

MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1973 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA: CRUISE 3b

(PROVISIONAL: Not to be quoted without prior reference to the author)

STAFF

D H Cushing
N Reynolds
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DURATION

Left Greenock, 0600 h 13 March
Arrived Grimsby, 1830 h 3 April

LOCALITY

Barents Sea

AIMS

1. To survey the southern Barents Sea for codling
2. To sample nanoplankton.
3. To record activity from the cod pineal.
4. To collect endocrine glands from a number of fish species.

NARRATIVE

An echo survey was executed between Skolpen Bank and a point 30 miles west of North Cape extending about 70 miles to seaward between 18 March and 27 March. The sampling gate was set between 1 m and 5 m off the bottom. Traces in midwater were also recorded. A number of Granton trawl hauls were made to identify the echo traces. When the bottom survey was completed, a midwater survey was made in the area where traces were abundant, that is, between the Kola meridian and Vardo. A sampling gate of 30 m was used at whatever depth the midwater traces were found. The fish were sampled with a midwater trawl. An attempt was made to sample the midwater traces continuously by trawl for 24 hours. After 15 hours of this project on 30 March, the weather prevented any more trawling. With the prospect of bad weather lasting for more than 24 hours scientific work was ended on the 30th of March.

RESULTS

1. Echo surveys

The distribution of fish was charted in numbers/m². The index includes single fishes larger than 20 cm and shoaled fish and represents samples both on the bottom and in midwater. The numbers of fish were: haddock, 3.10⁷; cod, 2.10⁷; redfish, 3.10⁷ (these are preliminary estimates). Estimates of mean length of all fish sampled were made with a lulse height analyzer. The ship steamed at 8 knots when the weather allowed and a signal to noise ratio of 10:1 was used.

To make an acoustic groundfish survey fully successful a number of improvements are needed:

- a) The midwater trawl and bottom trawl should both be quickly available. Because it takes about 6 hours to change trawls in good weather, the survey was done in two parts and for that reason is unsatisfactory; weather could delay the changeover for two or three days and a subsequent midwater survey might not be completed.
- b) The average noise level at 8 knots was about $5 \mu v$ and it increased rather quickly as weather deteriorated. Some form of continuous noise recording is needed if the best use is to be made of acoustic survey. The use of a towed transducer on a long cable might be investigated to reduce noise. Every reduction in noise means an increase in speed. The present survey was done at 8 knots, reduced to 6 and 4 knots in poor weather. It would be an immense improvement to add 2 knots to these speeds.
- c) The data processing was carried out in steps of one mile as given in the printout. About half a dozen computations were made on the material. With the pulse height analyzer information the counted material could be combined in a small ship-borne computer, giving numbers/m² at every mile steamed.

2. Midwater trawling

A number of hauls were made with the 1200 mesh Engel trawl and up to 10 baskets of cod and haddock were caught, including one or two large cod. In shooting the trawl the headline transducer does not give enough information; no signal can be expected from the bottom until the whole system has settled down. What is needed is a pressure transducer on the headline. Its signal would be presented on the echo sounder record at the trawl depth between surface and bottom. Such information would be available during shooting and the control of depth would begin as the warps were being paid out. A headline acoustic transducer could still be used to measure the gape and to record a proportion of the fish entering the trawl. The transducer winch should have an indicator of the warp length on the main winch and then the operator could match the speeds of the two winches.

3. Nanoplankton

A continuous record of chlorophyll in the surface waters was made with the fluorometer. Two cells/ml were found on the eastern half of the survey grid and 5-8 cells/ml on the western half. The phytoplankton were predominantly diatoms, Skeletonema, Rhizosolenia, Coscinodiscus and Nitzschia with some dinoflagellates. Some diatoms were starting to form chains. About twenty cultures were established, preparation for electron microscopy were made and some 16 litre samples were taken for spectrophotometry.

4. Electrophysiology

Recordings were made of spontaneous dark activity and photosensitivity of the pineal organ from cod of different sizes and states of maturity. Other cod were maintained in deck tanks for up to eight days in order to examine the effects of light adaptation on pineal electrical activity and photosensitivity. The modification of photosensitivity by electrical stimulation of the pineal nerve tract was investigated.

5. Endocrinology

The endocrine organs; pineal, pituitary, hypothalamus were also gathered from redfish, catfish, lumpsuckers, long rough dabs, mock halibut, herring and capelin. A small number of corpuscles of Stannins were taken from cod and haddock.

Acetone dried powders were prepared from all the glands and these will be subjected to further separation and analysis by Dr Bullard at the INRA laboratory near Paris.

6. Fish sampling

91 cod otoliths and 45 haddock otoliths were taken; 904 cod, 1004 haddock. 658 redfish and 37 coalfish were measured.

7. Hydrography

Bottom temperatures were measured at stations on the echo survey grid. There was little relationship between fish density and temperature presumably because we remained in the area of the North Cape current. One water bottle was imploded.

D H Cushing
16 April 1973

SEEN IN DRAFT: GWA

INITIALLED: HAC

DISTRIBUTION

Basic list

- Dr Cushing
- Dr Reynolds
- Mr Bye
- Mr Pawson
- Mr Pearson
- Mr Meggett
- Mr C J Garrod
- Mr Billard (INRA)