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Scottish Marine Biological Association

Dunstaffnage Marine Research Laboratory

CRUISE REPORT

R.R.S. CHALLENGER

RRS CHALLENGER

CRUISE 3/85 (GORDON)

12 - 29 APRIL

1985

S.M.B.A., P.O. Box No. 3, Oban, Argyll, Scotland.

Scottish Marine Biological Association

Dunstaffnage Marine Research Laboratory

Cruise Report

RRS Challenger

Cruise 3/85

12-29 April 1985

RRS CHALLENGER

Duration of Cruise: 12th April 1985 to 29th April 1985

Dunstaffnage to Dunstaffnage

Locality: Rockall Trough

Captain	P. McDermott
1st Officer	P. Moran
2nd Officer	P. Oldfield
3rd Officer	R. Hagley
Chief Engineer	I. McGill
2nd Engineer	D. Hornsby
3rd Engineer	C. Philips
4th Engineer	A. Tomas

Scientific Staff

Dr J. Gordon (Chief Scientist)	SMBA
Mr R. Harvey	SMBA
Mrs J. Duncan	SMBA
Mrs S. Phillips	SMBA
Mr R. Young	MBA
Mr P. Pascoe	MBA
Mr R. Easton	MBA
Dr P. Rodhouse	BAS
Dr S. Shackley	Department of Oceanography, University College of Swansea
Mrs R. Russell	IOS
Mr G. Davies	Heriot Watt University

Aims of the Cruise

(1) To sample the fish populations of the Rockall Trough using a semi-balloon otter trawl and to compare the results of fishing with paired or single warps.

(2) To experiment with lights attached to bottom trawls.

(3) To obtain Agassiz trawls and epibenthic sledge samples from the SMBA permanent benthic stations and other stations on the Hebridean Terrace.

(4) To collect material for Institutes and Museums.

Narrative (All times GMT)

Challenger sailed from Dunstaffnage at 10.00 hrs on 12th April and headed for the SMBA permanent station (54^{o}N 12^{o}W) but on passage was delayed by strong westerly gales. By the morning of 14th April the swell had moderated sufficiently to tension the main warp using an Agassiz trawl as a drogue over a sounding of 2700 m. 9000 m of wire were paid out and after towing for about an hour it was decided to ease back the ship's speed and attempt to sample the bottom. On recovery the trawl had indeed taken the bottom but the codend knot had slipped and few specimens were collected. Challenger then proceeded to the permanent station and the epibenthic sledge was deployed between 22.58 and 03.53 hrs (Station 2). This was followed by an Agassiz trawl between 05.12 and 09.46 (15/4) (Station 3) but once again the codend knot had slipped resulting in a poor catch. A finer meshed bag was then attached to the epibenthic sledge and it was launched at 10.57 but because of a fault on the winch it had to be recovered to re-set the clock which operates the door closing mechanism. The sledge was launched again at 13.55 and successfully recovered at 18.36 (Station 4). The semi-balloon trawl was then assembled and fished between 19.05 and 02.06 (16/5) (Station 5). Before leaving the permanent station the Agassiz trawl was deployed once more between 05.07 and 10.03 and yielded a good catch.

Challenger then steamed towards the Hebridean Terrace and when sounding of 2500 m was reached the semi-balloon trawl was fished between 09.25 and

13.08 (17/4) (Station 7). Station 8 was at 1000 m on the Hebridean Terrace and on passage the battery packs and lights were attached to the semi-balloon trawl. The trawl was shot at 09.25 and recovered at 13.08. Station 9 was a repeat of Station 8 but with the lights still attached but switched off. The trawl was shot at 14.20 and when recovered at 18.11 it was found that one of the bridles had parted and damaged the trawl and light cables. The trawl was repaired and fished again without lights at 750 m between 21.12 and 00.16 (18/4). Challenger then steamed to 1250 m and the semi-balloon trawl was fished between 02.37 and 06.40 yielding an excellent catch of over 800 kg of fish despite the trawl having an extensive tear. While the trawl was being repaired an Agassiz trawl was fished at 1385 m between 08.53 and 12.03 (Station 12). This was followed by a semi-balloon trawl at 1000 m without lights attached. The trawl was shot at 15.25 and on recovery at 19.42 it was found that the bridles leading from the swivel on the main warp to the otter boards had become twisted due to a faulty swivel. The gear was recovered with some difficulty but an excellent catch was obtained (Station 13!). New bridles were fitted and the swivel was replaced and once again the trawl was shot over a sounding of 750 m between 21.33 and 01.37 (19/4) (Station 14). During this station the wind speed had been steadily increasing and with an ever increasing swell all work ceased. By 20.00 the wind speed had decreased and Challenger steamed to a 1250 m station but on arrival it was decided to postpone further trawling to 06.00. By this time the wind had once more increased and at 10.00 it was decided to steam to the SMBA Station M in the hope that it might be possible to work the Agassiz trawl and the epibenthic sledge. Slow progress was made in heavy seas but on arrival on Station at 19.24 (20/4) the swell had moderated sufficiently to shoot the Agassiz trawl

(Station 15). The trawl was recovered at 00.01 (21/4) and the epibenthic sledge was deployed between 02.49 and 07.10 (Station 16).

Challenger then steamed back towards the Hebridean Terrace and when a sounding of 2000 m was reached the semi-balloon trawl was fished between 11.13 and 16.18 (Station 17). On the assumption that the weight of the batteries was causing the damage to the semi-balloon trawl (later found to be incorrect) an MBA trawl was rigged and fished at 1000 m with lights on between 20.38 and 00.32 (Station 18). This station was repeated between 01.27 and 04.50 (22/4) with the lights switched off but during the tow the trawl came fast and on recovery it was found that the rope headline had parted. While the trawl was being repaired the semi-balloon trawl was rigged and fished between 07.10 and 11.38 over a sounding of 1250 m (Station 20). This was followed by a station of 1500 m between 12.49 and 16.22 (Station 21). Challenger then steamed back to 1000 m and the MBA trawl was fished between 20.28 and 23.59 (Station 22) but once again the headline parted and the trawl came fast. By this time it had been discovered that the damage to the semi-balloon trawl was being caused by unequal wing end extensions and when these were evened up no further problems were encountered. The lights were attached to the semi-balloon trawl and it was deployed at 02.28 (23/4) and recovered at 05.57 (Station 23). Stations 24 to 28 were all on the same area of the slope at 1000 m depth and were fished with either lights on or off. This comparative series was complete by 09.18 (24/4) and Challenger steamed to fish a 1750 m station between 12.30 and 17.15 (Station 29). This was followed by a 1500 m tow between 18.15 and 22.58 (Station 30). A further series of comparative lights on/lights off experiments were

carried out at 1000 m (Stations 31-37) between 00.38 (25/4) and 11.12 (26/4).

The lights were then removed and a 500 m station was fished between 12.56 and 15.44 (Station 38) but on recovery the codend was found to have chaffed through with the loss of most of the catch. During this tow the wind had freshened and a heavy swell had begun to build up. It was decided to shoot an Agassiz trawl head to wind at 16.28 and it was recovered at 19.40 with a tear in the net (Station 39). The epibenthic sledge was then rigged and deployed at 20.42 but on recovery at 23.59 it was found that the codend had been lost (Station 40). The Agassiz trawl was rigged and fished over a sounding of 750 m between 02.30 and 05.40 (27/4). During recovery the main warp jumped off the metering wheel and in the process of replacing it a kink was straightened out into the warp at about 560 m. Station 42 was a further Agassiz trawl at 500 m and whilst paying out the winch was stopped and the kink examined and considered by the ship's staff to be suitable for further use. The Agassiz trawl was recovered at 10.09 and with a slight moderation in the swell it was decided to repeat the 500 m station. The semi-balloon trawl was shot at 11.39 but during the tow it was difficult to maintain the required depth because the warp was leaning well to port in the cross swell. The trawl was recovered at 14.09 (Station 43). This station was repeated between 15.24 and 17.45 in much improved sea conditions (Station 44). It was then decided to repeat an earlier 1500 m station which had been invalidated because of a failure to slow the ship down after ceasing paying out. Station 45 was fished between 22.32 and 02.52 (28/4) and Challenger returned to the 1000 m station for a further lights experiment before having to depart for Dunstaffnage. Station 46

was fished between 05.09 and 08.38. This completed the scientific programme and Challenger docked in Oban at 08.30 on the 29th April. The heavy scientific equipment was unloaded and Challenger sailed for Dunstaffnage.

Results

Aim 1

The semi-balloon trawl was used to sample a transect of stations on the Hebridean Terrace between 500 and 2000 m at 250 m increments using the single warp. All stations between 500 and 1250 m were also fished with paired warps. This was the first time that this had been done on the same cruise and the results confirm that the catches of sharks, Alepocephalus bairdii and the scabbard fish (Aphanopus carbo) are enhanced by towing on paired warps. There are probably many other differences, notably in the catches of Synaphobranchus kaupi, which will only become apparent when the results have been fully analysed in the laboratory. It was noticeable that the invertebrate catches were greater when the trawls were towed on a single warp.

The light experiments (Aim 2) were useful to the SMBA investigations and provided a series of trawls at the same depth. When fully analysed these will provide information on the repeatability of catches and of possible diurnal effects.

The benthic work at the two permanent stations yielded useful fish material and the opportunity was taken to use the semi-balloon trawl at 2900 and 2500 m thus adding to SMBA collections from these depths.

J.D.M.G.

Aim 2 Artificial lights on bottom trawls

As a continuation of preliminary work of this nature done on Challenger (9/84) a series of comparative hauls (lights on and lights off) were carried out with two lights and battery packs attached to the headline of the bottom trawls. The effects of weight and drag caused by the battery packs were reduced as much as possible by decreasing the size of the pack and adding compensating floats. Efforts were made to be consistent in as many factors as possible during the tows, i.e. depth, time of day, position, speed, direction and duration (1 hour) of tow.

A total of 9 comaprative pairs were achieved: 8 with the OTSB14, 7 fished as a single warp and 1 with paired warps and 1 with a small otter trawl of similar size (52 ft foot rope). All the comparative hauls using lights were carried out at a depth of 1000 m on the Hebridean Terrace.

For each haul the fish were sorted into species, weighed, counted and measured, and the numbers and weights (or volumes) of cephalopods and red 'prawns' were also recorded. The fish processing involved many hours of arduous work and we are extremely grateful to the other members of the scientific party (especially the 'fish-wives') for their expertise, patience and good humour throughout this task.

A preliminary analysis of the results show little difference in overall figures for numbers and weights of fish between the lights on and lights off hauls. However, it appears that a number of species are affected by the lights, either showing an increase or decrease when the lights are used, and in some cases a change in size distribution is apparent. The numbers and weights of cephalopods and red 'prawns', although relatively small, both show a large increase when the lights were on.

More detailed analyses will be carried out in the near future which should provide both interesting and useful comparisons to the data from similar work with midwater and inshore bottom trawls.

R.K.Y. & P.L.P.

Aim 3 Invertebrate samples

Two epibenthic sledge samples were obtained at the SMBA Permanent Station in 2900 m. These extend the unique time-series of samples from this station to 11 years. The second of these samples was taken with a 0.5 mm mesh main net in place of the standard 1 mm net. This will allow an analysis of the effect of mesh size on the size-frequency structure of bivalve molluscs in the catch, an exercise which has not been repeated since 1976. The Agassiz Trawl from this station yielded a typically small catch, dominated on this occasion by gastropods.

A second repeat station, Station 'M' in 2200 m in the northern part of the Rockall Trough, was sampled with the sledge and Agassiz Trawl. Good catches were obtained with both gears, adding to the time-series started at this station in 1978. Poor sea conditions prevented the deployment of the large spade box corer.

Four other hauls with the Agassiz Trawl were made at depths from 1400-530 m on the Hebridean Terrace. Some time was lost following the recovery of a damaged trawl when it was found that the replacement was unserviceable owing to holes in its net, a bad cod end and incorrectly rigged bridles/weak link. An attempt to use the sledge in 1000 m in poor conditions led to the loss of the cod end section of the net and joining ring, and further use of the gear was prevented.

The invertebrate catches from fish trawls were sorted on board. A large quantity of valuable material was obtained for workers at a

number of Institutes and Universities. Of particular interest were samples of regular and irregular sea urchins for growth and reproductive studies, specimens of a cushion star not previously seen in samples from this area, and an antipatharian coral.

R.H.

Aim 4

Ovaries of mature and maturing deep-sea fish were sampled and prepared for examination under the transmission electron microscope (TEM) to study the ultrastructure of oogenesis (oocyte growth and development) and vitellogenesis (the formation of proteinaceous and lipid yolk).

The species (Table 1) were selected on the basis of ovarian developmental stage, i.e., maturing or running ripe (Stages IV and V, S.M.B.A.). A cursory visual examination of the ovary at fixation gave some indication of the degree of synchronicity of oocyte development. In two species it was decided to sample less mature ovaries to provide as wide a range as possible of oocyte developmental stages. Whether this assessment of synchronicity is accurate will be revealed by microscopic examination.

TABLE 1

Species	Developmental Stage (SMBA)	Haul No.
Alepocephalidae		
Alepocephalus bairdii	V, VI	3/85/9
Macrouridae		
Nezumia aequalis	II, IV/V, V	3/85/9
Coelorinchus occa	III, IV/V	3/85/11
Coryphaenoides rupestris	I, II, III/IV	3/85/8
Moridae		
Lepidion eques	IV, IV/V	3/85/8

Method

An ovarian lobe, or a subsample of one lobe for A. bairdii was removed from the female immediately after the catch was sorted and weighed. The tissue was fixed for 1 hr at 4°C in primary fixative consisting of 5% glutaraldehyde (TAAB) in 0.1M HCl and calcium chloride - buffered sodium cacodylate (pH 7.4) and 0.17M sucrose. (The theoretical osmolality for this primary fixative is 900 milliosmoles but the effective strength is much lower at approximately 340 milliosmoles). Tissues were washed in several changes of 0.1M HCl/calcium chloride - buffered cacodylate (pH 7.4) and 0.17M sucrose at 4°C for 24 h, post-fixed for 1 hr in chilled 1% osmium tetroxide in 0.1M HCl/calcium chloride - buffered cacodylate and 0.17M sucrose, washed for a further hour in ice-cold distilled water then dehydrated in a graded series of acetone to 100% acetone for 1 hr at room temperature. Tissues were finally embedded in Epon 812 resin (TAAB).

Embedded tissue will be sectioned, stained and examined in the Corinth Mark II transmission electron microscope, Zoology Department, University College of Swansea.

A study of the size-frequency distribution of the oocytes in maturing fish ovaries yields information concerning the spawning habits and fecundity of those species. Analysis may be carried out on whole oocytes fixed in Gilson's fluid or on sectioned ovaries fixed and stained for light microscopy. It is essential to be able to relate oocyte ultrastructural developmental stages to oocyte size-frequency groups determined by size frequency analyses. In order that a direct comparison can be made between sizes of EM-prepared oocytes and those prepared in Gilson's fluid, the second lobe of the ovary of

C. rupestris (Stage III/IV) was fixed in Gilson's fluid and a size-frequency analysis will be carried out. Size-frequency analysis will also be carried out on whole oocytes in TEM-prepared tissue prior to sectioning and examination under the EM. Cross-reference should then be possible between the ultrastructural stages in oogenesis (EM-prepared tissue) with the size-frequency groups obtained from Gilson's-prepared tissues.

Specimens of Epizoanthus paguriphilus were deep frozen after collection. These will be used by Dr P.A. Tyler, Oceanography Department, University College of Swansea, in his current studies of the partition of energy during gametogenesis by deep-sea invertebrates. Analysis of the calorific content of the various tissue layers of these coelenterates will complement other work on this species which has recently been completed.

S.E.S.

The opportunity to participate in this cruise was taken to collect specimens for biochemical analysis and begin a seasonal survey of liver versus body weight in as wide a variety of fish as possible.

Swimbladders were dissected from a few specimens of six fish species (Nematonurus armatus, Spectrunculus grandis, Antimora rostrata, C. (Coryphaenoides) guentheri, C. (Chalinura) brevibarbis, Cataetyx laticeps) for Dr K. Sulak, Virginia Institute of Marine Sciences, for biochemical analysis. These were placed in iced

seawater and swimbladders dissected out to be frozen in seawater afterwards.

Twenty to thirty small individuals of each of four species of fish (Chimaera/Hydrolagus, Synaphobranchus kaupi, Nezumia aequalis, C. (Coryphaenoides) rupestris) were frozen from one station, taking care to avoid contamination, for Dr R. Morris, Institute of Oceanographic Sciences, Wormley (IOS), for biochemical analysis of trace metals.

Livers were taken from six species of fish for a liver versus body weight survey (C. (Nematonurus) armatus, Histiobranchus bathybius, Antimora rostrata, Alepocephalus bairdii, Synaphobranchus kaupi, Coelorinchus occa) for N. Merrett, IOS. They were dissected out and frozen for weighing at the laboratory. Large fish were weighed to the nearest 10 g at sea but small specimens were frozen to be dealt with ashore.

Mrs R. Russell, IOS.

Parasites of Deep-Sea Fishes

Monogenean parasites were collected from the gills and skin of several species of fish captured in the bottom trawls. Further to the work carried out during a previous Challenger cruise to this area (9/84), adult parasites and eggs were taken for studies on the morphology and attachment mechanisms of adult and larval stages. Two additional species of parasite were found on this cruise.

Mr P. Pascoe, MBA.

Acknowledgements

We are grateful to Captain McDermott, his officers and crew for all their help and advice in making this a highly successful cruise. We coped well without a fishing skipper in the deployment of the otter trawls but had it not been for the expertise of Mr R. Easton (MBA) in repairing damaged trawls the cruise could well have been a failure. We gratefully acknowledge his long, patient and good humoured hours of net mending on the trawl deck. The repetitive trawling on the Hebridean Terrace involved large quantities of fish being landed at frequent intervals. The SMBA and MBA scientists gratefully acknowledge the help by those of other institutes and universities who help to sort and measure these catches. Finally we should like to thank the operations staff at RVS for their help in planning the cruise.

J.D.M. Gordon
May 1985.

APPENDIX I

Station data

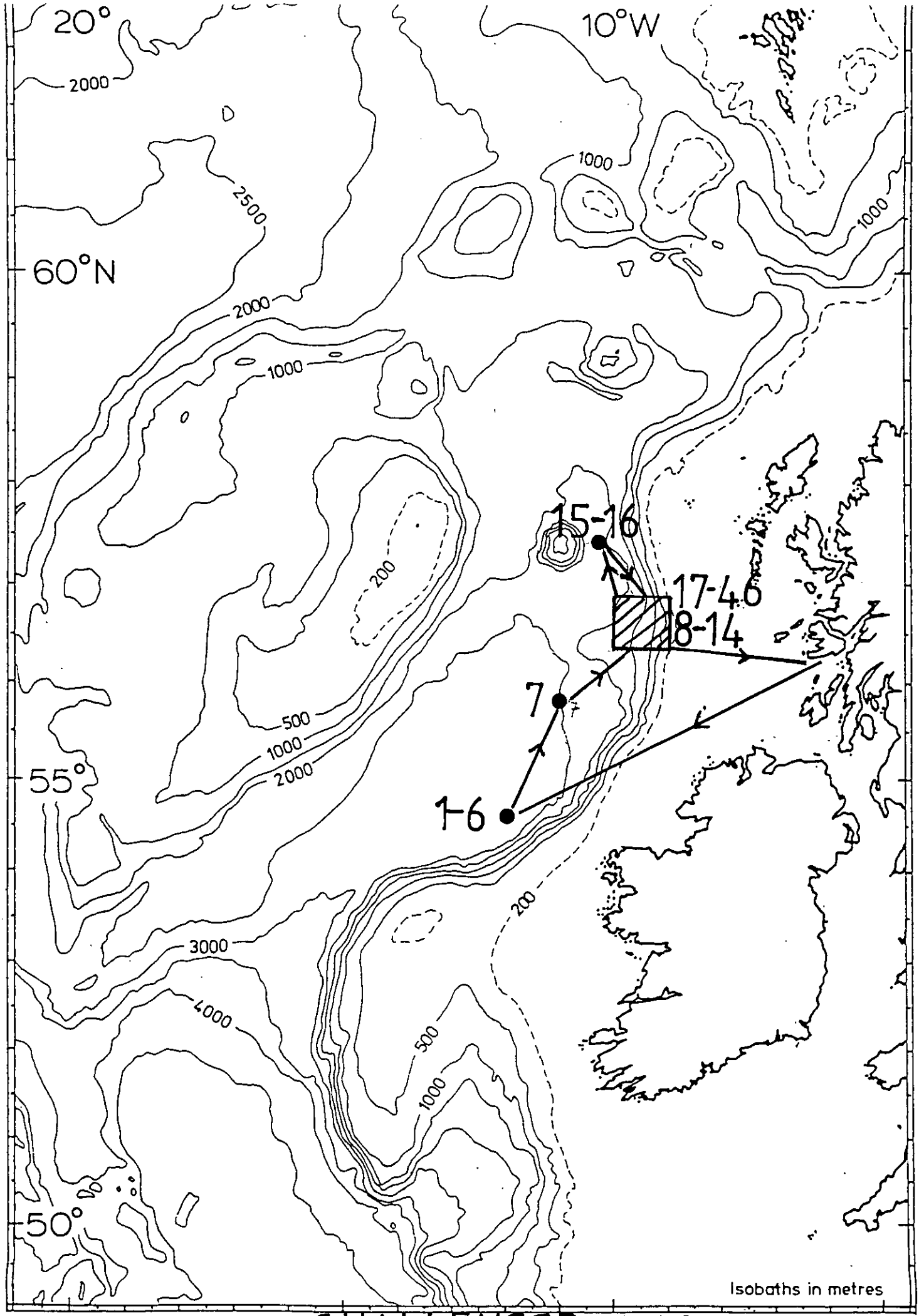
Station Number	SMBA Ref. No.	Date	Net	Position (start)*	Depth	Time on bottom (GMT)	Duration (mins)	Speed (knots)	Course	Wire out	Remarks
J/85/1	AT282	14/4/85	Agassiz trawl	55°06'N 11°22'W	2760 ?	?15.20-16.22	62	1.5	230	9000	Tensioning main warp
J/85/2	ES283	15/4/85	Epibenthic Sledge	54°39.1'N 12°15.3'W	2940-2950	01.00-02.10	80	1.1	200-207	6000	1 mm net - door failed to close
J/85/3	AT284	15/4/85	Agassiz trawl	54°40.3'N 12°12.5'W	2910	07.00-08.15	75	1.1	207	5978	Codend free
J/85/4	ES285	15/4/85	Epibenthic sledge	54°39.4'N 12°13.8'W	2910	16.05-17.07	62	1.0	215	6000	0.5 mm net
J/85/5	-	15/4/85	OTSB single warp	54°37.4'N 12°25.0'W	2970-2980	22.05-23.40	95	2.4	244	8500	
J/85/6	AT286	16/4/85	Agassiz trawl	54°44.0'N 12°17.2'W	2900-2910	06.52-08.20	88	1.1-1.7	250	6000	
J/85/7		16/4/85	OTSB single warp	55°47.1'N 10°51.6'W	2500-2455	21.52-23.52	120	2.5	000	7500	
J/85/8		17/4/85	OTSB paired warps	56°27.4'W 09°17.5'W	970-1010	10.50-11.50	60	2.6	343	2900	Lights attached - on
J/85/9		17/4/85	OTSB paired warps	56°42.6'W 09°11.2'W	945-1010	15.52-16.52	60	2.7	029	2900	Lights attached - off
J/85/10		17/4/85	OTSB paired warps	56°31.3'W 09°12.8'W	795-805	22.14-23.14	60	2.7	160	2250	
J/85/11		18/4/85	OTSB paired warps	56°33.4'W 09°26.0'W	1250-1270	03.54-04.54	60	2.7	010	3023	Net damaged
J/85/12	AT287	18/4/85	Agassiz trawl	56°42.8'W 09°21.2'W	1380-1390	10.05-11.05	60	1.5	192-205	3500	
J/85/13		18/4/85	OTSB single warp	56°28.0'W 09°17.0'W	960- 995	16.42-17.42	60	2.8	345	3000	Swivel failed - twisted bridles
J/85/14		18/4/85	OTSB single warp	56°30.3'W 09°12.2'W	720- 775	23.06-00.06	60	2.6	160	2250	
J/85/15	AT288	20/4/85	Agassiz trawl	57°18.3'W 10°21.8'W	2210-2200	21.23-22.25	62	1.5	350-329	5500	
J/85/16	ES289	21/4/85	Epibenthic sledge	57°18.6'W 10°24.6'W	2210-2180	04.45-05.40	55	1.3	335	5200	
J/85/17		21/4/85	OTSB single warp	56°53.9'W 09°59.9'W	1955-1995	13.15-14.25	70	2.3	200	6000	
J/85/18		21/4/85	MBA trawl prd. warp	56°26.7'W 09°17.4'W	990-1020	22.06 -23.06	60	2.7	355	3049	Lights attached - on
J/85/19		22/4/85	MBA trawl prd. warp	56°33.8'W 09°18.5'W	1030-1035	02.47-?03.17	? 30	2.5	010	3000	Headline parted - net fast, lights attached off
J/85/20		22/4/85	OTSB single warp	56°33.8'W 09°25.9'W	1225-1245	08.54-09.54	60	2.6	009	3750	
J/85/21		22/4/85	OTSB paired warp	56°31.4'W 09°39.3'W	1480-1500	14.11-15.11	60	2.5	190	3000	
J/85/22		22/4/85	MBA trawl prd. warp	56°25.5'W 09°17.2'W	995-1020	21.56-22.40	? 50	2.5	350	3000	Headline parted - net fast, lights attached off
J/85/23		23/4/85	OTSB single warp	56°24.8'W 09°18.0'W	995-1000	03.46-04.46	60	3.0	010	3000	Lights attached - on
J/85/24		23/4/85	OTSB single warp	56°25.6'W 09°17.1'W	980- 990	09.36-10.36	60	2.1	000	3000	Lights attached - on
J/85/25		23/4/85	OTSB single warp	56°25.2'W 09°18.4'W	1000-1005	14.30-15.30	60	2.6	359	3000	Lucas weights in place of batteries
J/85/26		23/4/85	OTSB single warp	56°25.0'W 09°16.3'W	940- 985	21.28-22.18	50	2.6	000-330	3000	Lucas weights in place of batteries - frequent A/C
J/85/27		24/4/85	OTSB single warp	56°24.4'W 09°17.3'W	950-1000	02.26-03.18	52	2.7	355	3000	Lights attached - on
J/85/28		24/4/85	OTSB single warp	56°24.9'W 09°17.9'W	990-1075	06.27-07.22	55	2.7	355-005	3000	Lights attached - on
J/85/29		24/4/85	OTSB single warp	56°50.1'W 09°30.8'W	1690-1740	14.15-15.05	50	2.6	200	5000	
J/85/30		24/4/85	OTSB single warp	56°28.8'W 09°38.1'W	1420-1480	20.12-? 21.12	? 60	2.4	160-165	4500	10 A/C, ship not slowed down on stopping payout
J/85/31		25/4/85	OTSB single warp	56°24.4'W 09°17.5'W	995-1010	01.56-02.56	60	2.5	350	3000	Lights attached - on
J/85/32		25/4/85	OTSB single warp	56°25.3'W 09°18.9'W	1055-1060	07.09-08.09	60	2.6	000	3000	Lucas weights in place of batteries
J/85/33		25/4/85	OTSB single warp	56°26.0'W 09°17.9'W	985-1000	12.18-13.18	60	2.6	000	3000	Lucas weights in place of batteries
J/85/34		25/4/85	OTSB single warp	56°24.5'W 09°18.1'W	980- 990	17.33-18.33	60	2.5	353	3000	Lights attached - on
J/85/35		25/4/85	OTSB single warp	56°25.7'W 09°17.7'W	970- 990	22.40-23.40	60	2.6	351	3000	Lights attached - on
J/85/36		26/4/85	OTSB single warp	56°24.0'W 09°19.4'W	1000-1025	03.42-04.42	60	2.8	355	3000	Lucas weights in place of batteries
J/85/37		26/4/85	OTSB single warp	56°25.2'W 09°18.2'W	945- 985	08.50-09.50	60	2.7	352	3000	Lights attached - on
J/85/38		26/4/85	OTSB single warp	56°23.0'W 09°08.1'W	410- 490	13.42-14.42	60	2.6	352	1500	Codend torn - catch lost
J/85/39	AT290	26/4/85	Agassiz trawl	56°28.4'W 09°15.7'W	910-1010	17.43-18.43	60	1.5	304	2700	Net torn - most of catch lost
J/85/40		26/4/85	Epibenthic sledge	56°29.3'W 09°20.0'W	1040-1100	22.10-23.05	55	1.5	333	2900	Codend lost - catch lost
J/85/41	AT291	27/4/85	Agassiz trawl	56°22.4'W 09°12.5'W	750- 810	03.25-04.30	65	1.3	350-005	2250	Warp off roller at 560 m, wire kinked
J/85/42	AT292	27/4/85	Agassiz trawl	56°23.0'W 09°08.42'W	515- 560	08.50-09.30	40	1.0-1.5	000	1500	
J/85/43		27/4/85	OTSB paired warp	56°17.5'W 09°11.6'W	565- 700	12.30-13.30	60	2.9	355-007	1500	Warp leaning to port - difficult to A/C, mean depth 580 m
J/85/44		27/4/85	OTSB single warp	56°17.7'W 09°11.0'W	545- 600	15.57-16.57	60	2.8	011	1500	
J/85/45		28/4/85	OTSB single warp	56°30.3'W 09°38.2'W	1470-1500	00.17-01.17	60	2.6	195	4500	
J/85/46		28/4/85	OTSB single warp	56°25.1'N 09°17.4'W	960- 985	06.16-07.16	60	2.8	355	3000	Lights attached - on, no extra flotation

* Positions for Agassiz trawls and Epibenthic Sledges are the mid-point of the tow.

APPENDIX 2

Material collected on the Cruise for other institutes, universities, museums, etc.

Echinoid gonads	Dr P. Tyler, Dept. of Oceanography, University College Swansea
Zoanthid anemones and pagurid crabs	Mr A. Muirhead, Dept. of Oceanography, University College Swansea
Gastropods	Mr J. Colman, Dept. of Oceanography, University College Swansea
Cirripedes	Miss R. Williams, Dept. of Oceanography, University College, Swansea
Scaphopods	Mr G. Davies, Heriot-Watt University
Asteroids	Miss A.M. Clark, British Museum (Natural History)
Coelenterates	Dr G. Paterson, British Museum, (Natural History)
Isopods	Dr R. Lincoln, British Museum (Natural History)
Tanaids	Dr D. Holditch, Dept. Zoology, Nottingham University
Decapods	Dr J. Mauchline, SMBA
Fish swimbladders	Dr K. Sulak, Virginia Institute of Marine Sciences, USA
Fish for biochemical analysis	Dr R. Morris, IOS
Fish liver samples	Mr N. Merrett, IOS
Cephalopods	Dr M. Clarke and Mr P. Pascoe, MBA
Gill parasites	Mr P. Pascoe, MBA
Plankton samples for coccolithophores	Dr Harbour, MBA
Epizoanthus paguriphilus	Dr P. Tyler, University College Swansea
Fish ovaries	Dr S. Shackley, University College, Swansea
Fish ovaries	Dr C. Craik, SMBA
Fish parasites	Dr A. Bullock, SMBA
Galeus melastomus	Mr P. Vas, Salford University



CHALLENGER 3/85