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CRUISE REPORT

F.R.S. "SCOTIA"

June-July 1955

(Oceanic Cruise)

"Scotia" left Aberdeen on Friday, 24th June, spending the first week completing the larval haddock survey west of Orkney and Shetland, and working the Butt of Lewis-Faroe line. A short break for water was made at Trangisvaag on 2nd July, after which the ship worked the area north-west of Faroe and southwards over the deep water and oceanic banks, arriving at Stornoway on 11th July. Here, fuel, water and stores were taken, and Mr. Steele replaced Mr. Craig.

During the second half of the cruise the ship proceeded via the Minch to begin a traverse westwards from Barra Head to and beyond Rockall, and thence by George Bligh Bank and Rosemary Knoll to the Faroe Shetland Channel, continuing course across the Wyville Thomson Ridge and a further 100 miles to the north-east, studying echo-traces. A break for supplies was made at Stromness on Saturday, 23rd, after which the ship proceeded to the Fladen area to do the productivity part of the programme, and Aberdeen was reached on the morning tide of 27th July.

In addition to the 50 stations of the larval haddock survey, the Fladen sampling and the 12 stations on the Butt-Faroe line, 22 oceanic hydro-plankton stations were worked, and 15 trawls, 5 great line, 2 shark line and 18 pelagic trawl stations were completed.

LARVAL HADDOCK SURVEY

This was completed in its entirety by the end of June, except that one station (58°46'N 06°30'W) was so close to the second standard station of the Butt-Faroe line that the two were worked together at the latter position. Brief examination of the collections did not reveal many haddock larvae, but lemon sole and other fish larvae were common at some stations, particularly near Orkney. As haddock of 5-11 cm. were taken in July in the oceanic area and also west of Orkney and at Fladen by the pelagic trawl, it seems possible that the larvae in the survey area were already too big to be adequately sampled by the 1 metre plankton nets by the end of June.

The plankton taken during this survey showed a large area of Pleurobrachia covering the north Moray Firth, Orkney and west Shetland waters (but not the Fair Isle area), and from the north Scottish coast to just beyond Cape Wrath. A band of Calanus existed round the edge of the Pleurobrachia, being particularly dense off the Butt; it was diminishing in intensity and extent north-east towards Shetland, and presumably extended round the north and east of Shetland to link up with the Calanus population found east of the Pleurobrachia in the Fair Isle area as well as to the south-east of the Moray Firth, and also at Fladen. Outside the Calanus band the plankton changed most markedly to a community of salps extending all the way from about 50 miles west of the Butt to at least the north of Shetland.

A dense patch of Limacina was inserted between the Calanus and Pleurobrachia north of the Minch and Cape Wrath, and a smaller patch north-west of Shetland.

The plankton indicator was used at all 39 stations requested by the S.M.B.A. and the samples have been sent to Leith for analysis.

Surface temperatures varied from about 9.5°C. to 12°C. and bottom temperatures from 8.5°C-9.5°C.

The echometer was used continuously - see separate section of this report.

THE BUTT-FAROE LINE

This was completed between the 30th June and 2nd July. Surface temperatures were mostly about 11-12°C., with bottom temperatures about 8.5°C. south of the Wyville Thomson Ridge and about 0° north of it. The plankton confirmed the Calanus population north-west of the Butt and the sudden change to a salp community after the 100 fm. contour. From there to the Wyville Thomson Ridge the plankton was largely homogeneous at all depths, but north of the Ridge the salp community did not extend to 250 metres, and below that boreal species dominated.

THE OCEANIC SURVEY

Surface temperatures varied from 8.8°C. off Myggenaes to 14°C. in WW16b and at the southern entrance to the Minch. Bottom temperatures were about 5.6°C. on the Faroe-Iceland Ridge to as low as 4°C. in 1500 metres on either side of Rosemary Knoll. Oceanic surface temperatures in the Rockall, Bligh and Rosemary areas were mostly rather below 13°C.

Salps were abundant over a wide area from Faroe Bank over the north-western and Rockall Banks and as far east as the 100 fm. contour off the Hebridean area. With the salps were Thalassicolla, Chelophyes and other oceanic species. In deeper water Aglantha was often dominant at 250 metres and only in the deep water closing nets did Euchaeta and other oceanic crustacea occur. Cyanea was abundant throughout almost the whole area investigated. North-west of Faroe salps were absent, but here again Calanus was very rare and jelly fish were dominant - here Bougainvillia, Laodicea and Aglantha. Calanus was abundant over the whole shelf west of the Hebrides as far south as was investigated and along the edge of the shelf from the Butt of Lewis to Shetland.

TRAWLING

Trawls at 7 stations during the larval haddock survey gave rather poor catches, except in B18b where 136 haddock and 86 whiting were taken. The haul on the Faroe plateau gave a good catch of large haddock which were used for line bait.

A suitable trawling ground for bait was looked for at the south end of the Minch but none was found to be workable without bobbins until west of 8°W., where moderate results were obtained, but adequate for the purpose. A trawl on Rockall Bank south of the Rock yielded 8 baskets of haddock, about 800 fish, but little else.

Examination of the Kingfisher C.R.T. at Fladen showed evidence of concentrations of fish about a fathom off the bottom, and the otter trawl was therefore shot to investigate, producing an excellent catch of about 500 haddock and over 140 whiting.

HERRING

Some echo-traces, probably herring, were seen east of the Moray Firth and Orkney and north-west of Shetland. No herring were caught in the pelagic trawls north-west of Faroe or anywhere else during the survey. Two large herring of 29 and 31 cms., were found in cod stomachs in ZZ18b (59°48'N 04°30'W).

Silc and mackerel were abundant in Stornoway harbour, and were reported as very abundant over a wide surrounding area. Two herring were taken in the trawl at Fladen, and herring traces were seen on the echosounder on the return journey, about 30 miles E.N.E. from Aberdeen.

GREAT LINING

Great lining was tried, using two lines each time. They were shot at 61°00'N 09°12'W (Faroe Bank) resulting in a halibut, 3 tusk, 7 ling and 1 skate, using haddock for bait. At 60°21'N 12°12'W (Lousy Bank) the catch was 4 halibut, 7 tusk, 1 skate and 1 Pristiurus, using tusk and ling for bait. At Rosemary Knoll, 59°12'N 10°09'W, 8 halibut, 17 tusk, 3 six-gilled sharks and 2 Pristiurus were taken, using tusk for bait.

During the second half of the cruise lines were attempted at two stations. At the north-east edge of Rockall Bank, 57°40'N 14°11'W, the result included 1 halibut, 40 ling, 4 tusk and 14 skate, using haddock for bait. A repeat shot at Rosemary Knoll using ling and tusk dollops took 4 halibut, 14 tusk, 1 skate and 8 Pristiurus. Unfortunately, the anchor line parted at the first anchor, probably chafed on the point of the anchor and the dahn pallets, and 300 fathoms of anchor line were set adrift, the rest being recovered from the second dahn. A search of about two hours in poor visibility for the lost gear failed but gave interesting information on the echo-traces on this bank.

Some Peterhead motor line vessels were seen fishing on Faroe Bank.

SHARK FISHING

Norwegian shark fishing vessels were seen just off the edge of the shelf some 45 miles north of the Butt. "Scotia" tried shark lines at 63°05'N 11°02'W but no catch resulted, although 3 haddocks used for bait had been bitten in two: 5 hooks had lost the bait but whether this was taken or not is unknown. Forty-eight haddocks and 6 Argentina used as bait were hauled untouched. A further attempt on George Bligh Bank, using haddock and ling dollops for bait, also resulted in no catch and the bait here was also largely untouched, only three haddocks had been bitten.

Three sharks (all six-gilled sharks, 163-193 cm.) were taken on the great lines at Rosemary Knoll, and Pristiurus was taken at several great line stations.

PRODUCTIVITY

The productivity programme was carried out on Fladen on 26th July.

THE CORBIN NET

Great hopes were pinned on this net for sampling small fish populations located by the echosounder. First shot from the forward gallows using the trawl warp, it was found to be difficult to get away from the ship's side, but eventually it was towed at 40 revs. using 70 fathoms of warps, and it came back completely ripped from end to end, the codend in the middle and the upper half trailing behind it, the seams of the net having given way.

After lacing together again, it was shot from the after gallows but failed to open properly, and after a number of trials with various adjustments, the net was dispensed with pending Mr. Corbin's comments and advice.

THE ICELANDIC PELAGIC TRAWL

This net was taken partly in the hopes of sampling oceanic herring to the north-west of Faroe, but no traces attributed to herring were noted in this part of the survey. As the new trawl warps recently fitted to "Scotia" filled the winch barrels, it was not possible to use this trawl with sweeps

without cutting the trawl warps and so seriously impairing trawling efficiency in the deeper grounds for the remainder of the year. The net was therefore rigged without sweeps.

After the first attempt showed the presence of small G. poutassou in the herring mesh codend, a small mesh cover was fitted over the top of the codend. This improved its retaining capacity of these small fish but would still allow a large percentage of the fish to escape. This rig was used throughout the rest of the first half of the cruise. During the second half, when herring sampling was no longer to be hoped for, the herring mesh codend was removed altogether and replaced by a much shorter length of small mesh netting of ½" between knots. This proved to be a very satisfactory sampling gear. (This does not mean maximum efficiency but that the catches could be compared with a reasonable degree of confidence. No estimate can be made of the numbers of fish escaping through the larger meshes prior to the codend). It was used for half an hour each time, towed at the depths at which the echosounder indicated the maximum likely concentration. Details of the catches are separately reported under the heading of "Echosounding".

ECHOSOUNDING

The MS24F echosounder was in almost continuous use throughout the cruise, the MS34J machine being used at particular places as occasion demanded. Traces were abundant and indeed not often absent, and were largely of three types. (1) Typical herring traces which were found only east of the Moray Firth and Aberdeen coast, east of Orkney and north-west of Shetland; (2) scattering layers of diffuse patterns; and (3) strong, well defined, continuous pelagic traces.

Type two, the diffuse trace, was found during the larval haddock survey, covering the areas occupied both by Pleurobrachia and by Calanus (but not that occupied by salps), and also at Faroe. It does not seem likely that Pleurobrachia, even in dense shoals, could have been responsible for these echoes, as salps were often equally abundant and are roughly of the same consistency and with nuclei in addition which might expect to increase the chances of traces from salps. Until the plankton collections have been worked up in detail, a reasoned assessment of the possibility of these and other common planktonic organisms being the origin of traces cannot be given, but brief examination tends to nullify any such suggestion. Plankton nets were towed above, in, and below traces of both the diffused and defined types, and there was frequent negative evidence of any connection. For example, dense swarms of Calanus and large Limacina were found below the traces, while within the trace area the collections were only about a quarter of the size. The Icelandic pelagic trawl, however, showed the presence of young fish, often in numbers, both by day and by night in the diffuse trace areas; fish such as haddock and whiting from 5-11 cm. in length, which are active enough to dodge the 1 metre townets, even in darkness, and are too small to be represented in the conventional fishery research gear. Fish such as larval lemon soles, etc. were often common in the plankton nets in areas of diffuse traces. The observations show no evidence of diurnal migration in the larger young fish which were just as abundant at noon as at midnight in depths of 8-30 fathoms. The interference pattern of these fish on the C.R.T. at sensitivity 4 is only about half to one inch. During the night these young fish are sometimes joined by larger fish such as whiting of about 25 cm., which caused C.R.T. patterns of about 1½" to 2". Flecks in the paper echo-trace recording can, I think, be attributed to large Cyanea. Euphausids were not abundant during the trip, and the evidence for or against their causing traces was very inconclusive.

Haddock (4-10 cm.) were taken by the pelagic trawl also on Rockall Bank and on Bill Bailey Bank at 60°46'N 10°16'W (5-11 cm.) and one at 8 cm. in the Faroe-Shetland Channel in ZZ20d (60°35'N 04°30'W). This seems to be more evidence that the haddock population of the outer banks can be derived or supplemented from a Rockall spawning as at least some of the young fish remain in the upper layers of the sea long enough for them to make such journeys.

The third type of trace, a well defined ribbon on the paper, was associated with the salp distribution but was also attributable to young fish and not to the salps or any other invertebrate planktonic organisms as these were never shown to be confined to narrow bands. Two main behaviour patterns were seen; one which showed very little evidence of diurnal migration was, it is believed, due to G. poutassou, and the other which gathered only a short time before midnight and disappeared with the dawn, was due to a mixture of oceanic fish, notably Myctophum glaciale, with lesser numbers of M. punctatum, Maurolicus mulleri, Stomias and Gonostoma.

G. Poutassou, 7-14 cm., were taken in a wide area over deep water only, off the edge of the shelf from at least the southern limits of the investigation, approximately 56°30'N, between Rockall and the Hebrides, through the Faroe Channel but fading out some 100 miles north-east of the Wyville Thomson Ridge. The western limits were Rockall and between Lousy and Bill Bailey Banks (approximately 11°W) with a tongue extending northwards over the deep water between Faroe and Iceland. Although these fish were found only over deep water and not over the Continental shelf, they were more concentrated in numbers over the deep water banks, i.e. water of 200-300 fathoms, and less over the very deep water up to 1000 fathoms, in spite of their distribution presumably being dependent upon oceanic water movements, and the fact that the fish themselves were always in the upper 30 metres.

The extent of the distribution and the numbers of individuals caught, sometimes over 300 per half hour haul, can be linked with the large numbers of small larvae found by the .M.B.A. Continuous Plankton Recorder surveys in the area west of the 100 fathom line to 17°W between 54° and 59°N in April 1955, which suggest that this year is one of exceptional abundance of G. poutassou.

At 60°30'N 03°00'W a marked trace was located at 15 fathoms and 1 lb. of explosives was set off at the precise depth but no G. poutassou or any other fish were seen to rise to the surface. At 59°44'N 07°15'W the trace was particularly marked and 14 photographs were taken with the Robot camera. Photographically, these were very successful, and excellent pictures of salps, medusae, etc. were taken, but none of G. poutassou. Photographs of the Kingfisher C.R.T. were also taken for record purposes and comparisons. Here, I would like to pay tribute to Mr. Craig's excellent work with the underwater camera, which failed to operate on test. In spite of poor sea conditions, tools, lighting, etc. he dismantled the intricate shutter and synchronization mechanism, found the fault and repaired it, maintaining (as the results show) excellent synchronization. In spite of these two negative pieces of information, the evidence that the traces were caused by G. poutassou seems reasonably definite, and the absence of floating fish after the explosion seems to indicate that no large fish were present. Further evidence that these traces are due to fish and not to salps or medusae is seen in the appreciable drop in level when the ship is stopped, probably due to the various ships noises frightening the fish. Drops of up to 30 fms. in 10 minutes were recorded.

Some adult poutassou were also taken in the pelagic trawl on Rockall Bank.

The scopelids, etc. were only found in numbers in the southern part of the survey, i.e. in the Rosemary and Rockall latitudes, and were not confined to the east of Rockall as were the G. poutassou.

Of special interest were the hauls taken on Rosemary Knoll on the 20th July, where the echo-traces were divided into two types. The lower one was sampled first, just prior to midnight, at 32-35 fathoms and caught about 80 G. poutassou with some scopelids. The upper layer at 15 fathoms was sampled immediately after midnight and also contained about 80 G. poutassou with some scopelids, but in addition 84 prawns of 14-16 cm. in length were taken.

COMMERCIAL PROSPECTS

Small G. poutassou were widespread over a large area and the numbers present must have been immense. From the S.M.B.A. evidence, it seems that 1955 was an exceptional brood year, so that these numbers may not be repeated and cannot be taken to represent an average annual abundance. Nevertheless, with the gear available, the catch rarely exceeded 300 fish in half an hour's tow with the pelagic trawl. This net, with its herring meshes, is probably very inefficient for the purpose and a properly designed net of graded meshes could perhaps be expected to yield about a basket an hour. It would thus require a net of vastly improved efficiency, more than could be reasonably expected, to make a commercial fishery an economic proposition, catching these fish for meal at low prices. As a source of small fish specially processed as hors d'oeuvres possibilities exist, but only if some special trend in the market made the demand possible. Samples of small G. poutassou were tried and found to be good eating.

It would seem that the scopelids were sampled at the northern edge of their distribution and that greater numbers might be available south of 54°N. Numbers occasionally reached 400 per half hour but unless these figures could be vastly increased the commercial prospects for a fish meal fishery do not seem to be any brighter than for G. poutassou.

Although the result of this survey would indicate poor commercial prospects for such a fishery, it would be wrong to come to any final decision on the results of a single cruise.

The midnight catch of 84 large and delightfully edible prawns on Rosemary Knoll might be worth a further investigation when the ship is in that area again.

Photos will be available later, in the library edition.

J. H. FRASER
8th August, 1955.

CIRCULATION

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