Dr. Wood

CONFIDENTIAL : Not to be quoted without reference to the Laboratory.
S.16 6 S.R.56

CRUISE REPORT

F.R.S. "SCOTIA"

July 16-August 9, 1956.

GENERAL

Crewing difficulties prevented "Scotia" from sailing on the scheduled date and it was not until 7 p.m. on the 16th that she eventually left.

The first part of the trip, including the Butt of Lewis to Faroe Bank line and the work on Bill Bailey, Lousy and Rosemary Banks to Stornoway, was completed in nine days. After taking stores and fuel at Stornoway the ship continued via St. Kilda to Rockall but was forced to lie to, en route, for 36 hours because of bad weather. The trawl and line work on and beyond Rockall was completed but a further spell of bad weather was encountered (the northerly edge of the more severe channel area storm). These two weather delays on top of a 5 days delay in starting made it impossible to complete the southern section via Porcupine Bank with any likelihood of finishing on schedule and it was therefore decided to omit this area and concentrate on work along the edge of the deep water to the west and north-west of Shetland and east of the Wyville Thomson Ridge. This was completed and "Scotia" returned to Aberdeen as scheduled on August 9.

HYDROGRAPHY

The Butt of Lewis to Faroe Bank work was completed with all details between 18th and 19th July. Surface temperatures south of the Wyville Thomson Ridge were in the region of $12\frac{1}{2}^{\circ}$-13° and north of the Ridge about $10\frac{1}{2}^{\circ}$. The drop (between stations 7 and 8) was clearly shown on the recording thermograph as well as by the P.N. bottle. Surface temperatures rose again to about 12° between Bill Bailey and Lousy Banks and to 13° between Rosemary Knoll and the Shelf, reaching 14° in places. (It was only $11\frac{1}{2}^{\circ}$ in St. Kilda Village Bay but was 14° immediately outside). There was a drop of 1° over the deep water towards and west of Rockall. A corresponding drop of temperature was also found on the third part of the trip from the Shelf water north of Scotland to the deep water east of the Wyville Thomson Ridge and there was another drop in the area between Vee Skerries and Fair Isle rising again south of Fair Isle. Minus temperatures were found in deep water north and east of the Wyville Thomson Ridge but otherwise the lowest temperature was $3\frac{1}{2}^{\circ}$ at 2,200 m. in the deep between Rosemary Knoll and St. Kilda. The recording thermograph was run continuously at sea and the annotated records kept; it reads about $\frac{1}{2}^{\circ}$ less than the thermometer in use in the P.N. bottle. At a number of stations the mid-water temperature readings seemed to be inversed but were confirmed by repeated re-checks.

CHEMISTRY, ETC.

Samples for oxygen and phosphate determination and for culture work were taken according to the pre-arranged programme except for the omitted southerly section. Samples for the estimation of Vitamin B_{12} were taken at five stations. The phosphate samples have been worked up and show generally a sequence of figures that could be expected but there were a few unexpected high or low figures. Surface results were variable about 0.3-0.7 micro-grams per litre with increased concentrations in deeper water reaching a maximum of 1.2 at 57°25'N 16°00'W (west of Rockall).

PLANKTON

Sampling was almost completely limited to the oceanic area north of 57° and west of 2°W.

Phytoplankton

Diatoms were concentrated to the east of the area bounded by Cape Wrath, Rosemary Knoll and Bailey Bank. The dominant organism near the

mainland masses was Rhizosolenia alata (gracillima) while the richest station situated to the south of the Faroes contained Chaetoceros atlanticus, Ch. lorenzianus and Nitzschia delicatissima. Dinoflagellates over the remainder of the area sampled were never in large numbers but showed dominance of Ceratium tripos and C. furca. Other organisms present over the stations surveyed included the dinoflagellate Goniaulax longispina, the radiolarian, Acanthometron pellucidum and the tintinnid Dictyocysta magna.

Zooplankton

Surface plankton along the edge of the Shelf was rather meagre, but with fair numbers of Calanus in the sub-surface layers; large quantities were found near Foula. A very dense patch of Limacina was located near the Flannen Islands but did not appear to be at all extensive. Rather meagre oceanic plankton with Arachnactes, Sulculeolaria, Thalassicolla, etc. was present on the Butt of Lewis - Faroe line and extended as a belt on either side from about Rosemary Knoll to Shetland. North-west of Rosemary and including Lousy Bank, and on both sides of (but not over) Rockall Bank, dense quantities of doliolids occurred, especially in the sub-surface layers. Over Rockall Bank Calanus was more abundant and conditions there were not unlike those over the Continental Shelf near St. Kilda. Salps were not so abundant as doliolids but were common particularly on both sides of Rockall and to the north of Lousy Bank.

This distribution would suggest a movement of oceanic water dominated by doliolids from the Rockall area towards the north of Rosemary and west of Faroe Bank which is following a stream, shown by Arachnactes etc., which now occupies the Faroe-Shetland Channel.

TRAWLING

Trawling was done on Faroe Bank, Rockall Bank and near North Rona but strong onshore winds made it impossible to trawl at St. Kilda. Good catches of haddock were obtained at all three stations - those near North Rona being fairly heavily infected with Lernea while those at Faroe Bank and Rockall had no Lernea. Chicken halibut were found at Faroe Bank. Adequate quantities of fish for line bait were taken.

SHARK LINES

Shark lines shot near the surface on two occasions produced no catch but sharks were taken frequently on the ground lines.

GREAT LINES

Excellent catches were made on the great lines. Halibut taken off Faroe Bank, Lousy Bank and north-west of Shetland were all clean fish but a single large halibut on Rockall Bank was heavily infected with Grillotia. Good hauls of ling, tusk and skate were also taken. A set of lines additional to those scheduled was shot at Mr. Seaton's suggestion in 500 fathoms at 60°48'N 11°28'W and resulted in a catch of 29 sharks belonging to five different species. Sharks were also taken at Rosemary Knoll and a large six-gilled shark at the edge of deep water west of Shetland.

HERRING

Herring traces were extremely sparse west of Orkney on the outward journey although a zig-zag route was steamed searching for them. No herring traces were found in the oceanic area west of the Hebrides or on the Outer Banks but plumes like herring traces occurred in patches west and north-west of Shetland during August, e.g. at 59°58'N 5°14'W and at 61°16'N 2°27'W. One or two Russian vessels were observed in that region.

PELAGIC TRAWL

The Icelandic trawl was fitted with a very long and heavy cod-end of a small mesh made of heavy twine. It was used on a number of occasions when the echo traces suggested a possible catch but the results were very poor indeed - usually no catch at all, but occasionally some very small Gadus poutassou and

shellfish. Different rigs were tried using rope 'legs' but with no success although the net appeared to be opening fully between the boards and with a large gape. Perhaps the effect of the mat-like cod-end so reduced the flow that the main flow of water was forced through the larger meshes taking any fish with it.

CORBIN NET

This net now works excellently, giving good catches of euphausids, leptocephali and other fish larvae of more than about 20 mm. It dives extremely well and on one occasion, when a sudden rise at 70 fm. showed on the echo-sounder, the net touched the bottom before the warp could be shortened and a full cod-end of sponges and starfishes was obtained.

ECHO TRACES

Diffuse traces were obtained on a number of occasions but not so continuously as in 1955 nor so concentrated in the form of a ribbon. Investigations were made using the Corbin net and pelagic trawl and plankton nets towed above, in and below the traces. In 1955 the investigations showed that much of the ribbon form of trace could be ascribed to the young stages of G. poutassou but in 1956 these young fish were found only in the Faroe-Shetland area and in no great numbers. This difference could be due to a much smaller brood in 1956 - there is strong evidence to suggest that 1955 was an exceptionally prolific year - or to the fact that the 1956 cruise was a little later in the year enabling the young fish to have become carried beyond the western section. A combination of both these reasons is probable.

As in 1955, townets above and below the traces seemed to indicate that plankton within its normal range of abundance did not produce distinct traces on the paper record, although some of the finer serrations on the C.R.T. picture are almost certainly due to planktonic organisms. In one instance a slight smudge type of trace was associated with extremely dense concentrations of Limacina (several litres in the townet). Sometimes normal volumes of Calanus etc. were obtained where no trace was seen and at other times similar quantities occurred in and below traces; in fact the usual oceanic distribution, with more Calanus in the lower net than that at 20 m., was found even in areas of dense traces at about the 20 m. level. Similarly at other positions poor plankton with a few Arachnactes and Siphonophores was found in and below traces.

The use of the Corbin net, however, indicated on three occasions that a peppery trace was due to euphausids (usually Meganyctiphanes norvegica but with some Thysanoessa longicaudata). Two of these were near the surface and one at 140 m. depth. These euphausids were not taken in numbers in the townets and it is likely that they are sufficiently active to avoid them even during darkness. On another occasion the Corbin net took siphonophores, doliolids, salps, Beroe, Diacria, Meganyctiphanes, larval Sebastes and six leptocephali.

Experiments with lights at 61°16'N 8°54'W, where catches with the pelagic trawl indicated a possibility of the trace being due to Gadus poutassou, showed that the lowering of the lamp case with the light off had no dispersal effect. On switching on the light the trace surrounding the lamp disappeared though it continued a few fathoms below it. This result was obtained on repetition but it was not a 100 per cent. effect. Further light experiments when the trace appeared to be due to Meganyctiphanes gave no result at all. North of Rockall a school of caaing whales was playing about the ship and an occasional dense blob was recorded on the echosounder. Small dense flecks were recorded on two occasions when porpoises were present.

No traces of any intensity were found this year on Rosemary Knoll in spite of a 12-hour search for them there, so that a repetition of the freak haul of the Peneid prawn Funchalia made in 1955 was not possible.

The hydrophone worked very well from a mechanical and electrical point of view and various small noises in the ship could be picked out and identified from about 15 fathoms. No noises that could be definitely attributed to biological sources were heard.

OTHER ITEMS

The diverse catch of Elasmobranchs including seven species of skates, six of sharks and three of dogfish enabled a good range of liver samples to be obtained for Vitamin A analysis. Three carboys for settlement of Coccolithophores for Professor Braarud were taken but one broke loose in bad weather and was smashed.

The results of this cruise support the statement made last year that there seems to be little chance of a successful fishery for meal purposes based on oceanic young or small fish and using nets of the current design. Nets of sufficiently small mesh cannot be made large enough to give the tremendous gape required and yet be strong enough for the very fast pelagic towing that would be necessary to catch them. Only rarely, and for a few hours just before midnight, do these fish appear to concentrate and then in insufficient density for commercial purposes.

J. H. FRASER.

29th August, 1956.

CIRCULATION

Mr. Leonard
Mr. Rae
Captain Bruce
Dr. Lucas
Dr. Wood
Dr. Tait
Dr. Fraser
Dr. Rae
Mr. Gordon
Library (2)
File
Spare (4)