

du vent sur un flotteur n'est pas la même à toutes les phases de la marée. Ainsi, par exemple, un vent défecteur, c'est-à-dire transverse par rapport à la direction flot-jusant, soufflant pendant l'étalement de courant ou pendant la période giratoire, alors que le courant est nul ou très faible, conduira un flotteur beaucoup plus en dehors de la route du courant résiduel que s'il agit pendant que le courant est dans toute sa force. Un même vent produira un effet différent, c'est-à-dire portera un flotteur en une autre région, s'il souffle pendant les heures de plein courant que s'il agit en dehors de tout courant ou par un courant faible. Il serait donc intéressant de posséder un appareil enregistrant la direction et la vitesse du vent en même temps que la direction et la vitesse du courant.

Sans doute, pareil instrument sera toujours difficile à installer à bord des bateaux-phare à cause de la giration du navire sur son ancre au changement de courant. Toutefois il ne paraît pas impossible d'imaginer une combinaison de l'anémomètre et du gyroscope qui éliminerait le facteur giration du navire.

2. Un autre point que nous voudrions mettre en relief est l'intérêt que présente l'emploi de flotteurs accouplés, dont l'un est flottant et l'autre, relié au premier par un lien plus ou moins long, est lesté au point de sombrer mais non de faire couler le premier. Il est clair que celui-ci opposant au vent une très faible surface et arrêté dans sa dérive éolienne par la résistance opposée par l'eau à son associé sombrant, prendra une direction et une vitesse très peu différentes de celles de la couche d'eau superficielle qui les contient tous deux. Or c'est le mouvement de cette couche d'eau qui présente tout l'intérêt au point de vue biologique. C'est cette remarque qui nous a conduit à employer ce genre d'appareil en même temps que des flotteurs simples. Nous comptons publier prochainement l'exposé d'une longue série d'expériences dans lesquelles les flotteurs accouplés ont donné des résultats nettement différents de ceux des flotteurs libres.

Il est à espérer que nos collègues britanniques songeront à ces deux desiderata dans l'emploi de leurs puissants moyens de travail qui promettent encore à la science de belles recherches et de nouveaux progrès.

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Ostende.

H. W. HARVEY. *Hydrography of the English Channel*. Conseil Permanent International pour l'Exploration de la Mer. Rapport Atlantique 1924. Copenhague 1925.

Hydrographical investigations in the English Channel have proceeded now for more than twenty years and it is therefore a timely object which Mr. HARVEY has achieved in bringing together the results of researches bearing on the hydrography of these waters. This work will undoubtedly rank as standard for some time to come, not only to those engaged

on the hydrography of the English Channel but to everyone having an interest in fishery research. Its value for purposes of reference, however, might possibly have been enhanced if some of the sections relating to water movements had been elaborated in somewhat greater detail, as for instance the section dealing with the rate of flow through the Channel. It is known that the rate of flow varies considerably but it is perhaps premature to attempt the establishment of a mean value. Moreover, the results of plankton distribution studies, which have a bearing on water movements¹), are not considered.

It is now a well established fact that water flows from the Atlantic into the English Channel. This flow appears to be governed to a large extent by the Atlantic Stream (the name "European Stream" is suggested as preferable for general adoption) which flows northwards along the European shelf, but our present knowledge of this stream is slight.

Besides the eastward movement of water through the English Channel, a feature which is important in any consideration of the hydrography of these waters is the counter-clockwise circulation which exists off the Channel's mouth, south of Ireland (vide Fig. 19 p. 65).

As is to be expected these systems of movement undergo perturbation from time to time. Emphasis is laid, and rightly so, on the importance to fishery investigations of studying the fluctuations of these movements, but before discussions of departures from the normal are justified, it must of course be ascertained that a reliable reference datum has been set up. It can now be accepted as certain that an annual fluctuation occurs in the flow of the water entering the English Channel, and evidence is produced which suggests two further periods of 2 and $18\frac{1}{2}$ years. MATTHEWS suggestion²) that two pulses may be experienced during the course of the year is not, however, touched upon.

On p. 65 line 7 a reference occurs which, on Mr. HARVEY's information, should read "(34)". It is doubtful whether the uprising of the current in the shallows of the eastern basin of the Channel may be accepted as a general condition, as the reference is to a special case. There is moreover another explanation of the fact that the salinity in the eastern basin towards Dover Straits is sometimes higher than it is slightly further westward, namely, that water of low salinity from the River Seine moves off-shore and cuts athwart the salter tongue.

Considerable attention is given to a discussion of temperature conditions, and an interesting method is described whereby reasons may be found for irregularities occurring in the seasonal flow of temperature. A list is made of the factors controlling fluctuations in the seasonal variation of temperature at a particular spot, and it is interesting to note the importance of the rôle of the thermocline (where the depth of water is sufficiently great to permit its formation) in regulating the amount of heat which may be gained by the water in summer. In hot calm summers less heat may be gained by the water mass as a whole than in summers with more wind and less solar radiation. These conclusions do not of course

¹) Cf. GOUAN L. H. Publ. de Circ., no. 29. 1905.

²) Fisheries, Ireland, Sci. Invest. 1913 IV (1914). p. 22.

refer purely to the English Channel and justification might perhaps have been found for adding to this section a note on the method by which the temperature wave itself may be studied. A reference to the work in question is, however, given in the bibliography [(43)] and a further paper by the same author¹⁾ is not without bearing on the temperature conditions in the English Channel.

The concluding sections (of general as well as local interest) deal with changes in the physical characteristics of sea water and their biological significance. The section concerning the distinction between inshore and offshore waters is of special interest in view of the advances which have recently been made in this connection. Besides differences in salinity and temperature, the chief difference between these two types of water evidently resides in the greater quantity of organic matter dissolved in the former, and incidental to this other changes take place which differentiate coastal water from that of the open sea. In the Introduction to the treatise variations in phosphates and nitrates are considered in relation to their power of limiting the fertility of the sea (LIEBIG'S law of the minimum). As regards the significance of the physical features of sea water with respect to the fisheries the correlations which have been attempted do not appear very conclusive and further research in this direction is clearly needed.

Evidently there is a misprint on p. 87, line 12; "surface" should surely read "bottom trailing".

J. R. L.

A. C. GARDINER, M. A. and MICHAEL GRAHAM, M. A. The Working Error of Petersen's Young Fish Trawl. Ministry of Agriculture and Fisheries. Fishery Investigations Series II, Vol. VIII, Nr. 3, 1925.

In this paper an account is given of an experiment designed to test the value as a quantitative fishing implement of the mesoplankton net usually known, after the name of its designer, as the Petersen young fish trawl.

A series of ten hauls were made in the southern North Sea under conditions as uniform as possible, the net being towed round a circle of two miles in diameter, each haul commencing at the bottom and by the shortening of the warp at regular intervals ending at the surface. The total catch of each haul was counted or estimated from a measured sample.

The takes of six selected organisms or groups were then compared in each of the hauls, the total number and probable error, both actual and percentage, being calculated for each. The probable errors for the six examples varied from ± 27 to ± 54 per cent. These figures are compared with those given by HERDMAN from Nansen net hauls off Port Erin, which show a very similar variation.

The value of these figures as evidence against the net depends on the assumption that the distribution of Plankton in the sea was uniform. If the variation in the catch can, as the authors believe, be ascribed to

¹⁾Fisheries, Scotland, Sci. Invest. 1916 I (February 1916).