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In confidence: Not to be quoted without reference to the Laboratory.

CRUISE REPORT

F.R.S. "SCOTIA"

April 4th - 20th, 1966

Narrative

The cruise was scheduled to start on 28th March, but due to a delay in completing the refit "Scotia" did not sail from Aberdeen until 23.30 hours on 4th April. Work commenced at 08.45 hours on 5th April, the ship then working eastwards towards the Norwegian Deeps, part of which was surveyed during 6th - 7th April. Trawling recommenced on the 8th, and continued during the 9th, until weather conditions deteriorated during the late afternoon and forced the ship to shelter in North Sound Orkney during 10th April. Trawling was carried out on the 11th in the area south east of Sumburgh Head and on the 12th "Scotia" docked in Lerwick at 09.00 hours to take on water etc. After sailing at 10.00 hours on the 13th and proceeding northwards along the east coast of Shetland only two stations had been completed when weather conditions made it necessary to shelter during the early hours of 14th April. The greater part of that day was spent in St. Magnus Bay and in the late afternoon "Scotia" proceeded to Anchor in Olna Firth until 07.00 on the 15th when she proceeded to Stations to the east of Shetland. Work then continued uninterrupted by weather until late on the 18th when very rough conditions were experienced as the ship proceeded across the mouth of the Moray Firth. No trawling was possible on the 19th April but hydrographic and plankton sampling was carried out. One further trawl haul was made on the morning of the follwoing day. As an easterly swell had been prevalent for a number of days it was decided not to risk entering Aberdeen harbour during darkness - Scotia therefore proceeded to dock in Aberdeen at 13.00 hours on 20th April.

Due to the delay in starting, Mr. Wilkins was replaced by Mr. Gangster throughout the cruise.

Observations were obtained from the greater part of the area planned, the main exception being the Skagerak, Moray Firth and north coast of Scotland.

Results

Hydrography. The surface temperatures of the southern central northern North Sea ranged from 5.5 - 6.0°C. To the eastward a marked front separated this water from the Baltic outflow water where 3.5°C was the lowest temperature recorded. To the east of Shetland temperatures of 6.5 - 8.1°C were observed and to the south-east of the Orkney-Shetland Channel temperatures ranged from 5.5 - 6.7°C. It is of interest that the temperatures in the latter area are lower than those reported by J. Eggvin in the pilot synoptic charts issued by I.C.E.S. for the period 22 - 31 March 1966 - 6.5 - 9.0°C. Eggvin commented that the temperatures during 22 - 31 March suggested a more than normal inflow through the Orkney-Shetland Channel. The inflow appears to have stopped or have been considerably reduced during the present cruise.

Salinities in the Baltic outflow ranged from 33.3 - 34.0 °/oo. Only off the north east of Shetland were salinities of > 35.3 °/oo recorded; in the remaining areas salinities ranged from 34.5 (off

Aberdeenshire coast and the outer Moray Firth) to 35.3 (east of Shetland).

Drift Indicators were released at the standard positions.

Samples for phosphate, nitrate and silicate were obtained at a few positions.

Productivity

Chlorophyll a analysis has not yet been completed but details are available for the greater part of the area surveyed with the exception of the area to the east of Orkney and the Turbot Bank area. Chlorophyll a concentrations of 8.0 - 11.1 mg/m^3 were recorded along the western boundary of the Baltic outflow, where the lowest chlorophyll a concentration recorded was 4.2 mg/m^3. With the exception of North Sound, Orkney and a station near Fair Isle concentrations of 2.9 and 1.6 mg/m^3 respectively were found, the chlorophyll a concentrations so far available for the shelf area ranged from 0.5 - 0.9 mg/m^3.

Chaetoceras spp were the most abundant forms in the Baltic outflow area where high chlorophyll a concentrations were recorded.

Zooplankton

Sampling with 1m (26) nets showed that Calanus was abundant over most of the area. Sagitta serratodentata was recorded to the east of Shetland, Physophora hydrostatica at E20d (with Sulculeolaria) and at E15a. Beroe was found at F19b and J14a. Eukrohnia hamata was recorded only from the Norwegian Deeps. Cod/haddock eggs were recorded at a number of stations but were very abundant at D21d.

Forty-four Gulf III samples were obtained. Biomass data will shortly be obtained from these samples as a preliminary assessment of the zooplankton standing crop.

Multi-depth Plankton Indicator Samples were obtained for S.M.B.A.

Phytoplankton was collected for Mrs. Reid.

Trawling

A wing trawl with a small mesh cover was used throughout the survey. Hauls were of one hour duration.

The main haddock concentrations were found in the western part of the area surveyed with the heaviest catches to the south-east of Shetland (425 - 1814 fish/haul) where the main size group had a modal length of 33 - 35 cm. Off the Moray Firth and Aberdeenshire coast fish with a modal length of 21 cm were the dominant group. The main whiting concentrations were also in the western part of the area surveyed with catches of 394 - 666/haul to the east of Shetland being the highest catches. A marked increase in size from a modal length of 20 cm at 57°30'N to 32 cm at 61°00'N was observed.

The highest catches of cod (15 - 18 fish/haul) were from Statistical Square F18.

The main concentration of Trisopterus esmarkii (101 - 255/haul) occurred in the south-western part of the area with depths of over 100 m.

Nephrops were only found in numbers at two positions - C16d and E16b - where 48 and 51 Nephrops respectively were caught.

Herring catches were high in the area 57°N - 59°N; 2°W - 1°E, where with the exception of one haul catches ranged from 200 - 1318 herring/haul. A high catch 662/haul was also obtained in Statistical Square E18. The model length ranged from 18.0 - 24.5 cm, 24 cm being the commonest modal length.

The average catch in the above areas was 552 fish/haul; outside these areas the average catch was 5 fish/haul.

Haddock and cod stomachs were obtained for food and feeding studies and the intestinal tracts of cod, whiting and haddock were preserved for parasitological examination.

Various species were obtained for a number of workers in and outwith the laboratory - e.g. 0-group hake, adult male skate and echinoids.

The incidence of nematode worms in cod was recorded.

Nine cod were tagged.

Blood studies

Blood was obtained from 262 fish (cod, whiting, haddock, saithe, Trisopterus esmarkii, pollack) and electrophoresis successfully carried out on board ship. The lack of a gimbal table at first made the preparation of agar slides exceedingly difficult, but following a suggestion by Mr. Bainbridge the slides were prepared on a block of wood floating in a bucket of water. This method gave excellent results. Blood group determination were made for 52 fish and blood serum obtained for use in the laboratory.

Eye lens extracts were also obtained.

Echo-sounding

Good echo-sounder records were obtained. There was a marked concentration of "plume" type echo traces along the western boundary of the Baltic outflow - as has often been noted in previous years. "Plumes" were also recorded to the east and west of Shetland, but "plumes" were entirely absent from the area of high herring catches. In the latter area "tick" type traces were however fairly frequent.

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12th May 1966