

SCOTTISH MARINE BIOLOGICAL ASSOCIATION

Dunstaffnage Marine Research Laboratory.

Cruise Report

RRS Challenger.

Cruise 7/78

24 April - 9 May 1978.

RRS CHALLENGER : Cruise 7/78

Duration of Cruise : 24th April - 9th May 1978 (All times BST).

Locality : Rockall Channel and Porcupine Bight

Weather : Excellent throughout. Winds mainly northeasterly and never more than force 5.

Staff : J.D.M. Gordon

P.R.O. Barnett

B.L.S. Hardy

J. Watson

J.A.R. Duncan (Mrs)

S.E. McLean (Miss)

A.G.H. Connelly

J.W. Patching (University of Galway)

D.L. Burkel (Glasgow Museum)

L.G. Ross (Stirling University)

Aims : (a) Fishing

- (1) To sample the demersal fish populations on the SMBA seasonal transect on the Hebridean Terrace using the large Granton trawl and the single warp trawl.
- (2) To compare the catch rates of the large Granton trawl and the single warp trawl on the upper slope.
- (3) To use the single warp trawl at 3000m close to the SMBA seasonal station.
- (4) To sample the upper slope on the IOS transect in the Porcupine Bight with the large bottom trawl and to occupy deeper stations with the single warp trawl.
- (5) To study the biochemistry of the lipid foam in the swimbladders of deep-sea macrourid fish.

(6) To obtain bacteriological samples from the intestines of deep-sea fish.

(7) To obtain samples of fish for a histological study of the melano-macrophage centres of teleosts.

(8) To collect further material for a study of the dermatology of teleosts.

(9) To collect deep frozen squid for Dr Clarke M.B.A. and Dr. Early, Torry Research Laboratories, Aberdeen.

(b) Multiple Coring

(1) To test a new 12-core adaptation of the previously 4-core multiple corer.

(2) To take multiple core samples at the SMBA 158 m Shelf Station, the SMBA 3,000 m seasonal station in the Rockall Trough, the SMBA 5,000 m station on the Porcupine Abyssal Plain (not achieved due to lost ship time), and the IOS Porcupine Seabight stations at 2,000 m and 4,000 m.

(3) To take multiple core samples at these stations for studies by Dr Patching of the sediment total biomass (by ATP determination), the sediment bacterial biomass (by muramic acid determination) and the concentrations of ammonia and other inorganic nutrients in sediments and overlying water.

(c) Miscellaneous

(1) To release drift bottles for the Department of Oceanography, Galway.

Narrative :

The scientific equipment was loaded at Mallaig on Saturday 22nd April and two of the scientific party joined ship

on Sunday 23rd. The remainder of the scientific party joined on Monday 24th but sailing was delayed because of the late-arrival of fuel and a fractured steam pipe. Challenger sailed at 10.00 25 April but shortly afterwards the chief steward was injured in a fall and on medical advice Challenger diverted to Oban where the steward was landed at 16.45. Challenger then lay at anchor off Dunstaffnage to await the arrival of a replacement. The new chief steward joined at 12.30 26 April and Challenger sailed at 13.00 for the shelf coring station. Coring began at 21.38 26 April and was complete by 23.00. Within 25 minutes of leaving this station for the fishing area a generator failed and the ship blacked out. The other generator was started but because both were required for working the winches Challenger headed for the Clyde for shore assistance with repairs. Challenger secured alongside Custom House Quay, Greenock at 19.24 27 April and although the generator was quickly repaired sailing was delayed until 09.00 29 April because of problems in locating a fault in a lub-oil pump.

Since the last fishing cruise in October 1977 the trawl warps had been cropped and the winches had been overhauled. It was therefore decided to check that the warps were level and the winches fully functional by first trawling in shallow water. The net was shot at 08.15 30 April but soon became fast on the bottom and had to be recovered. Fortunately the damage was minimal and to allow time for repairs Challenger steamed to the 1250 m fishing station arriving at 14.05. The trawl was shot at 15.03 and recovered with a good catch at 19.00.

Challenger then steamed to the 2000 m multiple coring station and a successful drop was made between 21.10 and 22.35. A further two drops were successfully completed at the 1500 m station

between 01.16 and 03.36 1 May and Challenger then steamed to the 750 m trawling station. The 750 m station was worked between 06.00 and 10.25 and a further trawl at 1000 m was completed between 11.06 and 15.39. Both trawls yielded good catches and the latter was exceptional by being the largest catch ever made by Challenger. Challenger then steamed to the 2000 m station and during the passage the single warp trawl was rigged. The trawl was shot at 21.08 and recovered at 02.15 2 May. Unfortunately the net failed to take the bottom and it was decided to postpone further trawling until the next morning. Challenger steamed to the 2000 m coring station and the multiple corer was deployed successfully between 03.19 and 04.19. A second attempt at the 2000 m trawling station between 08.08 and 14.41 was successful and a good catch was obtained. The single warp trawl was again used to sample the fish at 1750 and 1500 m between 17.40-22.08 and 23.10-03.41 3 May respectively. Challenger then steamed to the 750 m station previously sampled with the large bottom trawl and the single warp trawl was shot at 05.34 and recovered at 09.35 providing useful comparative material from the two nets. This completed the work on the Hebridean Terrace and course was set for the SMBA deep station in the Rockall Channel.

Challenger was hove-to on station at 21.58 and 5 successful drops were made with the multiple corer. The station was complete by 04.35 4 May. The single warp trawl was then deployed between 05.20 and 12.15 but failed to take the bottom. A second attempt between 13.00 and 19.20 produced good results. Challenger then set course for the Porcupine Bight to use the remaining working time to carry out some of the work originally planned for this area. A P.D.R. run over the proposed 1000 m trawling station

showed that the ground was unsuitable but an area further south at a depth of 850 m appeared to be promising. The large Granton trawl was shot at 15.30 5 May and recovered at 19.10. An interesting catch of fish and invertebrates was obtained. Challenger then steamed to the 2000 m coring station and three successful drops were completed between 01.44 6 May and 04.35. The single warp trawl was worked between 11.00 and 17.55 at a depth of 3000 m.

The remaining working time of the cruise was spent at the 4000 m station. Unfortunately the PDR failed shortly before arrival on station but despite the difficulties this caused we decided to continue with the programme. The single warp trawl was shot at 19.30 and recovered at 02.08 7 May. Unfortunately most of the catch had failed to reach the codend and was lost on recovery. Challenger then steamed back to station and the multiple corer was used between 04.07 and 10.02. 4 drops were made but on two occasions no cores were obtained.

Challenger then sailed for Barry and secured alongside at 08.00 9 May. The scientific gear was unloaded during the morning and the scientific party left ship at 15.30.

Results

(a) Fishing

(1) The fishing on the Hebridean Terrace was in the main very successful. In order to make up some of the lost time due to engine repairs the least important 500 m trawl was missed. Good catches of macrourids were obtained from all stations and samples of a variety of less important species were preserved in formalin for length-weight measurements in the laboratory. Perhaps the most interesting feature of the catches was the dense

concentrations of Alepocephalus bairdii in the 1250 and 1000 m hauls. These were in a very ripe condition which suggests that this was a spawning aggregation.

(2) It was the original intention to repeat all the large bottom stations with the single warp trawl but in order to make up for lost time only the 750 m station was repeated. This station was chosen because it has the greatest variety of species. Preliminary results confirm previous impressions that the single warp trawl is less effective in catching fast swimming species such as sharks and scabbard fish.

(3) The purpose of the new fishing station close to the SMBA seasonal station is to obtain information on the fish populations in the area. The dominant fish was Nematonurus armatus and good samples of invertebrates, especially holothurians, were obtained.

(4) The original intention had been to deploy the large bottom trawl at depths of 500, 750, 1000 and 1250 m on the IOS transect on the Porcupine Bight. This proved to be a difficult area in which to find suitable ground. The inaccuracy of Decca and the long time interval between satellite navigator fixes made position fixing difficult. By chance a suitable area with a depth ranging from 750-850 m was found close to the proposed 1000 m station and the trawl was shot and successfully recovered. Although the catch was smaller than is normally obtained on the Hebridean Terrace, at equivalent depths, many of the species were similar. The notable exceptions were the absence of Coryphaenoides rupestris and the presence of two new species Hoplostethus mediterranea and Trachyscorpia cristulata.

The single warp trawl was successfully worked at the 3000 m station and the catch appeared to be similar to that obtained at an equivalent depth in the Rockall Channel. The 4000 m

sample, had it been successfully landed, would have been a useful comparison with the IOS trawl used at this station a few weeks earlier.

(5) Samples of lipid foam material from the swimbladders of slope dwelling fish were collected and rapidly frozen by Dr Ross of Stirling University. It is hoped that qualitative and quantitative analysis of the material will demonstrate whether or not it is an artifact of decompression. Washings from bladder interiors will be examined for surfactant lipids, which may be important in gas secretion.

Dr Ross also made a survey of the number of retia mirabilia in the swimbladders of a range of macrourids in an attempt to determine variability within a species.

(6) Bacteriological plates of lower gut material were prepared and incubated by Dr Ross for Dr M.T. Horne, Stirling University.

(7) Samples of Chimaera monstrosa and Helicolenus dactylopterus were collected for the study of the melno-macrophage centres by Mr. C. Agius, Stirling University.

(8) Miss S. McLean collected a variety of material for Mr Bullock's study of the dermatology of teleosts. A range of different histological fixatives was used to sample the skin of the blue ling Molva dypterygia.

(9) Deep frozen specimens of Torarodes sagittatus, a deep water squid, were obtained for Dr Clarke, MBA and Dr Early, Torry Research Laboratories, Aberdeen.

(b) Multiple coring

A new 12-core assembly to take undisturbed cores of the top 15 cm of sediment was tested and worked very successfully.

It is an adaptation of the previous 4-core assembly and is designed to provide three times the number of cores for a single haul, thus providing (i) some saving in shiptime, (ii) additional cores from each haul to supply the needs of meiofaunal, geochemical and microbiological specialists and (iii) to provide more meiofaunal individuals for single species studies, particularly in the deep sea sediments where the species diversity is greater than in shallower waters.

Table 1 summarises the multiple coring operations. The corer worked very well both in the fine sand^d of the Shelf Station at 158 m and in deep sea sediments ranging from 1500 m to 2,900 m. Until the last station (4,000 m, Porcupine Seabight) the corer made 12 drops at 4 stations without any empty cores. However, at the 4,000 m Porcupine Seabight station, a heavy swell had developed (with little wind) which, from the evidence of the Shipek camera mounted on the corer, resulted in the corer lying on its side during descent and prematurely firing during two of the four drops. Apart from the heavy swell, this may also be partly due to the heavier weights associated with the 12-core assembly resulting in a centre of gravity somewhat higher than the centre of resistance. The combination of rapid descents by the ship from wave crest to trough and the lowering speed of the winch (about 100 m/min) could have resulted in the corer frequently lying on its side during descent.

The multiple corer therefore provided further excellent material from the 2,900 m SMBA station for the continuing seasonal studies of harpacticoid copepods by SMBA and of nematodes by the British Museum (Natural History). In addition, good cores were obtained for detailed studies of the microdistribution of meiofauna at 158 m on the shelf, 1500 m and

2,000 m from the Hebridean Terrace and at 2,000 m and 4,000 m on the I.O.S. Porcupine Seabight stations.

In addition, the corer provided cores from the Porcupine Seabight for geological studies of the recent and fossil foraminifera by the Geology Dept., University College of Wales, Aberystwyth (Mr. G. Pearce, CASE Research Research Student).

Finally, the corer provided satisfactory cores for Dr. Patching's studies (University College, Galway, Eire) of the total and bacterial biomasses and of the remineralisation of deep sea sediments, for which the preliminary laboratory work was carried out on board.

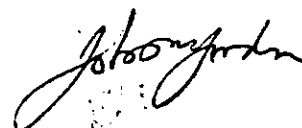
Cores from stations 1, 5, 14, 18 and 21 (Table 1) were sectioned and the ATP from the sections was concentrated and purified on charcoal columns for subsequent measurement. Subsections were preserved for subsequent Muramic acid and nutrient analysis. The concentration of ammonia in the overlying and pore water of the sediment surface layers was measured at stations 14, 18 and 21.

Throughout the coring operations, the Shipex camera worked well once it had been mounted on the multiple corer. When first prepared for use at the Shelf Station it failed during test due to shorting in the high tension Marsh Marine connector on the strobe unit. The plug was replaced by Mr. Watson. The only other failure was when, at the 4,000 m Porcupine Station, it ran out of film during the final haul because the triggering weights had become detached and the camera photographed at 15 sec intervals during the descent and ascent.

(c) Miscellaneous

(1) Dr Patching, Galway University, released drift bottles for a colleague in the Department of Oceanography, Galway.

The release positions are given in Table II.



J.D.M. Gordon.

19/5/78.

TABLE 1

Station No.	Date	SMBA Ref.	Gear	Position (approx.)	Depth (m) (approx)	Temp °C	Sal	Remarks
1	26/4/78	A3	Multiple corer	56°02'N 07°39'W	158	8.64	35.34	2 drops - 24 cores. No bottom photographs.
2	30/4/78	Test trawl	Large trawl	56°38'N 08°40'W to 56°39'N 08°42'W	130	-	-	Net fast. One bridle and footrope parted. Wing damaged. Warps square.
3	30/4/78	7/78/34	Large trawl	56°36'N 09°24'W to 56°33'N 09°28'W	1250	-	-	Good haul
4	30/4/78	-	Multiple corer	56°40'N 10°04'W	2000	3.45	34.97	1 drop. 12 cores. Shipek camera bottom photographs
5	1/5/78		Multiple corer	56°40'N 09°33'W	1500	4.26	35.02	2 drops. 24 cores. Bottom photographs
6	1/5/78	7/78/35	Large trawl	56°36'N 09°07'W to 56°34'N 09°12'W	750	-	-	Good haul
7	1/5/78	7/78/36	Large trawl	56°35'N 09°16'W to 56°33'N 09°20'W	1000	-	-	Good haul - large numbers of Alepocephalus.
8	1/5/78	-	Single warp trawl	56°50'N 10°01'W to 56°46'N 10°04'W	2000	-	-	Net not on bottom.
9	2/5/78	-	Multiple corer	56°58'N 09°54'W	2000	-	-	1 drop. Shipek camera bottom photographs.
10	2/5/78	SWT 23	Single warp trawl	56°51'N 10°02'W to 56°47'N 10°04'W	2000	-	-	Good haul
11	2/5/78	SWT 24	Single warp trawl	56°47'N 09°38'W to 56°44'N 09°40'W	1750	-	-	Good haul

12	2/5/78	SWT 25	Single warp trawl	56°29'N 09°39'W to 56°24'N 09°39'W	1500	-	-	Good haul,
13	3/5/78	SWT 26	Single warp trawl	56°28'N 09°09'W to 56°32'N 09°12'W	750	-	-	Good haul.
14	3/5/78	A2	Multiple corere	55°02'N 12°03'W	2900	2.76	34.97	5 drops - 60 cores. Shipek camera bottom photographs.
15	4/5/78	-	Single warp trawl	54°50'N 12°14'W to 54°39'N 12°23'W	3000	-	-	Net failed to take the bottom
16	4/5/78	SWT 27	Single warp trawl	54°27'N 12°48'W to 54°25'N 12°55'W	3000	-	-	Good haul
17	5/5/78	7/78/37	Large trawl	51°15'N 11°39'W to 51°17'N 11°38'W	800	-	-	Good haul
18	6/5/78		Multiple corer	50°56'N 12°18'W	2000	3.54	34.97	3 drops - 36 cores. Shipek camera bottom photographs
19	6/5/78	SWT 28	Single warp trawl	50°12'N 13°36'W to 50°08'N 13°33'W	3000	-	-	Good haul
20	6/5/78	SWT 29	Single warp trawl	49°48'N 14°01'W to 49°42'N 13°58'W	4000	-	-	On bottom but most of fish lost on recovery.
21	7/5/78		Multiple corer	49°53'N 14°01'W	4000	2.48	34.92	4 drops - 23 cores (2 drops completely blank). Shipek camera photographs.

TABLE II

Drift Bottle Releases (Times in GMT)

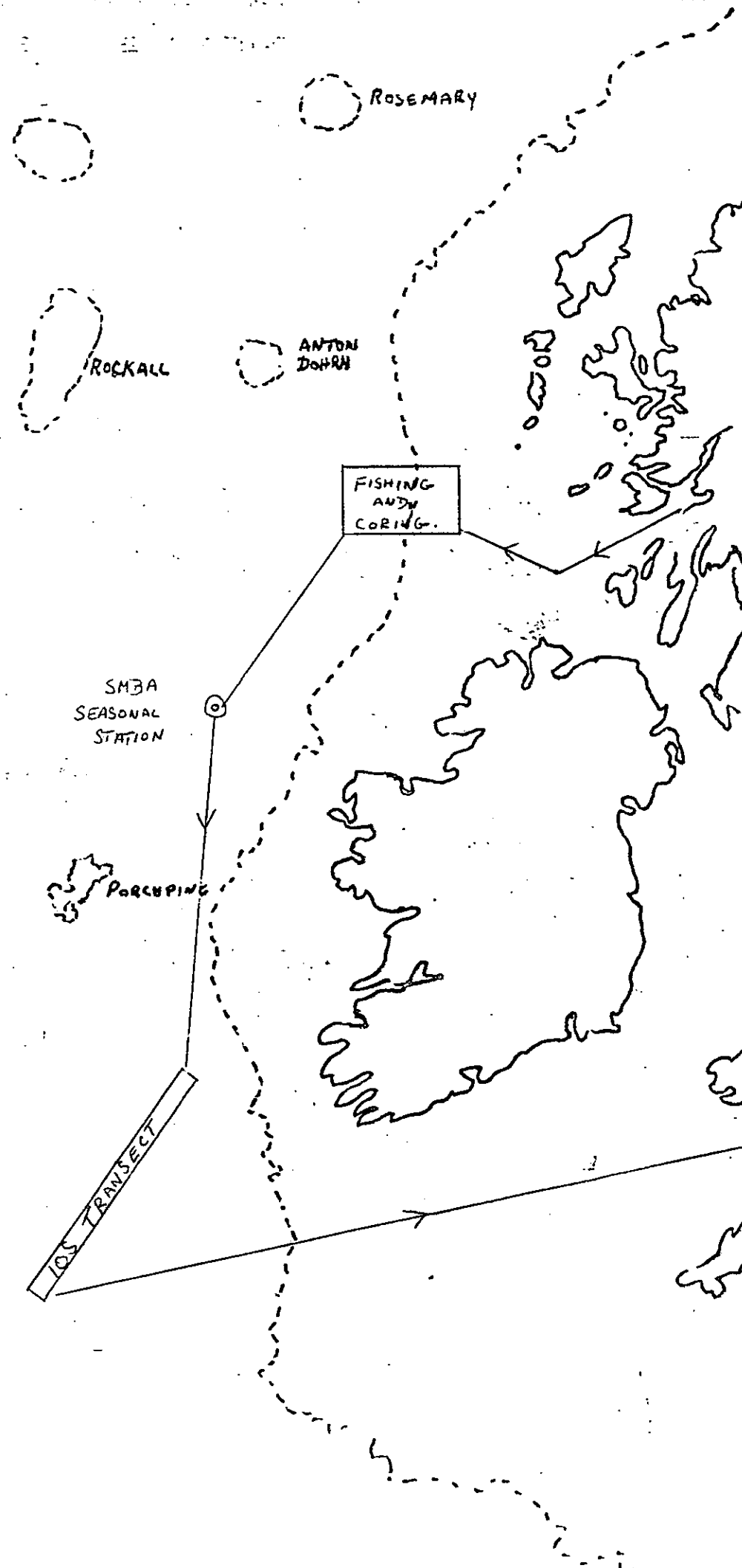
No.	Date	Time	Position (Sat. Nav.)
1	1/5/78	18.58	56°57.7'N 09°57.6'W
2	3/5/78	12.32	56°02.7'N 10°10.6'W
3	3/5/78	21.19	55°02.8'N 12°03.6'W
4	4/5/78	19.50	54°08.1'N 13°00.5'W
5	5/5/78	02.05	53°08.2'N 12°30.9'W
6	5/5/78	09.43	51°53.8'N 11°58.2'W
7	6/5/78	04.01	50°53.5'N 12°21.5'W
8	7/5/78	22.27	50°21.3'N 10°38.8'W
9	8/5/78	08.47	50°43.8'N 07°55.2'W

60°N

55°N

50°N

CHALLENGER
CRUISE
7/78



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