

REPORT ON CRUISE OF "SCOTIA"

25th February to 16th March, 1949.

J. Lewis

Narrative.

"Scotia" left Aberdeen at noon on Friday, 25th February on passage to Whiten Head fishing ground. From Duncansby Head westward through Pentland Firth the passage was exceedingly stormy. Weather forecasts during the day predicting continuance of the storm, shelter was sought in Loch Eriboll in the afternoon of Saturday, 26th February. Nine Aberdeen trawlers also sheltered there throughout the whole of the following day, until early Monday morning.

"Scotia" left Loch Eriboll at 8.30 a.m. on Monday, 28th February, in heavy snow. On account of the poor visibility, the first programme station was amended to a position farther offshore which has previously been worked. After a foul trawl, hydrographic and plankton operations were carried through in worsening weather conditions. The trawl, however, was again shot, but in course of trawling, weather and sea conditions became severe, to such an extent that the ship took two very heavy rolls which I estimate to have been scarcely, if at all, less than 45° . The trawl was immediately hove in and, in common with a number of trawlers, "Scotia" set course again for Loch Eriboll in very heavy seas. At least nineteen trawlers sheltered with us in the loch until the morning of Wednesday, 2nd March.

Leaving Loch Eriboll at 8.30 a.m. on 2nd March, "Scotia" proceeded to the Butt of Lewis ground and thereafter north-westward on the line of stations to Faroe Bank. At the fifth station out from the Butt, weather conditions again deteriorated very rapidly. Six and a half hours, however, were spent on the station, before conditions became unworkable, in repeated endeavours to overcome by various manoeuvres the effect of the ship's heavy leeway in relation to hydrographic and plankton warps. None of these experiments was successful. In particular, the hydrographic warp, with five reversing water-bottles mounted, stood out at such a large angle from the vertical that even a double messenger repeatedly failed to operate the reversal of the uppermost bottle, thus nullifying the entire series.

Time and fuel factors, in conjunction with increasingly serious weather forecasts, were decisive in determining to set course for Syderø, Faroe. "Scotia" put into Trangisvaag on the morning of Friday, 4th March. This was a wild day throughout, and "Scotia", unable to hold to anchor in Trangisvaag Fjord, had to move into the neighbouring fjord of Vaag in the evening for safe anchorage. With prospective abatement in weather conditions, "Scotia" put to sea again about mid-day on Saturday, 5th March. Trawling stations to the west and north of Faroe were successfully fished and throughout Sunday and Monday relatively fine weather conditions enabled also the line of six stations due north of Faroe to latitude $65^{\circ}30'N$, to be completed.

"Scotia" put into Thorshavn for stores on Tuesday morning, 8th March, and despite somewhat adverse weather from the north, put to sea again the same evening. Conditions remained favourable throughout the crossing from Faroe to Shetland, when eleven hydrographic and plankton stations were carried through. On the afternoon of Wednesday, 9th March, from about mid-channel, wireless telephone contact was made with "Explorer", then occupying a position immediately north of Flugga, Shetland, and about to proceed eastward along latitude $61^{\circ}01'N$. Previous attempts to contact "Explorer" in this way were abortive, mainly by reason of blocking by trawlers. Even the successful contact was after a time cut out by the same means.

Rough weather was again encountered west of Shetland where trawling was carried out on Rona's Voe, Foula, and Scalloway grounds. By late evening on Thursday 10th March weather became so bad and visibility so poor that trawling on Fitful Head ground was abandoned.

"Scotia" put into Lerwick on Friday morning, 11th March. "Explorer" arrived in Lerwick the following day.

Storm conditions detained "Scotia" in Lerwick until Tuesday morning, 15th March. On that day, however, the line of six hydrographic and plankton stations between Sumburgh Head, Shetland, and Dennis Head, Orkney, was overtaken before severe weather set in from the south-west and precluded operations planned for west of Orkney waters.

Conditions being impracticable for working when "Scotia" reached the Pentland Skerries, trawling and hydro-plankton station at 1.30 a.m. on 16th March, "Scotia" continued to Smith Bank in the Moray Firth where a successful trawl was shot and other observations carried out.

Time allowed only of a trawl haul at the Bunan Deeps station before "Scotia" made for Aberdeen to berth there one hour after high water on 16th March.

Trawling Results.

1. Whiten Head.

Although the first shot was fouled by twisting of the trawl, specimens of large ripe haddock, and of plaice, were obtained.

2. Butt of Lewis.

Plaice, negrim, cod, haddock, saithe, /ling, hake, /lythe and rays were among the species caught.

3. Myzgenaes, south.

A good representative catch included plaice, lemon sole, cod, haddock, including baby haddock, and whiting.

4. Myzgenaes, north.

Three halibut, with plaice, cod and haddock were the main items of a small representative catch.

5. 62°25'N. 7°11'W. - N.W. Faroe.

Lemon sole, cod and haddock formed the main catch.

6. 62°32'N. 6°35'W. - N. Faroe.

Trawl badly damaged - no fish.

7. Fuglo.

A very small catch yielded mainly common dabs with one plaice and one halibut.

8. 62°12'N. 6°11'W.

Four haddock and two whiting formed the total catch.

9. 61°59'N. 6°17'W.

A fair catch of haddock, some whiting and a few cod and long rough dabs formed the total yield.

10. Fuzze.

Despite a torn trawl, lemon sole, cod, haddock, and gurnard were decked.

11. Honas Voe.

A badly torn trawl yielded no fish.

12. Fouls.

A good catch of haddock, whiting, red and grey gurnard with a few plaice, lemon sole and megrim, was obtained. Herring was represented by two specimens.

13. Scalloway Ground.

Plaice, lemon sole and common dab bulked over haddock, whiting and gurnards.

14. Smith Bank.

A small catch yielded practically only cod and haddock in very small numbers.

15. Bushan Deep.

A badly torn trawl gave only two specimens of codling, one cod, three whiting and smalls.

Stress of weather and serious damage to the trawl in one instance rendered mid-water trials by trawl impracticable. The latter event also precluded the catch of the required haddock or other specimens for Torry Research Station.

Plankton.

Except for some of the catches off the Butt of Lewis and again after Lerwick, I have never before experienced such extremely poor plankton hauls. Subject to this limitation, Sagitta seemed to be fairly general, with Meganyctiphanes, some Aglantha and, off Shetland particularly, evidences of young fish, sandeels and fish eggs.

On account of weather conditions, only one attempt at deep-water towing with stramin net could be made. This was at a position 60 miles north of Faroe. 1,000 fathoms of warp were run out in about $1\frac{1}{2}$ hours and in $2\frac{1}{2}$ hours were hove-in again with the ship cruising at slow speed. The last 200-300 fathoms of warp were inextricably tangled and the net burst to shreds. It had not been on the bottom as was at first feared, which makes the tangling of the warp, coupled with the ruin of the net, somewhat difficult of explanation. The slow rate at which the warp was run out should have obviated tangling and it was felt that the still slower rate of hauling-in with the ship underway should have been sufficient not to overstrain the net.

Hydrography.

Insufficiency of comparative data for the time of year in the region visited precludes actual definition of the temperature anomaly encountered, but upper water temperatures reaching over 9°C over the Wyville Thomson Ridge would appear to be rather in excess of, than below, those to be expected at the end of February, while 6° to 7°C water around Faroe seems about right for early March. The object of the northward line of stations from Faroe

was achieved in so far as a drop in temperature from almost 7°C to $3\frac{1}{2}^{\circ}\text{C}$ in the upper 100-metre layer between the two northmost stations on the section shows almost conclusively that the Atlantic current coursing to the eastward on the north side of Faroe was completely traversed and soundings obtained, at the northmost station, within the limits of the East-Icelandic Arctic Current. On the Faroe to Shetland section, temperatures of $8\frac{1}{2}^{\circ}\text{C}$ and upwards between longitudes $2^{\circ}50'W$ and $1^{\circ}W$, indicates the northward passage of the Atlantic Current between these limits. The abrupt fall in temperature west of $2^{\circ}50'W$ to 7°C is evidence of admixture by turbulent and upwelling processes of oceanic (Atlantic) with sub-Arctic or boreal water from the East-Icelandic Arctic Current. To the eastward of longitude $1^{\circ}W$ the temperature is less but indicative nevertheless of admixture of the oceanic with coastal water in the neighbourhood of Shetland.

Oxygen and phosphate distributions on two sections, that northward from Faroe and the Faroe-Shetland section, were investigated. On the first, the highest oxygen-content, belonging apparently to Atlantic water, was found in a layer which reached the surface in the middle of the section but was overlaid nearer Faroe by water which was relatively poorer in oxygen. Farther north the richer oxygen water was blocked by East Icelandic water, again relatively poor in oxygen. Maximum phosphate values were found on the surface in mid-section and again in deep water below 1200 metres.

Between Faroe and Shetland the highest oxygen values were found on the surface in the western half of the section, with a minimum in mid-section. The lower water-layers, especially on the eastern part of the section, were evidently deficient in oxygen. Phosphate distribution shows similar features as regards the upper waters but deep waters gave values indicating relatively high phosphate content.

Overall, both oxygen and phosphate contents would appear to have been low, but this can only be confirmed by further investigation in comparison with such similar seasonal values as may exist.

General.

Several features in general working conditions on board "Scotia" from the scientific standpoint call for comment.

The severe weather conditions encountered provided a very effective test of working conditions as a whole.

The internal comfort of the ship in both working and leisure accommodation is very much appreciated, more especially under such stress of weather as was experienced. There can be no question, however, of the seriousness of the faults of excessive motion and of the strong drift of the vessel in wind conditions greater than those characterised in the weather forecasts as moderate. These defects have most serious results on trawling, vertical plankton netting, and hydrographic work.

Trawling from "Scotia" in moderately high wind conditions tends to be dangerous on account of the difficulty, sometimes the impossibility, of manoeuvring the vessel away from the trawl warps while shooting the trawl. The ship, in fact, tends to ride into and over the warps which in these circumstances come dangerously near the ship's propeller. Moreover, "Scotia" is ill-designed from the point of view of the officer superintending shooting and hauling operations, his view of the main deck/amidships aft being almost entirely blocked by the boat deck. /from

As has previously been pointed out, the strong and rapid leeway of the vessel under moderate, fresh, or strong winds, entirely vitiates the depth recorder readings for vertical plankton nets and sea water sampling instruments, these readings becoming only rough approximations, instead of being accurate to within a matter of two or three feet at 600 to over 1000 fathoms.

As mentioned in the narrative above, experiments were tried without success to counteract the ship's tendency to drift.

That this tendency is due in much greater degree to direct windage on the vessel than to sea current was clearly manifest at some of the stations worked in the middle of the Faroe-Shetland Channel under conditions of fairly heavy sea swell and drift but little wind. In these circumstances little difficulty was experienced in keeping the ship up to the vertical wires carrying water-bottles etc. to substantial depths.

The above windage effects are obviously due to the great amount of superstructure carried by "Scotia" above the level of the boat deck, and it is submitted that the question is so serious as to warrant the most careful consideration of ways of diminishing this windage.

Previous mention has been made also of the over sensitivity of the hydrographic winches to steam pressure at the commencement of outgoing or incoming operations. The suggestion has been made that a different type of control gear would reduce the risk here of running gear out or in at too great initial speed, by giving the winch operator finer control of the onset of steam pressure.

The very narrow side-deck space on either side the main deck constitutes a considerable handicap to facile working under practically all conditions, but especially in roughish weather. It is felt that the engine-room casing on both sides of the ship could be taken substantially inboard without any disadvantage to the engine-room, and thus provide much-needed extra side-deck space.

The after boat-deck winch carries a maximum amount of 11mm-diameter warp and can only do so if the warp is evenly wound on to the barrel of the winch. Irregular winding causes fouling of the brake block and also the clutch-mat. Even winding is almost impracticable under present circumstances by one man attending both to the running of the winch and to the hand winder. An automatic spreader similar to those on the hydrographic winches is essential on the after boat-deck winch.

The above factor of windage in regions where no shelter is available, in conjunction with the restricted cruising range of "Scotia" by reason of limited fuel capacity, raises serious doubts as to the capacity of "Scotia" to undertake such extensive cruises as are desired during the present year (i.e. into far northern and western waters). Only by taking all possible steps to overcome these disadvantages can they become possible.

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