

Letters to the Editor

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NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 962.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

Echo Sounding in Fishery Research

THE vessel used for the annual oceanographical investigations in the Lofoten area (the *Johan Hjort*) had a Hughes echo sounding gear (magnetostriction system, frequency 16,000 cycles per second) installed

the conclusion of this investigation on April 5. Concurrently, the temperature in the 'fish' water-layer had decreased from 6.5° – 6.0° to about 3.0° C. In some instances a perceptibly lower oxygen and hydrogen ion concentration was observed in this water-layer than in the layers immediately above and below.

Although two zigzag trips were made across the entire bank area of the West Fjord, strong marks such as those shown in the records reproduced were only obtained at the locality referred to above; in other places only small and widely separated dots. Still a certain amount of fishing, if not very successful, was going on everywhere. A true estimate of the quantity of fish represented by marks of different types can, however, be gained only by further study in connexion with the use of suitable fishing implements.

OSCAR SUNDB.

Johan Hjort,
Kabelvåg, Lofoten.
April 6.

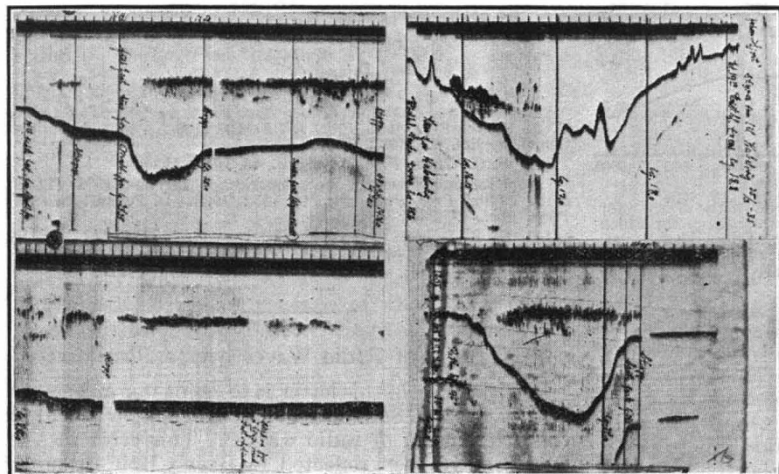


FIG. 1. Four 'echo'-records showing spawning cod in midwater at Lofoten. The left-hand diagrams partly with ship stopped. The bottom right-hand record is somewhat disfigured by oscillations set up by excessive shaking of ship's motor; but it shows also a second echo from the bottom, reflected from the surface. Marks on top of each diagram are produced every minute and are 6.7 mm. apart.

before leaving Bergen last February. The gear worked smoothly all along the coast and besides furnishing a great number of interesting sections, revealed many features hitherto unsuspected; among others, that the clay flooring of deep fjords is invariably about 10 m. thick and generally very flat.

Marks referable to fish were seen on the record only after the arrival at that portion of the Lofoten fishing area where the most prolific fishing has been going on during recent years—at Høla—a bight of the West Fjord of very restricted dimensions, say, 10 miles by 4 miles. At this place fish were indicated continuously along straight courses of 2 nautical miles and more. The nature of the indications may be seen from Fig. 1, which is a photographic reproduction of four separate records, partly obtained while the ship was stationary among the hand-line boats, which got the fish exactly at the depth indicated.

It is interesting to note that this spawning concentration of cod has apparently no relation to the bottom. This was well known before, but no one could have imagined the fish to be limited to such a sharply defined layer of only 10–12 metres in thickness, extending widely above deep water and shallow, always at the same distance from the water surface. This distance was 72 metres at the first encounter with the spawning shoals (March 11) and 50 metres at

Absorbing Layer of the Ionosphere at Low Height

THE ionosphere is now generally regarded as divided into two main regions of intense ionisation. The upper (*F* or Appleton) region commences at a height of about 250 km., while the lower (*E* or Kennelly-Heaviside) region begins at a height of about 90 km. Besides these two main regions, the existence of a so-called *D* or absorbing layer has been suggested from time to time¹. The presence of such a layer has not, however, until now been experimentally demonstrated, and it has rather been the tendency in recent years to discredit its existence. Recently we have, however, in the course of our ionospheric studies at Calcutta been able to detect echoes of radio waves returned from a virtual height of about 55 km. by the well-known pulse method. The echoes from the *E* layer were at the same time observed to be returned from a virtual height of 119 km. The present communication gives a preliminary account of the observations we have made in connexion with the existence of a low-lying absorbing layer.

The appearance of echoes from the *D* layer is closely connected with the weakening of echoes from the *E* layer which is observed with the progress of the day². This absorption may be due either to a decrease in the gradient and lowering of the height of the lower boundary of the *E* layer, or to the formation of a distinct absorbing layer at a much lower