

to the Ice Patrol observations, as he certainly should be, in forming his conclusions.

But the most important point of all is that there is no way of checking BEAUGÉ's claims, as to the success or failure that might attend the fisherman who accepts the idea that cod-water is defined by the temperature of 3—5 degrees. The papers are scattered with isolated references to good or bad fishery in particular water, as on p. 101 of the present paper; but such remarks are hardly sufficient to convince us that these audacious claims are justified. On page 203 of Tome II, Fasc. 1, there is a chart of part of the "Accores des Chalutiers", inscribed with a number of figures representing good cod catches; and all the inscriptions, whether for small numbers or large, lie between the (100 metre) isotherms of 3 and 5° C. The data of positions and captures were obtained from captains by wireless; and it is not clear why, at the same time, observations of poor catches might not have been obtained and plotted, to see whether they lay in the zone of "cod-water" or not. As a matter of fact the catches inscribed vary from 1 to 31; (we are not told what the unit of measurement is). Without evidence from poor hauls the chart is worth little, and BEAUGÉ's italicised comment that "they are all included in the zone of cod-water" is of no significance. Then, on pages 208—210 of the same paper, there is a long table shewing the results of fishing, along with simultaneous observations of temperature. It is disappointing to find, however, that the catches include all species of fish, and that sometimes they included enormous quantities of *Sebastes* and *Urophycis*, so that the much-desired correlation of cod catch and temperature cannot be attempted.

This is not to say that BEAUGÉ's thesis is regarded as wrong. On the contrary it seems likely to be right, but it is impossible to accept it, until data are given from which we can judge approximately the proportion of cases in which fishing operations yield results in accordance with the theory.

M. G.

R. RALLIER DU BATY. La Crise de la Pêche au Chalut. La Nature, No. 2840. Paris 1930.

M. DU BATY describes the history and the present plight of the deep-sea trawling industry in France. In 1893, the French trawler owners, seeing the English trawlers making large catches of hake off the coasts of France, bought similar trawlers, and commenced a lucrative fishery. The fishing grounds on the shallower coastal portions of the continental shelf were soon fished out; trawlers had to go further and further afield for hake; and, at present, even the fishing grounds along the edge of the deep water are yielding diminishing catches. Lorient, La Rochelle and Arcachon are in a sorry plight, and, if Boulogne has suffered less, it is because she is less dependent on the hake for the welfare of her industry.

M. DU BATY emphasizes the change in the nature of the hake fishery, which has followed more and more intensive trawling. Apart from the seasonal irruption of the hake on to the shallower banks, the hake fishery is now a deep-sea fishery all the year round, and ships capable of towing efficiently the gear, with its great weight of warp, and skippers with the

knowledge and skill to work the very uneven slopes successfully, are at a premium. The difficulties of this fishery are well-known to English skippers. There are many places, on the edge of the deep water, where it is impossible to tow for long on a straight course, and a constant and skilful watch must be kept on the warps, to avoid towing off the bottom, on the one hand (when, as M. DU BARY rightly points out, it will take no fish) and coming up on to a bank, with its risk of destroying the gear, on the other. Many French trawlers (and English trawlers also) are adopting echo-sounding gear to help them, but this will find its greatest usefulness only when the slopes are accurately surveyed and charted.

The cause of this diminution in yield, and of this change in the nature of the hake fishery, is due, M. DU BARY thinks, to over-fishing, and possibly to changes in the sea bed and the overlying water, due to trawling. He compares the yield of the trawl fishery generally with that of the pelagic fisheries. The yield of the trawl fisheries has progressively declined, but can this be said of the pelagic fisheries, he asks, rhetorically. Even the masses of "coral", which grow in the deeper water, and which once formed the refuge of multitudes of "sedentary" hake, are now being destroyed, so that only "migratory" hake, whose appearances are short and fleeting, are there found. The adoption of the Vigneron-Dahl trawl, which he figures and describes (comparing it with the otter trawl and the "chalut-boeuf"), postponed, for several years, a crisis, which once again faces us.

M. DU BARY calls, in fact, for "rationalisation". The French industry must break with the traditional lines of English ships and methods. New and bigger vessels must be built, capable of fishing at 1500 metres, if need be. Accurate and detailed charts of the slopes at the edge of the deep water must be put at the disposal of the skippers, with improved gear and appliances, both technical and oceanographical, for working them. The existing grounds must be more intelligently exploited, and extended into deeper water.

This is admirable advice; but the reviewer must join issue with the author on some other points. For example, the English hake fishery, at least, cannot be said to have shown a progressive decline in yield in the last thirty years. The situation seems to have become stabilised somewhere about 1909, and, since then, the fishery has shown fluctuations comparable with those shown by all intensive fisheries, not excluding pelagic fisheries. There has been a continuous decline in the proportion of bigger fish, but this is the inevitable consequence of intensive trawling. The concentration of the hake in a comparatively narrow strip, especially in winter, along the edge of the deep water, makes them peculiarly vulnerable. We find ourselves, at present, in a period of depression, such as we had in 1923, and the sentiments expressed in this article were often heard then. If the past is any guide to the future, there is little reason to believe that this depression is permanent.

Further, it is probable that the fishery is already prosecuted to the maximum depth at which a profitable haul of hake is to be expected. The reviewer has witnessed probably the deepest hauls ever made on a commercial scale — between 400 and 600 fathoms depth. Hake were not

taken beyond about 350 fathoms¹⁾, and this depth is already within reach of many trawlers.

The author's remedy, in fact, is actually being applied slowly and cautiously; to apply it in the drastic fashion he advocates would require, under existing conditions, little less faith and courage than that required by the Galilean fishermen, whose plaint, that they had toiled all night and had taken nothing, so fitly and finely opens this article. C. F. H.

H. LISSNER. Monatskarten zur deutschen Treibnetzfisherei 1929, Ber. d. deutsch. wissensch. Komm. f. Meeresforschung, N. F. Bd. V, Heft 3. Berlin, 1930.

It was a good idea which suggested the collection of monthly records of the drift-net fisheries for herring in the North Sea, as has been achieved for the fourth time by the well-known German investigator. On a similar principle to the "Squares" used in English statistics, indicated by letters and numbers, — with this difference, however, that these squares proved much too large for the purpose in hand, so that each of them was subdivided into nine smaller ones — each rectangle shows month by month both the number of hauls and the average catch of herring in crans ("kantjes") on separate charts, so that we may see at a glance, where in a particular month the fishing was most intensive and where also it proved to be most prolific. This is a most practical way of plotting the generally patchy herring shoals for further study; if indeed hydrographic conditions have any causal connection with this concentration of ripening and spawning herrings, LISSNER's charts should make it easy to bring such connection to light. Salinity and temperature conditions are, however, only investigated on broad lines, and it would be an advantage if fishermen themselves were generally provided with simple means of determining the hydrographic conditions and, as an alternative, the character of the plankton during the actual fishing time, and really did avail themselves of such aids! As long as this is not the case we have to be content with the valuable information LISSNER's meticulously drawn charts give us. Indeed we intend to start such work in Holland also.

The paper begins with statistics of a general nature about the production of the herring drift-net fisheries of countries around the North-Sea, the vessels used in these fisheries and the weekly records, during the seasons of 1929 and 1928, of the catch per lugger and per trip. A table showing monthly fluctuations of the landings (1929 and 1928) presents the usual irregular curve, with a tendency to fall in the middle of the season and again before the great autumn fishery near Yarmouth starts. The monthly charts above referred to, from July to November, are particularly instructive and show the time-honoured shifting of fishing regions as the summer draws on. Records were obtained from 245 trips out of a total of 662. Gradually as the season advances, the characteristically scattered nature of the fishing, which is particularly apparent in the month of August in the slack season, changes to the concentration of the vessels in the

¹⁾ See this Journal, Vol. III, No. 1.