

## THE MARINE BIOLOGICAL ASSOCIATION.

THE council of the Marine Biological Association, in the report for 1902-1903, presented to the annual general meeting of the association on June 24, state that the work of the association has been considerably augmented in consequence of the fact that a commission has been accepted from H.M. Government to carry out in the southern British area the programme of scientific fishery investigation adopted by the International Conference, which met at Christiania in 1901. The work in connection with these investigations is being carried out in the southern part of the North Sea and in the English Channel. In connection with the North Sea work, a laboratory has been fitted out at Lowestoft, and the steam trawler *Huxley* has been hired. Some difficulty was experienced in obtaining a vessel suitable for the work with the funds provided by Government, but the council were fortunate in securing the assistance of one of their members, Mr. G. P. Bidder, who himself purchased the *Huxley* from her former owners and let her upon favourable terms to the association. Accommodation for the naturalists has been fitted up in the old fish-hold of the trawler, and a small laboratory has been built on deck.

The investigations in the North Sea include a scientific survey, by means of the s.s. *Huxley*, of the trawling grounds between the east coast of England and about 3° 30' E. longitude, in connection with which observations are made on the nature of the bottom, the nature and abundance of animal life living on the bottom and serving as food for fish or otherwise, the size and weight of the fishes caught, the food of the more important fishes, the condition of the fishes as regards sex, maturity, or spawning, and the temperature of the sea at surface and bottom. A simultaneous survey is being carried out of the regular fisheries on the trawling grounds, with the assistance of reliable masters of commercial fishing vessels. Experiments are also being made on the migrations of fishes, by marking and liberating fishes in large numbers over wide areas. These experiments are designed to throw light on the extent and direction of the seasonal and other migrations of food-fishes at different stages of their growth, particular attention being paid to the migrations of under-sized flat-fish, and also to give an indication of the percentage of fish on the trawling grounds actually caught by the trawling fleets from one year to another. In addition to the above lines of research, special investigations are to be made on the rate of growth, age, fecundity and racial varieties of fishes, on the abundance of floating fish-eggs, and on the variations in the size and weight of fish landed at the various fishing ports throughout the year.

Up to the middle of June the *Huxley* completed twelve scientific trawling voyages in the North Sea. More than 34,000 fishes have been measured, the animal life of the bottom has been systematically studied from the point of view of distribution, and the food-contents of about 3000 fishes have been examined and determined. Plaice have been marked and liberated in different parts of the North Sea. In November and December a number of small flat-fish were marked on the grounds west of the Borkum Reef, and the results obtained are already of great interest and importance. They indicate that during December and January there was a marked migration southwards and westwards of the small plaice previously congregated on the inshore grounds of the northern and western coasts of Holland, the distances travelled being in many cases quite unprecedented, viz. from one hundred to one hundred and sixty miles in six weeks or two months. More than 10 per cent. of the fish liberated have already been recovered.

The English portion of the international scheme of hydrographic and plankton observations, the execution of which has been assigned to the Marine Biological Association, is to be carried out in the western half of the English Channel.

These investigations have for their object the study of the seasonal changes which take place in the physical and biological conditions prevailing over the entire region covered by the international programme, though more particularly directed to a study of the waters entering the North Sea from different directions. They are designed to determine (1) the origin, history, and physical and biological characters of the water found in each locality at

different seasons of the year and at corresponding seasons in different years, changes in which must necessarily have a profound influence upon the distribution and abundance of the fish-life in the sea; and (2) the variations which take place in the floating and swimming organisms (plankton) which constitute the fundamental food-supply of the sea.

The investigation is being carried out (1) by means of a series of quarterly cruises made simultaneously over the whole area by the vessels of the participating countries, as a result of which a thorough knowledge, based upon the most accurate available methods, is obtained of the conditions prevailing at all depths at certain fixed stations, together with a less detailed knowledge at intermediate points; and (2) by observations, more especially of the surface conditions, at as many points as possible during the time intervening between the seasonal cruises.

Complete series of observations at twenty stations in the English Channel were obtained during the first fortnights of February and May.

The ordinary work of the association has been carried on at the Plymouth Laboratory during the year. Work on the detailed record of the Plymouth fauna has been continued, the trawling experiments in the bays on the south coast of Devon have been completed, and a considerable number of naturalists have made use of the laboratory for their special researches. The statement of receipts and expenditure for the year shows a deficit of 17*l.* 1*s.*

## THE PARSONS STEAM TURBINE.

THE recent launching of the cross-channel turbine steamer, the *Queen*, to which reference was made in our issue of July 2 (p. 209), has directed attention to the efficiency of turbine engines for many purposes. An ideal engine is one which has only one rotating part, and in which the direction of movement is not varied. Engineers have for many years recognised this fact, and much time and money have been expended in their endeavour to perfect a rotary engine. No practical success was, however, attained until 1884, when the Hon. C. A. Parsons, F.R.S., placed on the market his first compound steam turbine applied to driving a dynamo. Since then Mr. Parsons has effected many and various improvements, until, at the present time, the Parsons steam turbine is recognised by engineers to be a thoroughly efficient and practical engine, which, in the larger sizes, has attained an unprecedented degree of economy in steam. In the latter few years, the Parsons steam turbine has been applied to the propulsion of ships with very satisfactory results, and bids fair, in the near future, to supersede the reciprocating engine for certain classes of vessels.

A description of the Parsons turbine was given in NATURE several years ago (vol. lxi. p. 424), with illustrations of its parts. The turbine consists of a cylindrical case with numerous rings of inwardly projecting blades. Within this cylinder, which is of variable internal diameter, is a shaft or spindle, and on this spindle are mounted blades, projecting outwardly, by means of which the shaft is rotated. The former are called fixed or guide blades, and the latter revolving or moving blades. The diameter of the spindle is less than the internal diameter of the cylinder, and thus an annular space is left between the two. This space is occupied by the blades, and it is through these the steam flows.

In the arrangement of turbine machinery as adopted in the turbine Channel steamer the *Queen*, there are three turbines, viz. one high pressure in the centre of the ship and two low pressure, one on each side of the ship. Each turbine drives a separate shaft, with one propeller on each shaft, three in all. Inside the exhaust casing of each of the low pressure cylinders a reversing turbine is fitted. In ordinary going ahead, the steam from the boilers is admitted through a suitable regulating valve to the high pressure turbine, and after expanding about 5-fold, it then passes to each of the low pressure turbines in parallel, and is again expanded in them about 25-f<sub>old</sub>, and then passes to the condensers, the total expansion ratio being 125-fold.

The *Queen* is the third passenger vessel built by Messrs. Denny and Brothers fitted with the turbine system of propulsion supplied by the Parsons Marine Steam Turbine Co.,