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to the Laboratory.

CRUISE REPORT

F.R.S. "SCOTIA"

PART I9th-28th March, 1969

"Scotia" left Aberdeen on the afternoon of Sunday, 9th March, 1969.

After releasing 100 bottom current markers off the mouth of the River Ythan, "Scotia" occupied the trawl position in the Buchan Deeps and completed the station late that night.

In working a line of stations somewhat sheltered from the strong north-westerly winds, "Scotia" arrived off the east of Orkney on the 11th March, and a decided improvement in the weather now allowed work to proceed in more open areas.

The intention then was to work a line of stations due east along $59^{\circ}30'N$ and to complete all the stations north of this line before entering Lerwick. Early on the morning of the 13th March, when "Scotia" was at $59^{\circ}45'N$ $2^{\circ}30'E$ and 120 miles S.W. of Shetland, a most adverse forecast compelled her to make for shelter.

This forecast was the precursor of the great south-easterly gale that blew with force 9 to 13 for 6 days.

"Scotia" weathered this gale lying west of Unst, in company with a Russian fishing fleet of more than 45 trawlers and 5 factory ships. "Scotia" was able to make for Lerwick on the 20th March to take on water and stores, and to exchange engineers.

On leaving Lerwick on the 22nd March the most favourable area in which to resume work was the Moray Firth, but after four stations had been completed there, a significant improvement in the weather made work possible in other areas also. Accordingly, in the four remaining working days of the cruise, as many areas and sub-areas that had not been sampled previously were now occupied, including a few environmental stations in the Baltic outflow.

"Scotia" docked at Aberdeen on the morning of the 28th March to take on oil in readiness for Part II of the programme.

Hydrography

Surface and bottom temperatures and salinities showed that vertical uniformity prevailed over the whole area except in the Norwegian Deeps. Surface temperatures ranged from 5° to $6^{\circ}C$ and salinities were normal for this time of the year. In all areas, except in the Norwegian Deeps, winter maximum nutrient values of ca 0.80, 8.50 and $4.50 \mu g.-at.$ for phosphate, nitrate and silicate respectively were recorded. In the Norwegian Deeps the values for phosphate, nitrate and silicate had been depleted to 0.20, 3.00 and $0.01 \mu g.-at.$ respectively.

Plankton

Standing crop of zooplankton was normal for the time of year, generally rather low, apart from the eastern stations.

Euphausiids were the most outstanding component of the samples. Thysanoessa inermis, and Thysanoessa raschii, and a few Nyctiphanes couchii were all widely distributed, and quite large numbers of Meganyctiphanes norvegica were found over the Norwegian Deeps. Chaetognaths were also well

represented, almost exclusively by Sagitta elegans, though Sagitta setosa was present within statistical square C15a, and Sagitta serratodentata in H17c. At stations towards the Norwegian coast Calanus and other copepods were more in evidence.

Few coelenterates were sampled apart from Berøe cucumis and Physophora hydrostatica at the more northern positions.

At eleven stations duplicate Gulf III hauls were made and one of the samples deep frozen for comparative dry weight determinations.

Multi-depth plankton indicator samples, and at selected stations special samples for biomass determinations, were obtained for S.M.B.A. Edinburgh.

Trawling

Owing to the severe disruption of the programme on account of weather, the west side of Orkney was not sampled, and in the North Sea itself only one trawl was completed north of 59°30'N. All other areas and sub-areas were adequately sampled, the Vinge trawl being used all the time; catches varied from $\frac{3}{4}$ basket to 36 baskets, the dominant species in all hauls being haddock.

The best catches of haddock came from two areas, one just N.E. of the Moray Firth at 58°30'N, 1°00'W and the other 60 miles due east of Peterhead at 57°30'N, 0°00'. Here numbers of individuals in the cod end varied from 8,000 to 10,000, the bulk of the catch being in the size range 13 to 29 cm. The best catches of larger haddock in the size range 30-66 cm came from these two areas with 400 and 544 individuals respectively and also from a trawl in the Fair Isle gap where 337 fish were taken. The poorest catches from $\frac{3}{4}$ to 4 baskets came from trawls over the Patch in the vicinity of 59°N 3°E, i.e. on the western edge of the Norwegian Deep.

Whiting occurred in all the trawls in numbers ranging from 8 to 1,390 individuals, the best catches coming from the same areas as for haddock. The bulk of this species was in the narrow size range of 20-26 cm with very few individuals in the larger range of 27-40 cm.

Common and long rough dabs were the best represented flat fish. In a position just outside the Moray Firth 480 common dabs (8-23 cm) and 513 long roughs (9-20 cm) were taken.

Best catches of other flat fish were with 25 fish (17-31 cm) and lemon sole 60 fish (14-34 cm) from within the Moray Firth; another of 68 lemon sole (15-33 cm), 10 plaice (29-48 cm) and 27 Raja montagui (30-50 cm) from the Fair Isle gap. Other species of skate taken in the trawls in very small numbers were R. clavata, R. naevus and R. batis.

T. esmarkii were very poorly represented in the trawls, there being hardly more than 200 individuals (11-16 cm) in the best catches of this species.

Shellfish taken in the trawls comprised 3 catches of Nephrops, the largest being one of 65 individuals (23-37 mm) from within the Moray Firth, and one catch of 2,880 shrimps, Pandalus borealis (1.5 mm) from the central ground of the Fladen.

PART II

29th March to 5th April, 1969

Three recording current meters were placed at 5, 10 and 15 miles from the Aberdeenshire coast. At the two inshore positions, 250 gallons of Rhodamine dye solution were released along with parachute drogues and bottom current markers. During the ensuing 36 hours, surveys of the dye patches were made using the fluorimeter; the thermograph-salinograph was run concurrently. A line of hydrographic stations was worked on the 2nd April. "Scotia" put into Aberdeen for 12 hours on the 3rd when the dye equipment was off-loaded,

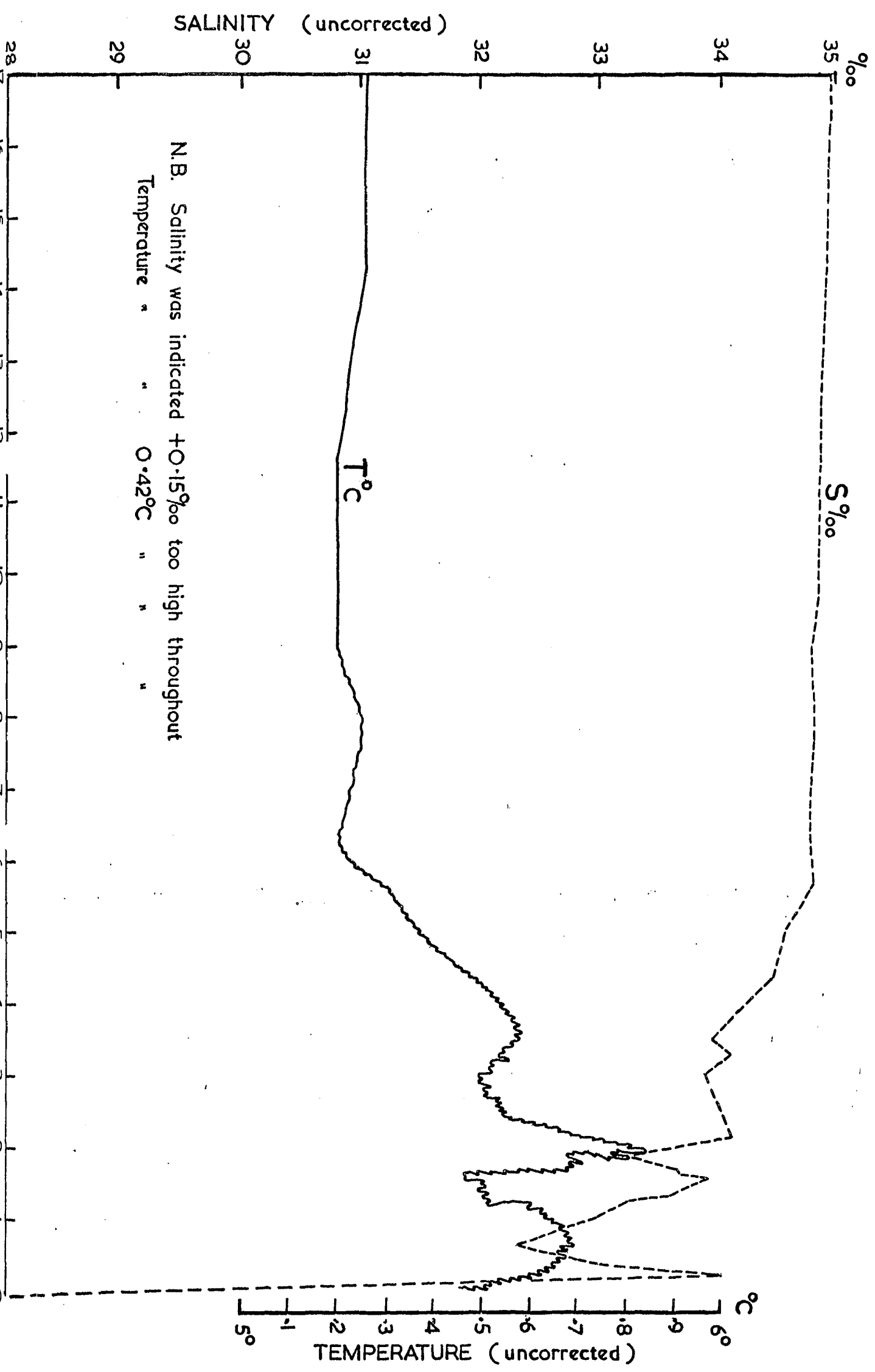
the thermograph-salinograph was transferred to "Mara", and Dr. Johnston disembarked. Finally "Scotia" anchored near the middle current mooring and direct current readings were made over a 12 hour period. The remaining scientists then came ashore on "Mara" and "Scotia" proceeded to Leith.

With reasonably good weather throughout, all tasks were accomplished. The thermograph-salinograph functioned well except during heavy pitching. A diagram of the temperature-salinity record for the passage from the outer current meter mooring to the pier head at Aberdeen is attached to illustrate the quality of these results. The scale selected for salinity does not show well the minor fluctuations in salinity beyond 6 miles off which were more apparent in the original record. The hydrographic situation within a 5 mile radius of Aberdeen is clearly quite complex.

R.B. BURNS
R. JOHNSTON

30th April, 1969

CONTINUOUS PROFILES OF SALINITY & TEMPERATURE AT 3m FROM OUTER MOORING TO ABERDEEN PIER HEAD.



N.B. Salinity was indicated +0.15‰ too high throughout
 Temperature " " 0.42°C " " " " " "