SCOTTISH MARINE BIOLOGICAL ASSOCIATION

DUNSTAFFNAGE MARINE RESEARCH LABORATORY

Cruise Report

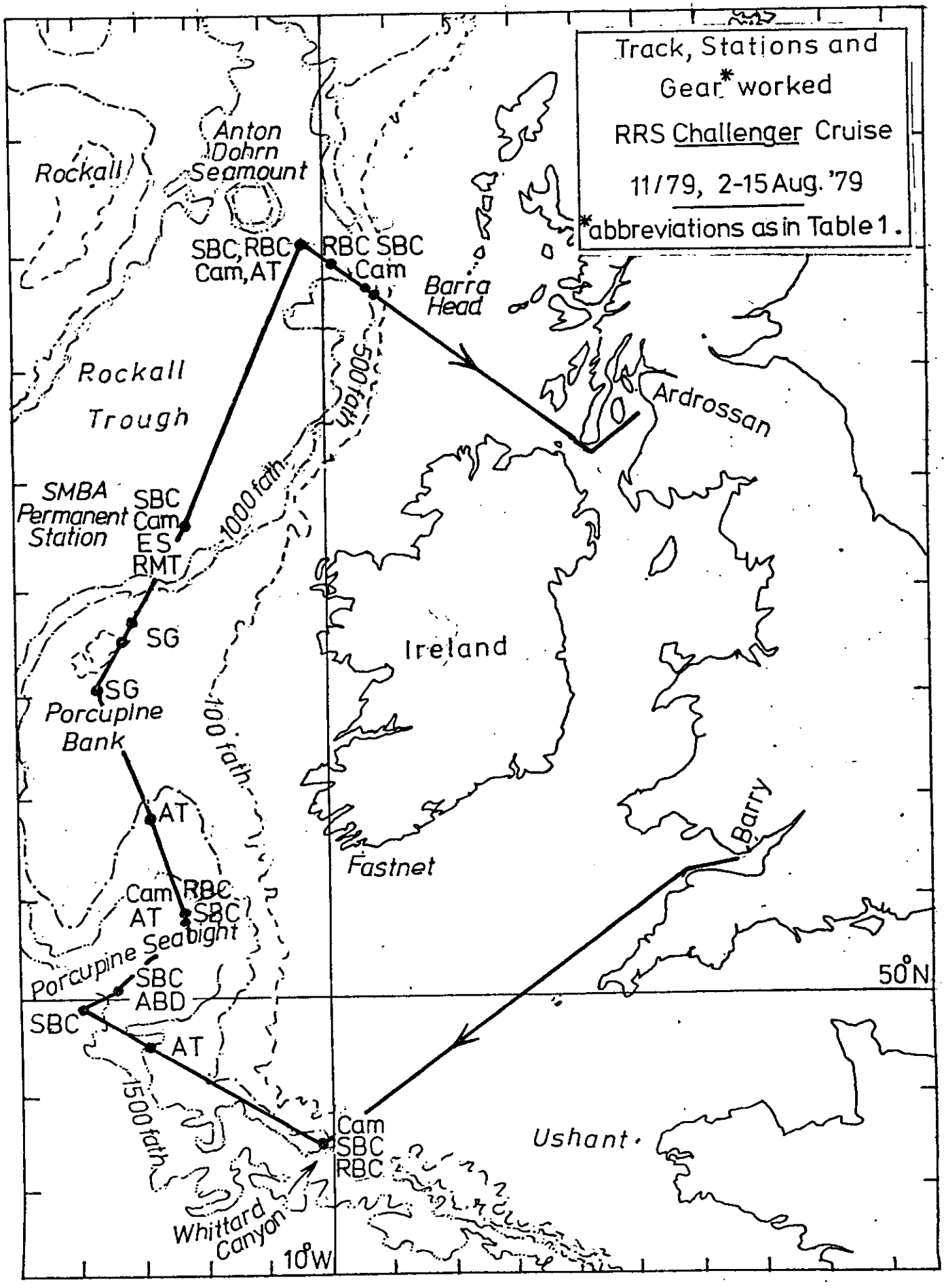
R.R.S. Challenger

Cruise 11/79

2 - 15 August

1979

MIAS 2298


Track, Stations and Gear* worked
RRS Challenger Cruise
11/79, 2-15 Aug. '79
*abbreviations as in Table 1.
Anton Dohrn Seamount
Rockall
SBC, RBC Cam, AT
RBC SBC Cam
Barra Head
Rockall Trough
500 fath
Ardrossan
SMBA Permanent Station
SBC Cam ES RMT
1000 fath
SG
SG
Porcupine Bank
Ireland
100 fath
AT
Barry
Fastnet
Cam RBC AT SBC
Seabight
Porcupine
SBC ABD
50°N
SBC
AT
1500 fath
Cam SBC RBC
Ushant
Whittard Canyon
10°W

RRS Challenger Cruise 11/79

Duration of Cruise: 1430 hrs 2 August (Barry) until 0700 hrs 15 August (Ardrossan) - all times BST.

Locality: Northeastern Atlantic, from Whittard Canyon in the Southwestern Approaches to the Rockall Trough up to latitude 57°N.

Scientific Participants:

R. Barrett	(MBA)
J. Bishop	(Port Erin)
C. Currie	(SMBA)
Dr J.D. Gage	(SMBA, Principal Scientist)
Miss J. MacArthur	(SMBA)
Mrs M. Pearson	(SMBA)
M. Pye	(Geol. Dept., Glasgow Univ.)
Dr A.J. Southward	(MBA)
Dr Eve Southward	(MBA)
Dr P.A. Tyler	(Dept. Oceanogr., Univ. Coll. Swansea)

Objectives:

1) To obtain quantitative samples of deep-sea macrobenthos using 0.25 m^2 box corers for study of benthic community structure and standing crop at locations on the continental slope in the Southwestern Approaches, in the Porcupine Seabight at

stations studied by IOS (Wormley) and at various locations in the Rockall Trough.

2) To obtain seabed photographs using a bottom triggered stereo and mono systems camera at some of these sites, including the Whittard Canyon, for MBA.

3) To obtain intact box cores of the deep-sea sediment, using the Reineck box corer, in order to extend studies of biogenic structure in shelf muds to deep sea deposits.

4) To obtain a large sample, using the epibenthic sled, of deep-sea macrobenthos from the SMBA Permanent Station in the southern Rockall Trough in order to continue the time series started in November 1975.

5) To obtain samples of benthic megafauna using the Agassiz Trawl at a station between the Anton Dohrn Seamount and the adjacent Scottish slope in order to continue a secondary time series, with an emphasis on megafaunal echinoderms, for Dr Tyler and SMBA, and opportunistically at other stations in order to augment previous ophiuroid records.

6) To obtain samples of deep plankton at the SMBA permanent station for Dr Tyler.

7) To obtain sediment samples from the Porcupine Bank for the Department of Geology, Edinburgh University.

Weather:

Although Force 6-8 winds were experienced on sailing day and on 6th August, these moderated and although a deep W-NW swell was experienced winds were generally light and the weather fine for the remaining duration of the cruise until the 14th August when wind and sea conditions worsened as a result of the deep depression centred on the Celtic Sea.

Narrative:

The scientific party joined RRS Challenger on the afternoon of 1st August and the ship sailed next day at 1430 with three RVS staff after a slight delay caused by the installation of new burners to the boilers. After engine trials off Barry, RVS staff were disembarked by launch at 1800 hrs and Challenger set course for the first station in the Western Approaches. This position in the Whittard Canyon was reached at 0800 hrs 4 August after 38 hours steaming in an easy NW swell and fine weather. The radar transponder buoy was moored at a suitable location about 3 miles from the working site which was fixed with reference to a small-scale bathymetric chart of the canyon prepared by Dr A.J. Southward and drawn with two-chain Decca coordinates (Southwest British and Irish chains). Because of sky-wave effects on Decca and Loran at night, the transponder was especially useful in the hours of darkness.

Then followed a programme of sea-bed photography using the MBA camera system on the hydrowire and box coring using the large SMBA 0.25 m^2 spade corer and the Reineck corer of Glasgow University. Despite problems with camera malfunction and with kinks in the hydrowire caused by the slackening of the cable as the camera was repeatedly lowered and raised, some satisfactory photographs were obtained by Dr Southward after developing the rolls of both black and white and colour film in the scientific darkroom. Although efforts with the Reineck proved unfruitful, three satisfactory cores at two depth horizons in the canyon were obtained with the 0.25 m^2 spade corer. Partly because wind and sea conditions had deteriorated somewhat by 5th August, work in the Whittard Canyon was terminated and Challenger sailed north for the Porcupine Seabight in order to work on a series of positions worked previously by IOS Wormley (Discovery cruises 88 and 92).

The first station was reached on 6th August in soundings of around 4000 m, but because of a heavy westerly swell and winds of force 6-8, work with the corers and cameras was ruled out and it was decided to steam to a nearby position on the Goban Spur in order to obtain a trawl haul for Dr Tyler using the 8-foot MBA Agassiz. An improvement in the weather prompted a return to the 4000 m station, but subsequent efforts to obtain box core samples in a heavy swell on this position were not successful, and some damage was incurred to the 0.25 m^2 spade corer. The station was abandoned early on 7th August and Challenger then steamed to two

more positions in about 3000 m and 2000 m depth, respectively, with a short programme of camera and box core lowerings at each. The work was hindered by small camera malfunctions and by further damage to the hydrowire caused by cable slackening. As previously, the camera was recovered by clamping the wire and heaving the damaged outboard section using an auxilliary winch and the hydraulic crane. Trouble was also experienced with the spooling gear of the hydrowinch. This necessitated quick repairs that were swiftly executed by the Chief Engineer Mr D. Rowlands and the Mate Mr Coombs. With the box corers, while some good cores were obtained many of the attempts produced either a partially washed sample or nothing at all. On one occasion, a sample using the Anchor-box Dredge was obtained in order to check on the hardness of the bottom.

The scientific party are particularly grateful to Mr P. Coombs for his efforts in safely recovering the cameras and for eventually devising a system whereby the camera could be deployed from the stern gantry using the main warp, and also for his great help, together with Mr D. Rowlands and the Second Engineer Mr I. McGill, in repairing damage to the venting flaps and the pulley strop of the 0.25 m^2 box corer.

The work in the Porcupine Seabight was concluded with two trawl hauls, using the 8-foot MBA Agassiz, for Dr Tyler, both of which recovered good catches, but with few ophiuroids.

Challenger then steamed across the Porcupine Bank for the SMBA Permanent Station. En route, Shipek grab samples were obtained from about 200 m depth for Dr Scoffin of Edinburgh University. After arrival on the Permanent Station in the southern Rockall Trough in the morning of 10th August, a programme of vertical work using the cameras and box corers was started in order to take advantage of the fair weather. An attempt using a special box subdivided into 25 divisions on the 0.25 m^2 box corer obtained a good sample, but great difficulty was encountered in preventing mixing between subsamples during their removal and the subsamples eventually had to be pooled.

Trials with the camera on the main warp using the system devised by Mr Coombs employing a length of nylon rope and a salvaged length of hydrowire proved successful and this system was adopted for all subsequent camera deployments.

The epibenthic sled sample required was then successfully obtained on 11th August, although some trouble was experienced with the pinger. Eventually the pinger failed completely and sufficient wire to bottom the sled had to be calculated. Owing to loss of wire on a previous cruise it was not possible to pay out more than 4750 m and the towing speed was reduced in order to increase the margin allowed in order to bottom the gear. The requirement for deep plankton was then met by a single deployment of the Rectangular Midwater Trawl (RMT). Owing to non-delivery of an RMT-8 net, the RMT 7 net was rigged on to the new RMT bars that replaced those lost in January. We are most

grateful to Mr Coombs and the Fishing Mate Mr F. Dunning for their great help in rigging and fitting the undersized net in the frame. Following repairs to the pinger by Mr Barrett of the MBA party, a good pinger signal was maintained and from which the maximum fishing depth of 2700 m was estimated.

On completion of work at the Permanent Station a course was set for a position between the Anton Dohrn Seamount and the adjacent Scottish slope where previous Agassiz hauls had started a secondary time series of benthic samples.

On arrival at 1530 hr on 12 th August it was decided to take advantage of the good sea conditions by deploying the cameras and box corers. Although some good photographic results were obtained, no successful cores were obtained with either the 0.25 m^2 or Reineck box corers on this station. The large RVS Agassiz was next deployed in order to obtain the seasonal sample required. The haul had to be made several miles south of the station position in order to keep clear of a possible current meter mooring. Another limitation was the reduced amount of main warp available. However, a good catch was obtained in the early hours of 13th August, although possibly because of the slower than usual speed of bottom tow, many stones, and more sediment, were present than usual in the net.

Challenger then set course for Ardrossan working a series of box core and camera stations en route on the Barra Fan. The first of these was at 2000 m depth with subsequent stations at 1200 m and 800 m. The programme was terminated at 0424 hrs

14th August with the safe recovery of the Reineck box corer and Challenger then steamed for Ardrossan, berthing at 0700 hrs on 15th August.

Results, Including Reports of Cruise Participants (see also Tables 1 and 2).

Objective 1). Out of 14 deployments of the large SMBA 0.25 m^2 box corer* only five good cores were obtained. Two other samples were retained but had suffered from washing, while the remainder recovered either a poor sample that was discarded or else nothing at all. Of the latter some of the failures resulted from damage sustained to the venting mechanism coming into contact with the tripod legs presumably as a result of the frame swinging within the gimbals. Although this was partially cured by weighting one leg, other failures were less easy to explain. The apparent undercutting of the sample on the side of the box closed by the leading edge of the spade suggested a combination of poor seating and water turbulence between this edge and the lower margin of the box that had allowed washing of the contained sediments, eventually allowing undercutting the sample block.

An attempt was made to improve the box seating on the spade by removing metal at the top of the pillar to permit the spade to more tightly seal the box. Although tests from the gantry in air

*A second 0.25 m^2 box corer currently under construction for RVS, and which it was hoped to bring, was not ready in time for this cruise.

indicated considerable improvement in box seating as a result of this, the poor success rate in subsequent drops to the seabed showed that the problem had still not been solved. Study of the pinger and warp tension recordings of all the box corer drops indicates a negative correlation of the amount of swell transmitted as surge on the wire with success rate. Possibly during hauling in of the corer after closure, a rapid jerking up and down of the inelastic wire, as a consequence of the heaving of the stern of Challenger, is sufficient to allow the spade arm to periodically drop in its fulcral slot and to open slightly, thus exposing the bottom of the core to washing.

J.D. Gage

Objective 2). A series of thirteen camera drops were made in depths ranging from 1200 to 3000 m. Although at first separate drops were made with the UMEL stereo system and the IOS oblique system on different supporting frames, later on all the cameras were deployed on one frame to give simultaneous detailed close-ups and more general oblique views of the sediment surface. Unfortunately, because of a number of small faults in rechargeable cells and underwater sockets, the Whittard Canyon station was not completed in stereo. Delays were also incurred as a result of the problems with the cameras on the hydrowire. However, the final system devised by Mr Coombs using the nylon rope on the main wire worked well and good results were obtained on nine lowerings.

A.J. and Eve Southward

Objective 3). Problems of technique were encountered in operating the Reineck corer in deep water; only three cores being obtained from 9 drops. These three cores were all obtained from sites less than 1500 m depth, one from the Whittard Canyon and two from the Hebridean Slope. Successful operation of the corer required a rate of descent of at least 50 m min^{-1}, and 20–30 m of excess cable payout after gear bottoms in order to ensure sufficient slack to allow triggering. Slower rates of descent were insufficient to overcome the effects of surge in periodically reducing tension on the wire, and hence resulting in premature triggering of the corer.

The successful box cores were returned intact to the laboratory and after drying were subsampled into 2 cm thick slabs for X-ray radiography. The results have revealed complex burrow systems, up to 0.5 cm in diameter, usually with a definite orientation of secreted tubes in the sediment.

M. Pye

Objectives 4–6). The single haul with the epibenthic sled yielded, as usual, a rich sample of abyssal macrobenthos; a preliminary examination showed a good representation of all faunal elements under current study and also included a small specimen of the deep-sea anomuran Neolithodes grimaldii. Towing speed over the ground was calculated as 1.3 knots with a maximum track length of 2.8 miles.

The Agassiz trawl haul from Station M also yielded a rich sample. A listing of the megabenthos will not be given here since the elements do not differ significantly from those given in SMBA Reports for Challenger cruises 6 and 9/78 (AT Stns 144 and 151). The three Agassiz hauls taken from the Porcupine Seabight area also yielded good catches, particularly of elasipod holothurians. The MBA 8-foot trawls, with heavy chafing gear attached to the bag, that were used for these hauls worked well in deep water.

The single RMT cast secured a good sample of bathypelagic plankton in the 7-metre net, but that in the fine-mesh net was rather poor. This net when hauled in was found to have caught around one of the bridles and hence may not have fished correctly. No specimens of the brittlestar larva Ophiopluteus ramosus, under current study by Dr Tyler and Dr Gage, were found, though from previous observations its presence would not be expected in August. However, in view of the possibility of incorrect fishing, less significance must be placed on this negative evidence.

P.A. Tyler
J.D. Gage

Objective 7). A series of 3 Shipek grab samples were obtained along a transect over Porcupine Bank for Dr Scoffin of Edinburgh University.

M. Pye

Acknowledgements

The scientific party are indebted to Captain Long and his officers and crew for their help and friendly interest on this cruise. The great help of Mr P. Coombs, the Chief Officer, in rescuing gear from snarled wires, in repairs to damaged gear and, with Mr Dunning, in successfully rigging the old RMT-7 nets to the new RMT-8 bars, is particularly acknowledged.

J.D. Gage

18 August 1979

Table 1. Listing of stations worked. Depths given corrected according to Matthews' (1939) 'Tables of the Velocity of Sound in Pure Water and Sea Water'. Positions given from Decca and Loran fixes except where asterisked (fixed from Transponder Buoy).

Operation No.	SMBA Stn.No.	Gear	Date	Time on bottom (hrs GMT)	Position	Depth (m)	Result
(Whittard Canyon)							
1	-	IOS Mono camera (IOS Cam)	4 Aug.	1305-1405	48°29'N 10°21'W*	1600-1800	22 frames black and white film
2	SBC155	0.25 m^2 box corer (SBC)	"	1513	48°27'N 10°20'W*	1330	Excellent core
3	-	Reineck box corer (RBC)	"	1741	48°28'N 10°21'W*	?	Not fired
4	-	RBC	"	1907	48°28'N 10°21'W*	?	Good core
5	-	UMEL Stereo camera (UMEL Cam)	"	2050	48°29'N 10°22'W*	1700-1900	Camera malfunction
6	-	UMEL Cam	"	2150	48°2'N 10°2'W*	1630-1800	"
7	-	SBC	5 Aug.	0030	48°27'N 10°21'W*	?	Not triggered
8	SBC156	SBC	"	0207	48°27'N 10°21'W*	1310	Good core, but supernatant water lost
(Goban Spur)							
9	AT157	Agassiz trawl (AT)	6 Aug.	ca 1500-1530	49°31'N 13°11'W to 49°30'N 13°13'W	1745-1760	Good catch - (see Table 2)
(Porcupine Seabight)							
10	-	SBC	6 Aug.	2336	49°55'N 14°07'W	ca 4000	No sample; closing wire damaged

Operation No.	SMBA Stn.No.	Gear	Date	Time on bottom (hrs GMT)	Position	Depth	Result
11	-	SBC	7 Aug	0236	49°54'N 14°10'W	ca 4000	No sample
12	-	IOS Cam	"	0855-1022	50°05'N 13°24'W	2975-3025	21 frames colour
13	-	SBC	"	1249	50°05'N 13°23'W	2855	No sample
14	ABD158	Anchor-box dredge (ABD)	"	1516	50°03'N 13°28'W	2855	Good sample
15	-	IOS Cam	8 Aug	0059	50°44'N 12°21'W	2180-2190	36 frames colour
16	-	RBC	"	0400	ca 50°50'N 12°21'W	ca 2100	No sample
17	-	"	"	0519	ca 50°50'N 12°21'W	ca 2100	No sample
18	SBC159	SBC	"	0828	50°55'N 12°21'W	2036	Excellent core
19	-	SBC	"	1136	50°54'N 12°22'W	2045	No sample
20	-	SBC	"	1307	50°54'N 12°22'W	2050	No sample
21	-	SBC	"	1459	50°55'N 12°20'W	2033	No sample
22	SBC160	SBC	"	1656	50°55'N 12°20'W	2030	Good sample a little washing of surface of core along one edge.
23	-	IOS Cam	"	1816-1922	50°54'N 12°19'W	2174-2184	36 frames colour obtained but hydro-wire damaged
24	AT161	AT	"	ca 2222 2300	50°52'N 12°27'W to 50°53'N 12°16'W	2055	Good sample (see Table 2)
25	AT162	AT	9 Aug	ca 1043-1120	51°50'N 13°00'W to 51°51'N 13°01'W	992	Good sample (see Table 2)

Operation No.	SMBA Stn.No.	Gear	Date	Time on bottom (hrs GMT)	Position	Depth	Result
(Porcupine Bank)							
26	-	Shipek grab (SG)	9 Aug	2055	53°00'N 13°44'W		No sample
27	-	SG	10 Aug	0148	53°30'N 13°19'W	ca 250	Sample obtained
28	-	SG	"	0344	53°41'N 13°10'W	"	Sample obtained
29	-	SG	"	0356	53°41'N 13°10'W	"	Sample obtained
(SMBA Permanent Station)							
30	-	SBC	"	1259	54°40'N 12°19'W	2920	No sample
31	-	IOS Cam	"	1445-1609	54°41'N 12°22'W	2910	35 frames colour (v. muddy) obtained
32	SBC163	SBC	"	1848	54°41'N 12°24'W	2910	x25 sub-cores obtained but later pooled
33	-	UMEL Cam	"	2200	54°41'N 12°24'W	2920	Camera fault
34	ES164	Epibenthic sled (ES)	11 Aug	0230-0330	54°37'N 12°22'W	2925	Good sample
35	RMT165	Rectangular midwater trawl (RMT) 1+7	"	0722-0826 at max. fishing depth	54°33'N 12°34'W to 54°35'N 12°36'W	2700 (max. fishing depth)	Good sample from RMT7; thin one from RMT1.
36	-	UMEL Cam	"	1248-1258	54°37'N 12°19'W	2918	Camera fault
37	-	"	"	1510-1607	"	2940	36 frames B and W

Operation No.	SMBA Stn.No.	Gear	Date	Time on bottom (hrs GMT)	Position	Depth	Result
(SMBA Hydrographic Station "M")							
38	SBC166	SBC	12 Aug	1526	57°07'N 10°20'W	2274	Incomplete core
39	–	IOS & UMEL Cam.	"	1614–1728	57°06'N 10°17'W	2220–2240	36 frames colour and B and W
40	–	SBC	"	2100	57°03'N 10°23'W	2220	No sample
41	–	RBC	"	2311	57°04'N 10°13'W	ca 2200	No sample
42	AT167	AT	13 Aug	ca 0126–0300	57°04'N 10°23'W to 57°06'N 10°26'W	2300	Good catch
(Hebridean Slope)							
43	–	RBC	"	0822	56°56'N 09°57'W	ca 1980	No sample
44	–	IOS & UMEL Cam.	"	1010–1126	56°57'N 09°57'W	1977–1972	36 frames colour and B and W
45	–	SBC	"	1319	56°57'N 09°57'W	1975	No sample
46	SBC168	SBC	"	1740	56°44'N 09°13'W	1206	Small washed sample
47	–	IOS & UMEL Cam.	"	1844–1926	56°39'N 09°15'W to 56°44'N 09°17'W	1230–1255	20 frames colour and B and W
48	–	RBC	"	2023	56°45'N 09°16'W	ca 1270	Good sample
49	–	SBC	"	2218	56°42'N 09°05'W	ca 1280	No sample
50	–	SBC	"	2307	56°43'N 09°05'W	765	No sample
51	–	SBC	14 Aug	0115	56°47'N 09°13'W	1190	No sample
52	–	RBC	"	0210	56°46'N 09°13'W	ca 1000	No sample; box damaged
53	–	RBC	"	0300	56°47'N 09°13'W	"	Good core

Table 2. Listing of fauna identified from Agassiz Trawl hauls* from Goban Spur and Porcupine Seabight. Numbers of specimens in parentheses. (Fish were identified by Dr J.D.M. Gordon of SMBA).

Sample No.	AT 157	
Taxon		
Porifera?	sp (on stones)	(2)
Scyphozoa	sp.	(1)
Actinaria	sp.	(1)
	Phelliactis robusta Carlgren	
"	sp. on shell of hermit crab	(1)
Madreporaria	Flabellum alabastrum Mosely (6 dead + 1)	
Sipuncula	sp.	(1)
"	sp.	(4)
Nemertea	sp.	(1)
Cirripedia	sp. on piece of coral	(1)
Decapoda	Hermit crab (one with anemone on shell)	(2)
Gastropoda		
Buccinidae	Colus sp. (dead shell)	
Fasciolaridae	Troschelia berniscensis	(1)
Bivalvia	Pectinidae sp.	(1)
Brachiopoda	sp.	(1)
Pogonophora	Siboglinum sp. tube bag	
Asteroidea	Pontaster tenuispinus (Duben & Koren)	
Ophiuroidea	Ophiactis abyssicola (M. Sars)	
Holothuroidea	Benthogone rosea Koehler (19)	
Pisces	Synaphobranchus kaupi Johnson	

*Fauna from AT167 (Hydrographic Sta. "M") were also identified, but the list does not differ significantly from listings from previous hauls from this position given in SMBA Cruise Reports for RRS Challenger Cruises 6/78, 9/78 and 1/79.

Sample No.	AT 161

Taxon

Porifera	sp. (on dead Caryophyllia ambrosia) (1)
Madreporaria	Fungiacyathus marenzelleri (Vaughan) (19)
"	Caryophyllia ambrosia Alcock (19)
Actinaria	sp. (2)
"	Phelliactis robusta Carlgren (2)
Sipuncula	sp.(p) in dead Caryophyllia ambrosia, scaphopod shell, and in old Colus shell
Cirripedia	Thoracica sp. (1)
Decapoda	Munidopsis curvirostris Whiteaves (1)
"	spp. (2)
Gastropoda	Buccinidae Colus sp. (10)
"	Turridae sp. (2)
Scaphopoda	Dentaliidae sp. shells
Asteroidea	Bathybiaster vexillifer Wyv. Thomson (6)
"	Pontaster tenui spinus (Duben & Koren) (32)
"	Dytaster grandis Verrill (10)
"	Hymenaster sp. (3)
Ophiuroidea	Ophiomusium lymani Wyv. Thomson (119)
"	sp. (1)
Holothuroidea	Benthodytes sp. (17)
"	Benthogone rosea Koehler (12)
"	?Laetmogone sp. (5)

Sample No.	AT 162

Taxon

Actinaria	Phelliactis robusta Carlgren
	?Epizoanthus sp. on hermit crab shell (33)
"	sp. (1)
"	sp. on piece of coral (1)
Polychaeta	Melinninae sp. (2) from columella of dead gastropod shell and in tube between whorls of shell of Troschelia berniscensis.

Sample No.	AT 162

Taxon

Polychaeta	Spirorbidae sp. (1)
Crustacea	Eucarida sp. (5)
"	Anomura Munida tenuimana G.O. Sars (1)
"	" sp. in gastropod shells carrying Epizoanthus
"	Eryonidae Polycheles sculptus (Smith) (1)
"	Decapoda sp.
Gastropoda	Fasciolaridae sp.
"	Fasciolaridae Troschelia bernicensis
"	Aporrhais sp. dead shells
Pogonophora	tubes
Asteroidea	Bathybiaster vexillifer Wyv. Thomson (2)
"	Brisingella coronata (G.O. Sars) 10-armed and 9-armed specimens (5)
Echinoidea	Phormosoma placenta Wyv. Thomson (140)
"	Cidaris cidaris (Linnaeus) (1)
Holothuroidea	Laetmogone violacea Theel
"	Benthogone rosea Koehler (1)
Pisces	Lepidia eques (Günther)
"	Nezumia aequalis (Günther) (1)
"	Synaphobranchus kaupi Johnson (1)