of the Irish Sea. Though primarily concerned with the revision of the systematic list of species occurring in that part of the island, it contains chapters which are far more than of local interest, embodying results of years of research which is of value and importance for all workers on marine algae.

The introduction includes an account of the area under investigation with notes on the conditions and the flora of the principal collecting grounds.

Preceding the main systematic portion is a list of the species added to the flora since 1913, when the last list was published. This includes in all about 100 names, the discovery of which is mainly due to the energies of the staff and students of the Botanical Department of the University at Liverpool. The revised list, which excluding the Cyanophyceae contains 349 names, gives evidence of critical examination, and it is obvious that every care has been taken to secure accuracy of determination as far as possible. Details of zonal distribution, seasonal and reproductive occurrence, are provided in all cases. A key to the genera, which is supplied, is of especial value as it aims at using only morphological characters of the vegetative thallus, rather than reproductive bodies.

A particularly interesting chapter is that entitled "The effect of alternating seasons on algal vegetation", where an account of the various types of perennation and season of growth is given and likewise a description of the periodic migration of the different littoral species up and down the shore — a phenomenon controlled doubtless mainly by the factors of light, temperature, and desiccation. It is pointed out that previous to the onset of unfavourable conditions copious spore-production of one type or another invariably takes place. The dates of the various reproduction phases are given under each species in the systematic list, and this information is summarized in a large table at the end of the volume under four vertical columns of Spring, Summer, Autumn, Winter, the various types of reproductive organs being grouped in the left-hand column. A. D. C.

A. B. Needler. The Haddock. Biol. Board of Canada. Bull. No. XXV. Ottawa, 1931.

In the special series of semipopular Bulletins which the Biological Board of Canada has issued in recent years on subjects of interest to the general public A. B. NEEDLER has published a paper on the Haddock. The author gives a brief and clear statement of the more important results of the scientific work done to elucidate the biology of the haddock, especially as regards the American waters, and deals further with the methods of capture, the marketing of the catch and finally with the use made of the waste, namely, small fish, heads, skin, viscera, and bones for preparation of oil, meal and glue.

Haddock occur on both sides of the North Atlantic, and the author draws attention to the fact that they are found much farther north on the eastern than on the western side of the Atlantic, due to the fact that the cold arctic water penetrates farther south on the American than on the European side of this ocean. In this connection it is of interest that according to Danish investigators the haddock has been caught in the West Greenland waters in accordance with the higher temperature found here in recent

years. The author further points out that haddock are rather particular in the choice of habitat; they are only found in quantity in salinities of 31.5 to 33 $^0/_{00}$. In the opinion of the reviewer these limits are drawn somewhat too narrow; in the North Sea haddock are fished in great quantities in salinities between 34 and 35.2 $^0/_{00}$, and in the western Baltic haddock have grown up in salinities varying between 18 and 24 $^0/_{00}$. The author deals fairly fully with earlier studies of the haddock, giving a clear account of the valuable results of A. W. H. NEEDLER's thorough investigations. The haddock undertakes rather long seasonal migrations governed in the main by temperature, whereas spawning seems to be not nearly as great a factor in producing migrations — "the haddock may spawn wherever they happen to be when time and conditions are favourable". Concerning growth the author mentions the interesting fact that the American haddock grow faster than the European, the 3-year old American haddock varying in length between 42 and 50 cm. whilst the European haddock at the same age have only attained a length of 30—40 cm. The author further states that the European haddock tend to grow faster, the warmer the water is. The reviewer is, however, not quite sure that this can be maintained as a general rule. It is true that the haddock grow faster in the warmer water off the south coast of Iceland than in the colder water off the north coast. But it must be borne in mind that on the whole the haddock of Iceland (and this also holds good for the haddock from the cold east and north coasts) grow faster than those from the North Sea, although the Icelandic water is by no means warmer — rather colder — than the North Sea water. There is more reason to suppose that it is not so much the temperature as the amount of food available for the haddock that governs the rate of growth. European writers have shown that haddock grow faster in regions (the Belt Sea and western Baltic) where the food principally consists of molluscs and crustaceans than where (as in the North Sea) it is mainly composed of echinoderms, which are of little value. Concerning the question of food the author states that the haddock feed almost exclusively on bottom animals. It is further mentioned that exceptions from this rule occur, haddock having been caught with their stomachs full of young whiting. In this connection it could have been mentioned, too, that the haddock in deeper water, i. e. the Skagerak, are known to feed to a considerable degree upon *Meganyctiphanes norvegica*.

In the last part of the paper the author gives a clear and good account of the methods of capture and the use made of the haddock caught. This part of the paper is of special interest for the biologist, also as it contains information on a subject rarely dealt with in scientific papers.

The author must be congratulated upon the way in which she has been able to compile in a clear and concise form a great stock of valuable information in a paper not larger than 28 pages. Not only for the general public but also for the scientist the paper of A. B. NEEDLER will be very valuable. Some of the figures, however, — for instance the figure showing a haddock scale — are technically not as good as desirable.

ERIK M. POULSEN.