

- (iv) General Oceanographical Publications.
 - (v) Comprehensive Reviews and Textbooks which have appeared.
- B. *Methods and Instruments.*
- (i) Sounding.
 - (ii) Physical and Chemical Researches on Sea Water.
 - (iii) Waves, Currents and Tides.
- C. *Topography.*
- (i) Depths and Shapes of Sea Floors.
 - (ii) Geology of Sea Floors.
 - (iii) Sea Level.
- D. *Sea Water.*
- (i) Temperature.
 - (ii) Salinity and Gas Content.
 - (iii) Tint.
 - (iv) Evaporation.
 - (v) Ice.
- E. *Water Movements.*
- (i) Currents.
 - (ii) Tides.
 - (iii) Waves.

II. Specific Researches.

- A. *Pacific Ocean.*
- (i) Topography.
 - (ii) Temperature and Salinity.
- B. *Indian Ocean.*
- C. *Atlantic Oceans.*
- (i) The whole ocean and the South Atlantic.
 - (ii) North Atlantic.
 - (iii) Areas connecting with the North Atlantic.
 - a) Mediterranean Sea.
 - b) North and Baltic Seas together.
 - c) North Sea.
 - d) Baltic Sea.
- D. *Antarctic Sea.*

Professor SCHULZ deals briefly with the work which has been done under these heads and gives full references to the original literature.

J. N. C.

HARDY, A. C. The Herring in Relation to its Animate Environment. Part II. Report on Trials with the Plankton Indicator. — Fish. Invest. Ser. II, Vol. VIII, No. 7 1925 (1926).

It is a pity that Mr. A. C. HARDY's studies on the food and feeding habits of the herring have come to an end — at least temporarily — owing

to his appointment to the "Discovery" Expedition. He has prepared the present paper to report on some of his experiments which he has had to discontinue.

It has been said both by naturalists and fishermen that the occurrence of herring or mackerel is influenced by the presence or absence of different kinds of plankton. When shoals of *Calanus* or other copepods are present, usually rich catches of herring are to be expected. On the other hand when much phytoplankton (especially diatoms) fills the water — what the British fishermen call "weedy water", "stinking water" — no successful fishing is probable.

If there is any truth in this saying, it would be of the utmost importance for the fishing vessels to know the plankton conditions before shooting their nets. The idea of Mr. HARDY was, therefore, to construct a simple and easily handled instrument to be used by the fishermen to obtain a preliminary knowledge about the plankton conditions.

Such an instrument is described in the present paper under the name of "plankton indicator". It is a cylindrical tube with a conical piece at each end and inside the rear cone is a disc on which a small piece of silk gauze is placed. (For more detailed information of the construction the reader is referred to the paper itself). The instrument is towed behind the ship for a short time, then hauled on board and the disc removed for examination.

By means of this instrument Mr. HARDY has had experiments carried out by different steam drifters in the North Sea and the English Channel.

The paper contains a report on the preliminary results obtained by these experiments; they do not give any definite answer on the question whether there is any direct correlation between the quantity and quality of the plankton and the quantity of herring or mackerel fished. But they contain some information which points towards such a correlation and other results which seem more complicated. The author sums up his results in the following sentences:—

- 1) For herring a green or even pale green disc (due to diatoms or *Phaeocystis*) appears to indicate water in which fishing is likely to be poor.
- 2) In the spring mackerel fishing in the south-west there is an indication that when the disc is quite free from copepods, fewer mackerel are likely to be caught than when there are copepods present in even very small numbers. But the difference in appearance of a disc with only a few copepods on it and a blank disc is not sufficient to form a practical indication for the fishermen.
- 3) In the summer herring fishing off Shields there is definitely no general correlation between the quantity of plankton and the catch of herring.
- 4) At certain seasons an approximate correspondence on a larger scale exists between the quantity of copepods and fish (herring or mackerel) present in a particular region.

As the author himself states the trials are only few, and he hopes that they may be continued by other workers and at other places. This hope has the warmest support by the reviewer.

C. H. OSTENFELD.