Le Mois Scientifique.  
 Montpellier: l'Université. Travaux de l'Institut de Zoologie de l'Université de Montpellier et de la Station Zoologique de Cette.  
 Musée du Congo. Annales.  
 Musée d'Histoire Naturelle, Paris. Bulletin.  
 Musée Oceanographique de Monaco. Bulletin.  
 Museo Nacional, Buenos Aires. Anales.

- Museo Nacional de Montevideo. Anales.  
 Museum of Comparative Zoology, Harvard College. Bulletin.  
 ———— Memoirs.  
 ———— Report.  
 The Museums Journal.  
 Naturforschende Gesellschaft in Basel. Verhandlungen.  
 Naturhistorischen Museum, Hamburg. Mittheilungen.  
 Neapel. Mittheilungen aus der Zoologischen Station.  
 Nederlandsche Dierkundige Vereeniging. Tijdschrift.  
 New York Academy of Sciences. Annals.  
 ———— Memoirs.  
 New York Zoological Society. Bulletin.  
 ———— Report.  
 New Zealand Institute. Transactions.  
 Nikolsk. Aus der Fischzuchtanstalt.  
 Norges Fiskeristyreelse. Aarsberetning vedkommende Norges Fiskerier.  
 Kgl. Norske Videnskabers Selskabs. Skrifter.  
 North Sea Fisheries Investigation Committee. Report of Fishery Board for  
 Scotland.  
 ———— Report of Marine Biological Association.  
 North Sea Fishery Investigations. Report of British Delegates.  
 La Nuova Notarisia.  
 Oberlin College. The Wilson Bulletin.  
 Physiographiske Forening. Christiania. Nyt Magazin for Naturvidenskaberne.  
 Plymouth Institution. Annual Report and Transactions.  
 Plymouth Museum and Art Gallery. Annual Report.  
 Quarterly Journal of Microscopical Science. (Presented by Prof. E. Ray  
 Lankester, F.R.S.)  
 Queensland Museum. Annals.  
 Rijksinstituut voor het Onderzoek der Zee. Helder. Jaarboek.  
 The Royal Commission. St. Louis International Exhibition, 1904. British  
 Section.  
 Royal Society of Edinburgh. Proceedings.  
 ———— Transactions.  
 Royal Society of London. Philosophical Transactions.  
 ———— Proceedings.  
 ———— Reports of Commission for Investigation of Mediterranean Fever.  
 ———— Report of the Sleeping Sickness Committee.  
 ———— Report to the Government of Ceylon on the Pearl Oyster Fisheries of the  
 Gulf of Manaar.  
 ———— Year-Book.  
 Royal Society of Victoria. Proceedings.  
 Selskabet for de Norske Fiskeriers Fremme. Norsk Fiskeritidende.  
 Smithsonian Institution. Annual Report.  
 ———— Bulletin of the United States National Museum.  
 ———— Proceedings of the United States Museum.  
 Sociedad Geográfica de Lima. Boletín.  
 Sociedad Científica de São Paulo. Revista.  
 Società di Naturalisti in Napoli. Bollettino.  
 Societas pro Fauna et Flora Fennica. Acta.  
 ———— Meddelanden.  
 Société Belge de Géologie, etc. Bulletin.  
 Société Centrale d'Aquiculture et de Pêche. Bulletin.

- Société d'Océanographie du Golfe de Gascogne. Rapports.  
 Société Suisse de Pêche et Pisciculture. Bulletin.  
 Société Imp. Russe de Pisciculture et de Pêche. Vvestnik R'ibopom'shlenosti.  
 Société Zoologique de France. Bulletin.  
 — Mémoires.  
 South African Museum. Annals.  
 Station Aquicole de Boulogne-sur-Mer. Annales.  
 Station de Pisciculture, etc., Toulouse. Bulletin.  
 Svenska Hydrografisk Biologiska Kommissioners. Skrifter.  
 Kgl. Svenska Vetenskaps-Akademien.  
 — Arkiv för Botanik.  
 — Arkiv för Zoologie.  
 Tuft's College. Studies.  
 United States Commission of Fish and Fisheries. Bulletin.  
 — Report of the Commissioner.  
 United States National Herbarium. Contributions.  
 University of California. Publications. Zoology, Physiology, Botany.  
 University of Pennsylvania. Provost's Report.  
 — Contributions from the Zoological Laboratory.  
 University of Toronto. Studies.  
 Kgl. Vetenskaps Societeten, Upsala. Nova Acta.  
 Welsh Museum of Natural History, Arts, and Antiquities. Report.  
 Wissenschaftliche Ergebnisse einer Zoologischen Expedition nach den Baikal  
 See.  
 Zoological Society of Japan. Annotationes Zoologicæ Japonenses.  
 Zoological Society of London. List of the Fellows.  
 — Proceedings.  
 — Transactions.

- 
- The Secretary, Danish Legation. Fiskeri-Beretning, 1904-1905.  
 The Director, the Royal Gardens, Kew. Nouvelles Archives du Muséum  
 d'Histoire Naturelle, Paris.  
 — Proceedings of the Washington Academy of Sciences.  
 The Foreign Office. Développement de la Sole ; Fabre-Domergue and Biérix.  
 Marshall Library, Owens College, Manchester. The Digestive Organs of the  
 Alcyonaria and their relation to the Mesogloal cell plexus ; by Edith M.  
 Pratt.  
 — Micro-organisms associated with Disease ; by S. J. Hickson.  
 — Note on the Buccal Pits of Peripatus ; by C. G. Hewitt.  
 — On the Isolation of the Infecting Organism ("Zoochlorella") of *Convoluta*  
*roscoffensis* ; by F. Keeble and F. W. Gamble.  
 Marine Biological Association of the West of Scotland. The Naturalist of  
 Cumbrae ; by T. R. Stebbing.  
 — The Journal of Conchology. Vol. VIII, No. 4.  
 — Bathy-Orographical Map of the Clyde Basin, prepared for the British  
 Association Meeting, 1901.  
 Mrs. Robertson and the Marine Biological Association of the West of Scotland.  
 On *Pisidium fontinale* and *Planorbis complanatus*, two fresh-water shells  
 new to Scotland, and *Helix villosa*, a land shell new to Britain ; by David  
 Robertson.  
 — The Fauna of Scotland, with special reference to Clydesdale and the

- Western district. Fresh- and brackish-water Ostracoda ; by David Robertson.
- Mrs. Robertson and the Marine Biological Association of the West of Scotland. Amphipoda and Isopoda of the Firth of Clyde and West of Scotland ; by David Robertson.
- Notes on the Common Limpet ; by David Robertson.
- On *Saxicava rugosa*, a bivalve mollusc showing an unusual mode of repair ; by David Robertson.
- Jottings from my note-book on *Pennatula phosphorea*, Lin., *Virgularia mirabilis*, Lam., and *Pavonaria quadrangularis* ; by David Robertson.
- Notice of thirteen Cumacea from the Firth of Clyde ; by David Robertson.
- Jottings from my note-book on *Lima hians*, Gmel. ; by David Robertson.
- A list of the Algæ of Lamlash Bay, Arran, collected during September, 1894 ; by David Robertson.
- Proceedings and Transactions of the Natural History Society of Glasgow. Vols. I-V, New Series.

To the authors of the Memoirs mentioned below the thanks of the Association are due for separate copies of their works presented to the Library :—

- Allen, A. W. Some Notes on the Life History of *Margaritifera panasesae*.
- Breitfuss, L. Skizze des Seegewerbes an der Murmanküste.
- Browne, E. T. A Report on the Medusæ found in the Firth of Clyde (1901-1902).
- Notes on the Pelagic Fauna of the Firth of Clyde (1901-1902).
- On the Freshwater Medusa *Limnocoñida tanzanicae* and its occurrence in the River Niger.
- Report on the Medusæ (Hydromedusæ, Scyphomedusæ, and Ctenophora) collected by Prof. Herdman at Ceylon in 1902.
- and Vallentin, R. On the Marine Fauna of the Isles of Scilly.
- Bruce, W. S. Some Results of the Scottish National Antarctic Expedition.
- Collet, L. W. Les Concrétions phosphatées de l'Agulhas Bank. Avec Une Note sur la Glaucous qu'elles contiennent. Par Gabriel W. Lee.
- Crossland, C. The Oecology and Deposits of the Cape Verde Marine Fauna.
- Danton, L. Notes Ichtyologiques.
- Darbishire, A. D. Professor Lang's Breeding Experiments with *Helix hortensis* and *H. nemoralis*.
- Driesch, Hans. Altes und Neues zur Entwicklungsphysiologie des jungen Asteridenkeimes.
- Skizzen zur Restitutionslehre.
- Über das Mesenchym von unharmonisch zusammengesetzten Keimen der Echiniden.
- Zur Cytologie parthenogenetischer Larven von *Strongylocentrotus*.
- Duncker, G. Über Regeneration des Schwanzendes bei Syngnathiden.
- Edwards, C. L. The Floating Laboratory of Marine Biology of Trinity College.
- Eliot, C. Nudibranchs from the Indo-Pacific : I, Notes on a Collection dredged near Karachi and Maskat.
- Nudibranchs and Tectibranchs from the Indo-Pacific ; II., Notes on *Lophocercus*, *Lobiger*, *Haminae* and *Newnesia*.
- and Cockerell, T. D. A. Notes on a Collection of Californian Nudibranchs.
- Notes on Two Rare British Nudibranchs, *Hero formosa*, var. *arborescens*, and *Staurodoris maculata*.

- Eliot, C. On some Nudibranchs from the Pacific, including a new genus, *Chromodoridella*.  
 — On some Nudibranchs from East Africa and Zanzibar. Part VI.  
 — On the *Doris planata* of Alder and Hancock.  
 — The Nudibranchiata of the Scottish National Antarctic Expedition.
- Farran, G. P. Report on the Opisthobranchiate Mollusca collected by Professor Herdman, at Ceylon, in 1902.
- Fowler, G. H. Biscayan Plankton collected during a cruise of H.M.S. *Research*, 1900.
- Giard, Alfred. La Poecilogonie.  
 — Les tendances actuelles de la Morphologie et ses rapports avec les autres Sciences.  
 — Sur la prétendue nocivité des Huitres.
- Hadley, P. B. Preliminary Report on the Changes in Form and Color in the successive stages of the American Lobster.
- Harmer, S. F. The Pterobranchia of the Siboga Expedition, with an account of other species.
- Herdman, W. A. Presidential Address to Linnæan Society. 1905.
- Hodgson, T. V. Decalopoda and Colossendeis.
- Holt, E. W. L., and Tattersall, W. M. Biscayan Plankton collected during a cruise of H.M.S. *Research*, 1900. Part V. Schizopoda.
- Report on the Schizopoda collected by Mr. George Murray, F.R.S., during the cruise of the *Oceana* in 1898.
- Hovey, E. O. The Grande Soufrière of Guadeloupe.
- Janet, C. Anatomie de la tête du *Lasius niger*. 1905.  
 — Description du Matériel d'une petite Installation Scientifique. Part I.  
 — Observations sur les Fourmies. 1904.
- Keeble, F., and Gamble, F. W. The Colour-Physiology of Higher Crustacea. Part III.
- Kiær, Hans. Om Tromsøsundets fiske. En oversigt over deres udbredelse og biologi.
- Kofoid, C. A. A Self-Closing Water Bucket for Plankton Investigations.  
 — Craspedotella, A New Genus of the Cystoflagellata, an Example of Convergence.  
 — Dinoflagellata of the San Diego Region. I. On Heterodinium, a New Genus of the Peridinidae.  
 — Some New Tintinnidae from the Plankton of the San Diego Region.
- Korotneff, A. Zoologische Expedition nach den Baikal-See.
- Moore, J. P. A new species of Sea Mouse (*Aphrodita hastata*) from Eastern Massachusetts.  
 — New species of Polychaeta from the North Pacific, chiefly from Alaskan waters. Five new species of Pseudopotamilla from the Pacific Coast of North America.
- Nathansohn, A. Vertikale Wasserbewegung und quantitative Verteilung des Planktons im Meere.
- Nobre, A. Mollusques et Brachiopods du Portugal.
- Norman, A. M. A new Heterotanais and a new Eurydice, genera of Isopoda.  
 — Greenlandic Polyzoa.  
 — Irish Crustacea. Ostracoda.  
 — Museum Normanianum, III. Crustacea.  
 — Notes on the Natural History of East Finmark.  
 — On *Cucumaria Montagu* (Fleming) and its Synonymy.

- Norman, A. M. Revised Nomenclature of the species described in Bate and Westwood's "British Sessile-eyed Crustacea."
- Olsen, O. T. A proposal to easily identify the Nationality of Fishing Vessels.
- Paulmier, F. C. Higher Crustacea of New York City.
- Mrs. Robertson. Protozoa (Foraminifera).
- Schepotieff, A. Zur Organisation von Cephalodiscus.
- Scott, T. A Report on the Free-swimming Crustacea found in the Firth of Clyde, 1901 to 1902.
- Shiple, A. E., and Hornell, J. Further Report on Parasites found in connection with the Pearl Oyster Fishery at Ceylon.
- Shiple, A. E. Notes on a Collection of Parasites belonging to the Museum of University College, Dundee.
- On Ento-Parasites from the Zoological Gardens, London, and elsewhere.
- The Effects of Metazoan Parasites on their Hosts.
- Trybom, Filip. Åtgärder för Fiskerinaringen i Sverige år 1904.
- Wolfenden, R. N. Plankton Studies. Preliminary Notes upon new or interesting species. Part I. Copepoda.

### The International Fisheries Investigations.

The following is a summary of the work done and of the conclusions arrived at by the scientific staff working under the direction of the Council.

#### SECTION I.—NORTH SEA WORK.

##### A. WORK OF THE S.S. "HUXLEY."

**TRAWLING INVESTIGATIONS.**—With the exception of a period of two months during the past winter, when the boat was laid up at Grimsby, the survey of the North Sea trawling grounds within the English area has made continuous progress. From June, 1905, to the end of May, 1906, the *Huxley* made nineteen fishing voyages, during which 240 hauls of the large commercial trawls were taken, and the quantities, sizes, and weights of the fishes caught systematically recorded.

From the commencement of the investigations seventy-five voyages have been completed, and the results of 893 hauls with the large trawls analysed and recorded.

Towards the close of 1905 the work accomplished during the previous three years was carefully reviewed, and a programme drawn up for the conduct of the investigations during the current year with the object of checking results obtained at corresponding seasons on the more important grounds in previous years, and of filling up gaps in the more complete series of data. The revised programme has been closely adhered to during the past half-year.

It is believed that the data are already sufficiently numerous and consistent to throw much light on the normal characteristics of the fish

populations on the more important grounds, as well as upon the more important seasonal changes in such characteristics; and a series of summary reports is in course of preparation for submission to H.M. Government during the current year as each is completed.

FISH MEASURED.—As a rough indication of the material obtained upon these voyages, it may be stated that more than 88,000 measurements of fish, representative of the total catch on almost every occasion, were made and recorded at sea during the past year, in addition to other work.

Nearly 300,000 fishes have been measured in this way since the commencement of the investigations, as shown in detail in the following table:—

	PLAICE.	HADDOCK.	OTHERS.	TOTALS.
1902-5. Voyages I-LVI . . .	65,509	15,950	128,775 ...	210,234
1905-6. „ LVII-LXXV	24,954	10,755	52,885 ...	88,594
TOTALS	90,463	26,705	181,660 ...	298,828

MARKING EXPERIMENTS.—During the past year 2042 marked plaice have been set free.

To the end of June, 1905, 5115 marked plaice had been liberated, of which 1224 have since been recaptured, yielding a percentage of 23·9 per cent.

More than 7000 marked plaice have thus been set free up to date.

The data yielded by these experiments are now sufficiently numerous to yield valuable indications of the main differences in the annual rate of growth of plaice in various parts of the English area. In certain areas they also show the progressive rate of growth from month to month. In addition to these results the experiments have thrown a continually increasing light on the seasonal migrations of the fish, the intensity of fishing in different areas, and upon differences in the rate of growth and habits of the two sexes; they add thus to our knowledge of the life history of this species in matters of considerable importance.

Transplantation experiments have been carried out during the spring months of 1905 and 1906 in order to check the results already reported as having been obtained during 1904.

The results of these experiments indicate that the rate of growth on the Dogger Bank is always markedly higher than on the coastal grounds south of 54° N. lat., though subject to variation in actual amount from year to year. Experiments have been carried out during the present year in order to determine whether this area of rapid

growth is continuous between the Dogger Bank and the coastal grounds north of Flamborough Head.

Other experiments have also been devised, and are being carried out to test whether the still smaller year-old fish of a length of two to four inches can be profitably transplanted to these depleted waters.

SPECIAL EXPERIMENTS.—The special investigations enumerated in the last annual report have been continued. Further reference to the more extensive of these experiments is made in the next section.

#### B. LABORATORY INVESTIGATIONS.

AGE OF FISHES.—The material which has been accumulated for studying the age of plaice at different sizes on the various fishing grounds consists of more than 12,000 otoliths, of which nearly 8000 have been collected from measured fish caught on board the *Huxley* during the past year.

Much time has been spent upon the study of this material, and a report upon the data acquired up to the end of 1905 is now in preparation. The results attained by this method have been of great value in throwing light upon the distribution of the various age-groups of plaice, the rate of growth in different regions, the age of the two sexes at first maturity, and similar problems.

In consequence of the relation which has been found to exist between depth and distance from shore on the one hand and the size of plaice at a given age on the other, and in view of the irregular character of the ground off the English coast, a continuous series of hauls of the trawl was carried out in May, 1905, on a line from the Leman Ground to the Dutch coast (which represents apparently the main axis of the off-shore migrations of plaice in the southern part of the North Sea), and the otoliths of all the plaice caught were extracted.

This experiment was repeated in September last, and again in May of the current year, the collections yielding from 2000 to 3000 otoliths on each occasion.

The results of these experiments have furnished a standard by which to estimate the value of results obtained from samples in isolated localities.

FOOD OF FISHES.—The material collected bearing upon this point amounts now to about 10,000 stomachs of fish, the contents of which have been systematically recorded. During the past year the food of

useful species has been more extensively studied with respect to the size of the fish—the specimens being preserved and examined according to size-groups differing by 5 cm. or 10 cm. In this way progressive changes have been shown in the feeding-habits of various species as growth advances.

Certain seasonal changes have also been shown. The plaice during the winter months have been found to abstain from feeding to a very large extent. Thus the percentage of stomachs of this species found empty has been found to vary from 99 per cent in November to 57 per cent in February, although during the rest of the year the average is less than 5 per cent.

**BOTTOM FAUNA.**—The invertebrates trawled or dredged on the various expeditions prior to 1906 have been identified and recorded with the exception of a few sponges and ascidians. The total number of hauls examined amounts to 1129, of which 769 were hauls of the large trawls and 360 special collections with small dredges and trawls.

A beginning has been made in summarizing these data by means of distribution-charts for the various species, the main object in view being the delimitation, as far as possible, of definitely characterized natural areas. The North Sea lends itself well to this work, as the variety of species is relatively small, and a considerable portion of these show fairly definite limits of distribution and centres of abundance.

**BOTTOM DEPOSITS.**—Out of 260 samples collected, nearly all (217) have now been graded, with the object of showing the relative proportion of fine and coarse particles in the deposits of different areas. For this purpose the samples are shaken through sieves of successively finer meshes, from 15 mm. to 0.5 mm. in diameter. A striking result of this sifting is the predominance of fine sand and its uniformity of character over large areas of the North Sea.

**HERRING INVESTIGATIONS.**—In consequence of resolutions passed by the International Council in 1905, increased attention has been paid to the herring, and samples of this fish have been examined at Lowestoft during the past year at intervals of about a month or six weeks in accordance with a prescribed scheme. Each sample consists of 100 fish, the locality of capture of which is known; and the characters of each fish are separately recorded as regards (1) length, (2) number of vertebrae, (3) degree of maturity, and (4) amount of fat. The samples

examined up to the present time have shown a high degree of uniformity as regards the number of vertebræ, which is held to be the best single index of racial peculiarities.

### C. FISHERMEN'S RECORDS.

These have been continued on the same lines as hitherto. The number of returns provided by the fishermen during the past year amounts to a total exceeding 5000, as under:—

Smacks	...	1403	hauls.
Steamers	...	4006	„
Total		<u>5409</u>	„

### SECTION II.—HYDROGRAPHIC AND PLANKTON WORK IN THE ENGLISH CHANNEL.

During the past twelve months the quarterly cruises have been carried out as usual, and a short extra cruise covering the south-western stations was made in September, 1905. Samples have also been obtained from lightships, from steamers crossing the English Channel, and from Atlantic liners.

The most strongly marked feature of the period has been: (1) a great increase in the strength of the Gulf Stream off the south of Newfoundland in the summer of 1905, shown not only by the analyses of the samples from this region, but also by actual observations by officers of liners; and (2) a rise in the salinity of the Bristol Channel and the western part of the English Channel, which was almost certainly connected with, if not due to, the increased velocity of the Gulf Stream.

During the period under consideration the conditions have varied considerably, but at no time has there been observed any important division into layers of different density.

During the May cruise the larger part of the water in the western half of the Channel was as high as 35·4 ‰ S., reaching 35·5 ‰ S. a short distance west of Ushant, and 35·6 ‰ S. in the Bay of Biscay just beyond the limits of the cruises. The 35·5 ‰ isohaline, as shown by samples analysed at Plymouth and at Copenhagen, ran in an irregular course round the west coast of Ireland nearly to the latitude of the Orkney Islands.

During the summer the distribution of salinity altered in such a way that the saltiest water found during the May cruise was close to the coasts of Devon and Cornwall instead of in mid-channel, an abnormal condition which continued, with slight modification, until the end of the year. The broad tongue of 35.5 ‰ S. off the west coasts of Ireland and Scotland was almost unchanged, though its northern extremity had retreated slightly. At the same time the salinity south of Ireland had risen to 36.0 ‰ S. as far north as latitude 50° N. It would appear, however, that the water of 35.4 ‰ S. now in the English Channel had entered from the west rather than from the Bay of Biscay; this conclusion is somewhat doubtful, as the samples taken in the Bristol Channel by various vessels do not agree very well among themselves, though it is confirmed to a certain extent by the presence in the plankton, as described below, of a large number of Pteropods of a species which is common off the west of Ireland, though known in the Bay of Biscay.

The extra hydrographic cruise in September, 1905, over the southwestern stations (Nos. 1, 2, 3, 4, and 5), did not show any important change, the highest salinity, 35.39 ‰, being found at Station 4 (55 miles west of Ushant). The high salinity water under the Cornish coast appears in the meantime to have been moving slowly eastward, keeping to the north side of the Channel and at the same time becoming slightly fresher. During the last half of September it was on the line joining the Needles to Cape La Hague, and three weeks later it was observed a short distance east of the Isle of Wight. In November, 1905, the salinity of the Channel as a whole was high, reaching 35.3 ‰ in the narrows between the Isle of Wight and Cape Barfleur and as far east as Beachy Head. Advantage was taken of the fine weather to extend the cruise further west than usual, and an extra station was worked at 47° 46' N., 7° 50' W., in 170 fathoms. The salinity was 35.57 ‰ at this station and 35.52 ‰ at Station 4.

During December and January the salinity of the Channel continued to rise, and at the beginning of February, 1906, water of 35.4 ‰ S. was found between Southampton and Havre, a decidedly high figure for the position.

The February cruise was carried out during the latter half of the month, and showed that water of 35.3 ‰ S. filled nearly the whole length of the Channel, with the exception of a narrow band of

35.2 ‰ S. running across Channel south of the Start. The saltiest water, 35.4 ‰ S., was found at Station 4 (see above) and extended north-east nearly to Station 2 (47 miles S.W. of the Eddystone). As usual, a southerly current of comparatively fresh water from the Irish Sea was found reaching nearly to the mid-channel line south of the Scilly Islands. During March the salinity of the western half of the Channel fell, and that of the eastern part rose, reaching 35.4 on the Newhaven-Caen line in April.

As in the previous year samples of plankton have been regularly collected on the quarterly cruises, and as far as practicable in the intervals between the cruises. The records of the species found on each cruise are published in the Bulletin of the International Council.

A paper by Dr. Gough on the distribution and migrations of the Siphonophore, *Muggiæa atlantica*, in 1904, has also been published by the International Council. From this paper it appears that a shoal of *Muggiæa* entered the English Channel in April from the south-west, the species being first observed off Ushant. It then spread eastward into the Channel as far as Portland, where it was found in August, and also northwards, being taken off the Land's End in the beginning of June. It was found in the Irish Sea in August, and subsequently along the south coast of Ireland as far west as Fastnet, and on the west coast as far north as Galway Bay.

The plankton during the summer and autumn of 1905 was characterized by the appearance in the English Channel of a vast swarm of Pteropods, *Limacina retroversa*, Fleming. These Pteropods were first observed on the south coast of Ireland and entered the Channel from the north-west. They thus appeared to spread in a direction opposite to that taken by *Muggiæa* in the preceding year. *Limacina retroversa* is a species which is seldom met with in the Channel, being more commonly found in more northern waters. Its appearance in the Channel is therefore of interest, as it suggests a flow of water from a more northerly direction than usual, a suggestion which is supported by the results of the hydrographic work. In company with the *Limacina*, other northerly species were observed, for example *Clione limacina* and *Rhizosolenia hebetata*.

### Published Memoirs.

The following papers, either wholly or in part the outcome of work done at the Laboratory, have been published elsewhere than in the Journal of the Association:—

CHUBB, G. C.—*The Growth of the Oocyte in ANTEDON: a Morphological Study in Cell-Metabolism.* Proceed. Roy. Soc., B. 519, 1906, pp. 384-7.

GOUGH, L. H.—*On the Distribution and the Migrations of MUGGIAEA ATLANTICA, Cunningham, in the English Channel, the Irish Sea, and off the South and West Coasts of Ireland in 1904.* Conseil Perm. Internat. pour l'Explor. d. l. Mer. Publications de Circonstance, No. 29, 1905, pp. 1-13.

HILL, M. D.—*Notes on the Maturation of the Ovum of ALCYONIUM DIGITATUM.* Quart. Journ. Micr. Sci., vol. 49, 1905, pp. 493-519.

MACBRIDE, E. W.—*Report on the Work done during the Occupation of the British Association Table at Plymouth, June, 1905. (Development of OPHIOTHRIX FRAGILIS.)* Report Brit. Assn. South Africa, 1905, pp. 183-5.

NORMAN, A. M. *On CUCUMARIA MONTAGUI, Fleming.* Ann. Mag. Nat. Hist., Ser. 7, Vol. XVI., 1905, pp. 352-9.

NORMAN, A. M., and SCOTT, T. *The Crustacea of Devon and Cornwall.* London, 1906, pp. 1-232.

SCHMIDT, JOHS. *The Pelagic Post-larval Stages of the Atlantic Species of Gadus.* Meddel. Komm. Havunders. Fiskeri., Bd. I, Nr. 4.

WILLIAMS, J. LL. *Studies in the Dictyotaceae. iii., The Periodicity of the Sexual Cells in DICTYOTA DICHOTOMA.* Annals of Botany, vol. xix., 1905, pp. 531-60.

WOODCOCK, H. M. *The Life-Cycle of "CYSTOBIA" IRREGULARIS (Minch.), together with Observations on other "Neogamous" Gregarines.* Quart. Journ. Micr. Sci., vol. 50, 1906, pp. 1-100.

WOODLAND, W. *Studies in Spicule Formation. Parts I-IV.* Quart. Journ. Micr. Sci., vol. 49, 1905, pp. 231-325 and pp. 533-59.

### Donations and Receipts.

The receipts for the year for the ordinary work of the Association include the grants from His Majesty's Treasury (£1000) and the Worshipful Company of Fishmongers (£400), Special Donations (£525), Annual Subscriptions (£102), Rent of Tables in the Laboratory (£42), Sale of Specimens (£393), Admission to the Tank Room (£126).

**Vice-Presidents, Officers, and Council.**

The following is the list of gentlemen proposed by the Council for election for the year 1906-7:—

*President.*

Prof. E. RAY LANKESTER, LL.D., F.R.S.

*Vice-Presidents.*

The Duke of ABERCORN, K.G., C.B.  
The Duke of BEDFORD, K.G.  
The Earl of ST. GERMANS.  
The Earl of DUCIE, F.R.S.  
Lord AVEBURY, F.R.S.  
Lord TWEEDMOUTH, P.C.  
Lord WALSINGHAM, F.R.S.  
The Right Hon. A. J. BALFOUR, M.P.,  
F.R.S.

The Right Hon. JOSEPH CHAMBERLAIN, M.P.  
Sir EDWARD BIRKBECK, Bart.  
Sir MICHAEL FOSTER, K.C.B., F.R.S.  
A. C. L. GÜNTHER, Esq., F.R.S.  
Sir JOHN MURRAY, F.R.S.  
Prof. ALFRED NEWTON, F.R.S.  
Rev. Canon NORMAN, D.C.L., F.R.S.  
EDWIN WATERHOUSE, Esq.

**Members of Council.**

G. L. ALWARD, Esq.  
Prof. T. W. BRIDGE, D.Sc., F.R.S.  
F. DARWIN, Esq., F.R.S.  
Sir CHARLES ELIOT, K.C.M.G.  
G. HERBERT FOWLER, Esq., Ph.D.  
J. STANLEY GARDINER, Esq., M.A.  
S. F. HARMER, Esq., Sc.D., F.R.S.

E. W. L. HOLT, Esq.  
J. J. LISTER, Esq., F.R.S.  
H. R. MILL, Esq., D.Sc.  
Prof. E. A. MINCHIN, M.A.  
Prof. D'ARCY W. THOMPSON, C.B.  
R. N. WOLFENDEN, Esq., M.D.

*Chairman of Council.*

A. E. SHIPLEY, Esq., F.R.S.

*Hon. Treasurer.*

J. A. TRAVERS, Esq.

*Hon. Secretary.*

E. J. ALLEN, Esq., D.Sc., The Laboratory, Citadel Hill, Plymouth.

The following Governors are also members of the Council:—

G. P. BIDDER, Esq., M.A.  
Sir RICHARD B. MARTIN, Bart. (Prime  
Warden of the Fishmongers'  
Company).  
E. L. BECKWITH, Esq. (Fishmongers'  
Company).

G. C. BOURNE, Esq., D.Sc. (Oxford  
University).  
A. E. SHIPLEY, Esq., F.R.S. (Cambridge  
University).  
Prof. W. A. HERDMAN, D.Sc., F.R.S.  
(British Association).



Dr.

*Statement of Receipts and Payments*

	£	s.	d.	£	s.	d.
To Current Income :—						
H. M. Treasury .....	1,000	0	0			
Fishmongers' Company.....	400	0	0			
Annual Subscriptions.....	101	16	0			
Rent of Tables .....	42	2	0	1,543	18	0
„ Extraordinary Receipts :—						
G. P. Bidder, Special Donation .....	500	0	0			
Dr. G. H. Fowler do. ....	25	0	0	525	0	0
„ Balance :—						
General Account.....	304	18	0			
Less Repairs and Renewals Account .....	133	12	2			
Overdraft at Bank .....	171	5	10			
Less Cash in hand .....	20	4	0	151	1	10

[NOTE.—This liability is exclusive of the amount of £100 referred to in the last statement.]

---



---

£2,219 19 10

*Examined and found correct,*

(Signed) N. E. WATERHOUSE, A.C.A.  
L. W. BYRNE.

E. A. MINCHIN.  
GEO. P. BIDDER.

26th June, 1906.

for the Year ending 31st May, 1906.

Cr.

	£	s.	d.	£	s.	d.
By Balance from last year, being amount due to Bankers ...	146	9	1			
Less Cash in hand .....	20	19	4	125	9	9
„ Current Expenditure :—						
Salaries and Wages—						
Director .....	200	0	0			
Naturalist (International Fishery Investigations) ...	250	0	0			
Director's Assistant .....	150	0	0			
Wages (including cost of preparing Marseilles Exhibit)	574	9	1	1,174	9	1
Travelling Expenses .....				54	4	0
Library.....	80	0	2			
Journal.....	3	5	0			
	83	5	2			
Less Sales of Journal .....	3	8	1	79	17	1
Buildings and Public Tank Room—						
Gas, Water, and Coal .....	88	18	0			
Stocking Tanks, Feeding, etc. ....	29	17	10			
Maintenance and Renewals .....	84	18	5			
Do. Repairs and Renewals Account...	32	18	6			
Rent of Land, Rates, Taxes, and Insurance .....	17	6	11			
	253	19	8			
Less Admissions to Tank Room .....	126	12	3	127	7	5
Laboratory, Boats, and Sundry Expenses—						
Stationery, Office Expenses, Printing, etc.....	112	18	7			
Glass, Chemicals, and Apparatus (in-						
cluding purchases on account of						
Marseilles Exhibit) .....	£191	15	8			
Less Sales .....	30	3	6	161	12	2
Purchase of Specimens .....				37	17	5
Maintenance and Renewal of Boats,						
Nets, Gear, etc. ....	£250	12	4			
Less Sales .....	105	1	3	145	11	1
Coal and Water for Steamer.....	118	8	11			
Insurance of Steamer.....	22	19	6			
	599	7	8			
Less Sales of Specimens, etc. (including £50 from						
International Investigations Commission for use of						
ss. <i>Oithona</i> ) .....	443	7	0	156	0	8
Bank Interest .....				2	11	10
„ Extraordinary Expenditure :—				1,719	19	10
Contribution towards the expenses of the International				500	0	0
Fishery Investigations .....						
				<u>£2,219</u>	<u>19</u>	<u>10</u>

---

### Notes and Memoranda.

---

#### *Diporula verrucosa*, C. Peach, off Plymouth.

THE type, and hitherto only recorded British specimen (Hinck's *British Polyzoa*, p. 220, Pl. XXXII. Figs. 1, 2), was procured by Peach in Lantivet Bay. When at the Biological Laboratory in 1889, I found a second example among material brought in by the dredger from deep water. The specimen is finer than the type, measuring 1.4 inches high and 1.3 inches wide. The proportionately great width is caused by a very obtuse angle of the first division of the stem; subsequently the branches are again dichotomously divided, and at their tips are the beginning of new divisions.

A. M. NORMAN.

#### *Hancockia eudactylota*, Gosse.

IN writing of the genus *Hancockia* in this Journal (vol. vii., No. 3, June, 1906, pp. 353-6), I have inadvertently followed foreign zoologists in calling the species described by Gosse, *H. dactylota*. The name given by Gosse was, however, *H. eudactylota* (see *Ann. and Mag. of Nat. Hist.*, xx., 1887, p. 316).

C. ELIOT.

PUBLICATIONS OF THE ASSOCIATION.

Journal of the Marine Biological Association.

OLD SERIES.

No. 1, AUGUST, 1887 (only a few copies left, reserved for Libraries).

No. 2, AUGUST, 1888. Price 1s.

NEW SERIES (*Royal 8vo*).

Volume I., 1889-90, 472 pp., 28 plates.

Volume II., 1891-2, 410 pp., 14 plates.

Volume III., 1893-4, xxxviii. and 458 pp., 5 plates and 25 woodcuts.

Volume IV., 1895-7, iv. and 425 pp.

Volume V., 1897-9, 550 pp. and 16 plates.

Volume VI., 1899-1903, 676 pp., 3 charts and 7 plates.

Volume VII., Nos. 1, 2, and 3.

Separate numbers (generally 4 to one volume), in wrappers, 3s. 6d.; to Members, 2s. 8d.

London Agents: Messrs. DULAU & Co., 37 Soho Square, W.

*Cloth 4to, 150 pp., 18 plates (12 coloured).*

A TREATISE ON THE COMMON SOLE.

BY

J. T. CUNNINGHAM, M.A., F.R.S.E.,

Late Fellow of University College, Oxford; Naturalist to the Association.

Price to Members, 20s.; to Non-Members, 25s.

*Medium 8vo, 368 pages. 159 Illustrations and two Maps. Price 7s. 6d. net.*  
(Macmillan & Co., London.)

THE NATURAL HISTORY OF THE MARKETABLE  
MARINE FISHES OF THE BRITISH ISLANDS.

*Prepared expressly for the use of those interested in the Sea-fishing Industries,*

BY

J. T. CUNNINGHAM, M.A.,

FORMERLY FELLOW OF UNIVERSITY COLLEGE, OXFORD;

NATURALIST ON THE STAFF OF THE MARINE BIOLOGICAL ASSOCIATION.

With Preface by

E. RAY LANKESTER, M.A., LL.D., F.R.S.,

PROFESSOR OF COMPARATIVE ANATOMY IN THE UNIVERSITY OF OXFORD.

PUBLICATIONS OF THE INTERNATIONAL COUNCIL  
FOR THE STUDY OF THE SEA.

---

BULLETIN  
DES RÉSULTATS ACQUIS PENDANT LES COURSES PÉRIODIQUES.

---

PUBLISHED QUARTERLY. Price per Volume of Four Numbers,  
18 Kroner (£1).

---

RAPPORTS ET PROCÈS-VERBAUX DES RÉUNIONS.

---

- VOL. I., 1902-3. Kr. 6.  
VOL. II., 1903-4. Kr. 4.  
VOL. III., 1902-4 (General Report). Kr. 15.  
VOL. IV., 1904-5. Kr. 4.
- 

PUBLICATIONS DE CIRCONSTANCE.

---

- No. 1. **C. G. Joh. Petersen**: How to Distinguish between Mature and Immature Plaice throughout the Year. A Preliminary Communication. 8 pp. 1 pl. July, 1903. Kr. 1.
- No. 2. **Martin Knudsen**: On the Standard-Water used in the Hydrographical Research until July, 1903. 9 pp. July, 1903. Kr. 0.50.
- No. 3. Die Literatur der zehn wichtigsten Nutzfische der Nordsee. In monographischer Darstellung. 112 s., 10 T; August, 1903. Kr. 3.  
The Literature of the Ten Principal Food Fishes of the North Sea. In the form of compendious monographs. 108 pp. 10 pl. August, 1903. Kr. 3.
- Nos. 4-5. **Martin Knudsen**: Ueber den Gebrauch von Stickstoffbestimmungen in der Hydrographie.  
— — Gefrierpunkttabelle für Meerwasser.  
Zusammen 13 s. September, 1903. Kr. 0.75.

PUBLICATIONS OF THE INTERNATIONAL COUNCIL  
FOR THE STUDY OF THE SEA—continued.

- No. 6. **Harry M. Kyle**: On a New Form of Trawl Net, designed to fish in midwater as well as on the ground. Preliminary notice. 8 pp. November, 1903. Kr. 0.50.
- No. 7. **P. J. van Breemen**: Ueber das Vorkommen von *Oithona nana* Giesbr. in der Nordsee. (Aus dem niederlaendischen Institut für Meeresforschung.) 24 s. Mit einer Karte. November, 1903. Kr. 1.
- Nos. 8-9. **T. Wemyss Fulton**: On the Spawning of the Cod (*Gadus morrhua* L.) in Autumn in the North Sea. With a Chart.  
— — A New Mark for Fish.  
Together, 14 pp. March, 1904. Kr. 1.
- No. 10. **G. O. Sars**: On a New (Planktonic) Species of the Genus *Apherusa*. 4 pp. 1 pl. March, 1904. Kr. 0.50.
- No. 11. **Martin Knudsen**:  $\sigma$ , Tabelle, Anhang zu den 1901 herausgegebenen hydrographischen Tabellen. 23 pp. May, 1904. Kr. 0.75.
- No. 12. Catalogue des poissons du nord de l'Europe, avec les noms vulgaires dont on se sert dans les langues de cette région. 76 pp. June, 1904. Kr. 1.
- No. 13A. Die Ostsee-Fischerei in ihrer jetzigen Lage. (Erster Teil.)  
I. Uebersicht über die Seefischerei in den dänischen Gewässern innerhalb Skagens. Im Auftrag von Dr. **C. G. Joh. Petersen** bearbeitet von **Andreas Otterström**.  
II. Uebersicht ueber die Seefischerei Schwedens an den süd—und östlichen Kuesten dieses Landes. Bearbeitet von Dr. **Filip Trybom** und **Alf Wollebæk**. Together, 59 pp. 6 pl. June, 1904. Kr. 1.50.
- No. 14. **E. van Everdingen** und **C. H. Wind**: Oberflächentemperaturmessungen in der Nordsee. (Vorläufige Mitteilung.) 10 pp. 1 pl. July, 1904. Kr. 1.
- No. 15. **Sigurd Stenius**: Ein Versuch zur Untersuchung der hydrographischen Veränderungen in der nördlichen Ostsee sowie im finnischen und im bottnischen Meerbusen. (Vorläufige Mitteilung.) 7 s. 5 t.
- No. 16. — — Graphische Berechnung von  $\sigma_t$  aus  $t$  und  $\sigma_\theta$ . 1 s.

*PUBLICATIONS OF THE INTERNATIONAL COUNCIL  
FOR THE STUDY OF THE SEA—continued.*

- No. 17. **A. J. Robertson**: Scottish Hydrographic Research during 1903. 6 pp.
- No. 18. **J. W. Sandström**: Einfluss des Windes auf die Dichte und die Bewegung des Meereswassers. 6 s.
- No. 19. **B. Helland-Hansen**: Zur Ozeanographie des Nordmeeres. Resumé eines am 22. Juli gehaltenen Vortrags. Mit 8 s. 3 fig.
- No. 20. **E. Ruppin**: Ueber die Oxydierbarkeit des Meerwassers durch Kaliumpermanganat. 9 s.  
(No. 15-20. Ensemble 37 pp. 5 pl. et 3 fig. October, 1904. Kr. 1.50.)
- No. 21. **Charles J. J. Fox**: On the Determination of the Atmospheric Gases Dissolved in Sea-Water. (Communications du Laboratoire central à Christiania No. 1.) 24 pp. 1 pl. 4 fig. March, 1905. Kr. 1.
- No. 22. **D. Damas**: Notes biologiques sur les Copépodes de la mer norvégienne. 24 pp. 1 carte. April, 1905. Kr. 1.
- No. 23. **V. Walfrid Ekman**: On the use of Insulated Water-Bottles and Reversing Thermometers. (Communications du Laboratoire central à Christiania No. 2.) 28 pp. 2 pl. 8 fig. April, 1905. Kr. 1.
- No. 24. **V. Walfrid Ekman**: Kurze Beschreibung eines Propell-Strommessers. (Communications du Laboratoire central à Christiania No. 3.) 4 s. 1 t.
- No. 25. **O. Pettersson**: Beschreibung des Bifilar-Strommessers. 6 s. 1 t.
- No. 26. **A. M. van Rosendaal** und **C. H. Wind**: Prüfung von Strommessern und Strommessungsversuche in der Nordsee. 10 s. 2 t.  
(No. 24-26. Zusammen 20 s. 4 t. July, 1905. Kr. 1.50.)
- No. 27. **V. Walfrid Ekman**: An Apparatus for the Collection of Bottom-Samples. (Communications du Laboratoire central à Christiania No. 4.) 6 pp. 5 fig. August, 1905. Kr. 0.50.
- No. 28. Bericht über die Anstalten zur Vermehrung des Lachses und der Meerforellen in den Flüssen der Ostsee. Im Auftrage der Kommission C 1, unter Mitwirkung von Prof. Dr. **O. von Grimm** (Russland), von dem deutschen Seefischerei-Verein (General-Sekretär Prof. Dr. **H. Henking**) (Deutschland) und von Fischereikonsulent **Chr. Levinsen** (Dänemark), bearbeitet von dem Geschäftsführer Dr. **Fil. Trybom**. 34 s. November, 1905. Kr. 0.75.

PUBLICATIONS OF THE INTERNATIONAL COUNCIL  
FOR THE STUDY OF THE SEA—continued.

- No. 29. **L. H. Gough**: On the Distribution and the Migrations of *Muggiæa atlantica*, Cunningham, in the English Channel, the Irish Sea, and off the South and West Coasts of Ireland, in 1904. 13 pp. 3 charts. 2 fig. November, 1905. Kr. 1.
- No. 30. **Rolf J. Witting**: Kurze Beschreibung eines elektrisch registrierenden Strommessers. 8 s. Textfig.
- No. 31. ——— Etliches über Strommessung. 11 s.  
No. 30–31. Zusammen 19 s. November, 1905. Kr. 0.75.
- No. 32. **Charles Atwood Kofoid**: A Self-closing Water-bucket for Plankton Investigations. 10 pp. 4 fig. December, 1905. Kr. 0.50.
- No. 33. Catalogue des espèces de plantes et d'animaux observées dans le Plankton recueilli pendant les expéditions périodiques depuis le mois d'août 1902 jusqu'au mois de mai 1905. 122 pp. February, 1906. Kr. 2.
- No. 34. **Fridtjof Nansen**: Methods for Measuring Direction and Velocity of Currents in the Sea. With an Appendix by Dr. **V. Walfrid Ekman**. 42 pp. 2 pl. and 31 fig. February, 1906.

---

*Published on behalf of the International Council*

BY

ANDR. FRED. HØST ET FILS,  
COPENHAGEN.

## OBJECTS

OF THE

# Marine Biological Association of the United Kingdom.

---

THE ASSOCIATION was founded at a Meeting called for the purpose in March, 1884, and held in the Rooms of the Royal Society of London.

The late Professor HUXLEY, at that time President of the Royal Society, took the chair, and amongst the speakers in support of the project were the late Duke of ARGYLL, the late Sir LYON PLAYFAIR, Lord AVEBURY, Sir JOHN HOOKER, the late Dr. CARPENTER, Dr. GÜNTHER, the late Lord DALHOUSIE, the late Professor MOSELEY, the late Mr. ROMANES, and Professor LANKESTER.

The Association owes its existence and its present satisfactory condition to a combination of scientific naturalists, and of gentlemen who, from philanthropic or practical reasons, are specially interested in the great sea fisheries of the United Kingdom. It is universally admitted that our knowledge of the habits and conditions of life of sea fishes is very small, and insufficient to enable either the practical fisherman or the Legislature to take measures calculated to ensure to the country the greatest return from the "harvest of the sea." Naturalists are, on the other hand, anxious to push further our knowledge of marine life and its conditions. Hence the Association has erected at Plymouth a thoroughly efficient Laboratory, where naturalists may study the history of marine animals and plants in general, and where, in particular, researches on food-fishes and molluscs may be carried out with the best appliances.

The Laboratory and its fittings were completed in June, 1888, at a cost of some £12,000. Since that time investigations, practical and scientific, have been constantly pursued at Plymouth. Practical investigations upon matters connected with sea-fishing are carried on under the direction of the Council; in addition, naturalists from England and from abroad have come to the Laboratory, to carry on their own independent researches, and have made valuable additions to zoological and botanical science, at the expense of a small rent for the use of a working table in the Laboratory and other appliances. The number of naturalists who can be employed by the Association in special investigations on fishery questions, and definitely retained for the purpose of carrying on those researches throughout the year, must depend on the funds subscribed by private individuals and public bodies for the purpose. The first charges on the revenue of the Association are the working of the seawater circulation in the tanks, stocking the tanks with fish and feeding the latter, the payment of servants and fishermen, the hire and maintenance of fishing-boats, and the salary of the Resident Director and Staff. At the commencement of this number will be found the names of the gentlemen on the staff.

In the summer of 1902 the Association was commissioned by His Majesty's Government to carry out in the southern British area the scheme of International Fishery Investigations adopted by the Conference of European Powers which met at Christiania in 1901. In connection with this work a laboratory has been opened at Lowestoft.

The purpose of the Association is to aid at the same time both science and industry. It is national in character and constitution, and its affairs are conducted by a representative Council, by an Honorary Secretary and an Honorary Treasurer, without any charge upon its funds, so that the whole of the subscriptions and donations received are devoted absolutely to the support of the Laboratory and the prosecution of researches by aid of its appliances. The reader is referred to page 4 of the Cover for information as to membership of the Association.

## CONTENTS OF NEW SERIES, Vol. VII., No. 4.

	PAGE
1. REPORT OF THE COUNCIL, 1905-1906 . . . . .	415
BALANCE SHEET, 1905-1906 . . . . .	434
2. NOTES AND MEMORANDA . . . . .	436

---

### NOTICE.

The Council of the Marine Biological Association wish it to be understood that they do not accept responsibility for statements published in this Journal excepting when those statements are contained in an official report of the Council.

---

### TERMS OF MEMBERSHIP.

		£	s.	d.
Annual Members . . . . .	per annum	1	1	0
Life Members . . . . .	Composition Fee	15	15	0
Founders . . . . .		100	0	0
Governors . . . . .		500	0	0

Members of the Association have the following rights and privileges: they elect annually the Officers and Council; they receive the Journal of the Association free by post; they are admitted to view the Laboratory at Plymouth, and may introduce friends with them; they have the first claim to rent a place in the Laboratory for research, with use of tanks, boats, &c.; and have access to the books in the Librarian at Plymouth.

All correspondence should be addressed to the Director, The Laboratory, Plymouth.