Scottish Marine Biological Association

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CRUISE REPORT

R.R.S. CHALLENGER

Cruise 15/81

October 6-20 1981

Rockall Trough

Marine Physics Group

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

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Cruise Report

R.R.S. Challenger

Cruise 15/1981

6 October to 20 October 1981.

Cruise Programme: RRS CHALLENGER, Cruise 15/1981.

Duration: 6th October 1981 to 20th October 1981: Barry to Ardrossan.

Locality: The Rockall Trough and its Continental Shelf between 51°N and 58°N. The cruise track is shown in figure 1.

Staff: A. Edwards

R. Bowers

D.J. Edelsten

D.A. Booth

N.D. Pascoe

N. MacDougall

M. Pearson

J. Wright (Univ. Coll. of Swansea)

S. Pain (Univ. Coll. of Swansea)

A. Harrison (IOS, Bidston)

T. Fury (Univ. Coll. of Galway)

Aims: 1) To service SMBA current meter moorings at stations F ($57^{o}30'N$, $12^{o}15'W$), M ($57^{o}18'N$, $10^{o}23'W$) and R ($57^{o}N$, $9^{o}W$).

2) To lay two bottom current meter moorings to the west of Porcupine Bank for joint SMBA/MAFF studies at positions A1-52^{o} 30'N. 14^{o} 46'W. (500 m.) and A2-52^{o} 30'N. 14^{o} 54'W. (750 m.)

3) To work the Anton Dohrn Seamount CTD section and other sections as time permits.

4) Service the toroidal mooring at the fouling studies site west of S. Uist. Position at $57^{o}18.7'N.$, $7^{o}38.7'W.$

5) To continue seasonal benthos studies in the south and central Rockall Channel at $54^{o}40'N$ $12^{o}16'W.$, Epibenthic Sledge Haul for one hour. Near station M, priority given to Agassiz trawl but if time allows - an epibenthic sledge haul will be done.

6) To lay two Bidston pressure recorders in the vicinity of mooring M and at the foot of the continental slope.

7) To collect Clarke-Bumpus plankton net samples and CTD profiles across the slope region of S.W. Ireland for the University College of Galway.

8) To collect 50 litre water samples for radiocaesium analysis and CTD profiles at ten standard positions between the shelf-edge and the Sound of Mull.

Narrative: Scientific equipment was loaded on a lorry at Dunstaffnage on 2nd October and transferred to Challenger during the afternoon of 5th October. Other gear from Galway and Bidston arrived on the 5th and 6th respectively. After repairs to the ship's gyro by Mr Price and his colleagues, Challenger left at 1400 h and headed for the start of plankton/CTD line P. Restrictions on engine speed, which applied throughout the cruise, and opposing seas during the night of the 6th and on the 7th delayed our arrival at station P1 until 0800/8th. Four stations (P1 to P4) were worked for Conductivity, Temperature and Depth (CTD) and Clarke-Bumpus plankton samples during the day, but the planned section was then stopped in the hope of reaching mooring station A1 165 miles away early on the 10th despite the gales forecast for the 9th. Gales occurred as forecast, and progress northwards was slow on the 9th until evening when the wind moderated. A1 was reached at 0800/10th and the mooring was laid in a depth of 500 metres during the morning. A2 was laid in about 750 m. during the afternoon, after which A1 was revisited and successfully interrogated before our proceeding to the start of a CTD section of stations P5 to P12. After completing this section at 0900/11th, the ship headed for the permanent benthic station (PBS). Early on the 12th, Mr. Harrison's acoustic gear was tested on 2300 m of hydrographic wire near the PBS. Completion of this test was delayed because of poor spooling of the wire. An epibenthic sled was then launched and hauled through the PBS and recovered at 1430 h/12th. The cod end had been lost

the trawl wire end was twisted. However, to repeat the haul would have seriously reduced the chance of reaching mooring F at daybreak on the 14th, so I reluctantly headed for the Bidston pressure recorder site west of the Hebrides Terrace Seamount. Progress to the north was again slow in the face of a north westerly gale and after launching the pressure recorder at midday on the 13th, CTD stations A-D were abandoned so as to retain an early arrival at F on the 14th. CTD station E was worked early on the 14th and mooring F was then sought successfully, recovered and relaid. CTD stations were worked during the night of the 14th/15th and mooring M was reached in the morning of the 15th. The mooring was recovered in good weather conditions but its wire snapped at depth between the 2nd and 3rd of the four current meters soon after the first meter came inboard. An Agassiz trawl rigged with old net was trawled through the calculated position of the dropped meters (and acoustic release) in the faint hope of catching them. No current meters were retrieved, but a satisfactory haul of benthic organisms was obtained by this haul, which because of error arising from the long period (2½ hrs) between satellite fixes proved not to have passed through the required position. The epibenthic sled was then deployed and later recovered early on the 16th without its link shackle between sledge and weak link. Much of the sample had therefore been lost and the sled was slightly damaged. A CTD dip and acoustic gear test were done early on the 16th and useless mooring wire was jettisoned at daybreak. The lost current meters were dragged for with a Gifford grapnel

in the morning: nothing was found and a new mooring was laid in the afternoon. The ship then returned to working the Anton Dohrn CTD section (ADS) at station N, where A. Harrison tested the buoyancy of the Barra Fan pressure recorder. The recorder was fitted with M. Pearson's sediment trap and then deployed in 2100 m. of water. There was then time to do two more stations in the ADS at 0 and 0' before heading for shelf mooring R in time for 0800/17th. In good weather, the mooring at R was recovered in the morning and relaid in the afternoon, after which the ship backtracked along the ADS to P. As a complement to the Clarke Bumpus plankton sampling in the southern Rockall Trough further samples were gathered over the shelf break at stations P', Q, Q' and R. The ADS was again broken off at midnight so as to reach the fouling mooring at 0800/18th. On arrival the wind, which had increased during the night, had reached about 30 knots and safe recovery of the rig was impossible. At 1230 both fouling rigs were sighted, apparently in good condition, but were left in worsening sea conditions in order to work a line of CTD stations to the west. After three stations, this line was abandoned in worsening conditions and the ship hove-to for the night of the 18th/19th. Although the storm had abated a little to winds of 30 knots at 0800/19th, seas were still running high and the fouling rig work was abandoned. The ADS was restarted at midday but in rough conditions was restricted to surface sampling for caesium concentration determinations until Barra Head had been passed, when CTD work was resumed. The last CTD station was worked at midnight on the 19th and Challenger later docked in Ardrossan at 1600 hrs on the 20th October.

Results

Table 1 summarises the moorings, table 2 the CTD and other hydrographic stations and table 3 the benthic hauls.

Aim 1 & 2:(i) Mooring F was recovered satisfactorily: a rotor was missing from the bottom current meter. A new mooring F was laid as planned.

(ii) Only 2 current meters were recovered from M. From the depth record of the acoustic release, it was clear that the wire had parted 600 m below the sub-surface float between recovery of the first and second current meters. The third and fourth current meters and the acoustic release were thus lost. The frayed end of the wire showed two kinks and one extra fray: there was no evidence of localised unusual corrosion. The depth of the break and the position of the mooring are such that submarine or trawling damage to the wire were unlikely causes of the damage. It is more likely that either the wire was damaged when the mooring was laid, after the anchor launch and during anchor descent, or was damaged during its reeling on to the winch used for paying out. Anchor descent is known to be most likely to damage those mooring components near the anchor and has not previously been a cause of damage so distant from the anchor. The most likely cause of wire damage which led to the final failure under recovery stresses is therefore reeling-on during the preparation of the mooring.

A new mooring was laid as planned.

(iii) Moorings A1 and A2 were successfully laid.

(iv) Weather was good during operations at mooring R. Recovery and relaying proceeded smoothly.

Aim 3: All planned CTD sections had to be reduced in order to make up time. In the south, the planned section to the southern end of Rockall Bank had to be abandoned and was replaced by the short section P5-P12 down the continental slope. In the north, stations A to D of the ADS were abandoned so as to keep to a daylight mooring timetable. An opportunist section over the shelf west of Benbecula was abandoned after 3 stations because of a south-westerly gale. Some shelf CTD stations of the ADS (T-C6) were restricted to surface sampling only because of high following wind and swell.

Aim 4: Although the two fouling moorings were sighted, it was unsafe to attempt recovery on the first day (18th/10) at this site because of a worsening south-westerly gale. On the second day (19th/10), conditions were no better, further gales were forecast and the work was abandoned.

Aim 5: (i) No sample was obtained at the permanent station at $54^{\circ}40'N$ $12^{\circ}16'W$.

(ii) Although in smaller numbers than on previous hauls, all the species usually taken in the Agassiz trawl at Station M were present thus enabling the work on Ophiomusium lymani to be continued as well as studies by Swansea University and the Radiobiological Laboratory at Lowestoft.

(iii) A small sample was salvaged from the Epibenthic Sled haul at Station M.

Aim 6: After release testing, and buoyancy checks on the Barra Fan recorder, both recorders were launched as planned and satisfactorily fixed thereafter. A simple sediment trap was attached to the Barra Fan instrument.

Aim 7: An abbreviated series of Clarke-Bumpus stations was worked over the shelf break towards Porcupine Bank and it was later possible to make a short series over the shelf break west of station R. These stations were worked in a standard manner: Clarke Bumpus sample were taken every 20 m. from the surface; plankton samples for preservation with Lugol's iodine were obtained at 0, 15, 30 m.

Aim 8: 50 litre samples of seawater and surface salinity samples were collected from standard positions C10 to C1 on 17th October (C10) and 19th October (C9-C1).

General: Time was lost on this cruise because of bad weather, engine speed restrictions and necessary occasional stratagems to ensure morning arrival at mooring stations. In consequence, CTD and plankton stations were lost, there was no opportunity to repeat the sled work at the PBS and, at the end of the cruise, even contingency time was of no avail in servicing the fouling mooring.

Equipment

(i). Precision Echo Sounder (PES): After the gales of October 9th, the PES was useless. It was discovered that the main cable into

the fish junction box had abraded to the extent that seawater could penetrate both screen and one conducting core. It seems as if this damage could have been avoided by more careful routing of the cable in the fish. The cable could not be repaired at sea and all mooring acoustic operations were subsequently controlled via the hull transducer.

(ii) CTD: A short circuit in the CTD winch slip rings was repaired early in the cruise and it was necessary to secure and repair loose or aging component boards in both deck unit and fish during the cruise. There was a possible shift in conductivity results following repairs to the fish.

(iii). Hydrographic Winch: The hydrographic winch did not spool correctly after the tests of acoustic gear. Adjustment of the spooling gear or wire tensioning or both may be necessary.

(iv). Navigation: Decca worked satisfactorily. Occasional long intervals between satellite fixes led to the accumulation of error in position or to small delays in determining the final position of laid equipment. The Magnavox printer in the "plot" only uses a small portion of its ribbons, which may be of the wrong sort.

(v). Epibenthic Sled: At the permanent station (PBS), the end pot and cod end of the extension net were torn off, the main wire having looped and fouled both net and protective aprons. This was probably due to the incorrect rigging of the swivel and safety strop, so the swivel was inoperative.

At Station M, the sledge was pulled aboard hanging by the safety strop, without the end pot but with aprons and nets intact. There was mud inside the aprons, a small sample trapped by the door in the main net and a jubilee clip round the cod end of the extension net. It seems likely that the trawl had obtained a sample before the shackle was lost between the sledge and the weak link. The sledge would then have been pulled sideways on the safety strop, allowing part of the sample to be trapped in the door when it closed at the end of the tow. A surge during retrieval caused the sledge to hit the ship, springing loose the end pot at this stage (and losing most of the sample). The jubilee clip's being over the cod end of the net is consistent with this hypothesis.

(vi) Main Wire: About 20 m of the main wire was cut off after recovering the epibenthic sled at the PBS. This wire had been damaged because faulty rigging of the swivel shackle between sled and wire prevented swivelling. All tension and wire-out gauges for the main wire worked only intermittently. The tension overload cut-out never came into play.

(vii) Clarke-Bumpus sampling was done from a 4 mm wire wound on to the starboard auxiliary winch and leading through the "A" frame.

(viii) Lights on the "A" frame were not working, but a flood-light was arranged to illuminate the Clarke-Bumpus sampling.

(ix) In heavy seas, sea water entered the wet laboratory through the floor drain.

(x) New sampling bottle clips are needed in the wet laboratory in the starboard half of the rack.

(xi) Many chairs in the laboratories are in ruinous condition and need to be replaced immediately.

Acknowledgements

I want to thank Captain G. Selby-Smith, his officers and his crew for their work and help during this cruise.

A. Edwards

21.10.81

Table 1: Moorings laid in cruise 15/81. October 1981

Date	Station	Lat. °N	Long. °W	Decca	Depth (m)	Details
1000/10	A1	52 30.2	14 46.5	D7 B 16.58 H 32.62	500	Current Meters at 270, 450 m. Release 2132 (320 - 380 - 0.94)
1400/10	A2	52 29.9	14 56.3	D7 B 16.6 H 34.2	765	Current Meters at 310, 720 m. Release 2117 (320 - 300 - 1.18)
1500/14	F*	57 29.3	12 15.2	8E F 33.9 H 71.54	1796	Current Meters at 1760, 1010, 510, 110 m. Release 2116 (0.96 - 320 - 260)
1500/16	M*	57 16.7	10 22.6	8E G 32.16 P 54.74	2216	Current Meters at 1850, 1100, 400, 90 m. Release 2133 (320 - 400 - 0.96)
1200/17	R*	56 59.4	9 00.2	C 33.58 E 75.58	136	First anchor. Two current meters
	-	56 59.2	9 00.5	C 33.64 E 76.62		Second anchor.
13	TG 285 (IOS) Hebrides Terrace	56 40.74	11 32.2	-	2430	Pressure recorder for recovery Feb. 1982 Release CR 238 (320 - 340 - 1.04)
16	TG 282 (IOS) Barra Fan	57 9.87	10 05.8	8E F 40.18 G 54.31	2100	Pressure recorder for recovery Feb. 1983 Release CR 236 (320 - 280 - 0.98)
18	CPCM	57 18.5	7 38.3	8E B 14.55 D 32.70 A 59.42	-	Both fouling moorings sighted about 1-2 cables apart. Ardivachar 8.3') Verran Is. 7.25') approximate range Rubha Ardule 7.25')

* Moorings were also recovered from these stations.

C 15/81

Table 2: CTD, Clarke Bumpus, Caesium and Surface Salinity Stations October 1981.

Station	Lat. °N'	Long. °W'	Depth (m)	Time Z	Date OCT 81	CTD Dip No.	CB/SS	Cs
P1	51 20	9 20	65	0820	8	001	CB	-
P2	51 17½	9 50	98	1205	8	002	CB	-
P3	51 20	10 13	120	1528	8	003	CB	-
P4	51 20	10 35	150	2025	8	004	CB	-
P5	52 35	14 30	383	1833	10	005	-	-
P6	52 36	14 40	445	1910	10	006	-	-
P7	52 37	14 50	631	2135	10	007	-	-
P8	52 38	15 00	877	2300	10	008	-	-
P9	52 39	15 10	1313	0057	11	009	-	-
P10	52 40	15 20	1990	0247	11	010	-	-
P11	52 41	15 30	3100	0500	11	011	500	-
P12	52 42	15 40	3210	0730	11	012	-	-
E	57 32	12 38	1636	0053	14	013	-	-
F	57 30½	12 15	1800	1700	14	014	SS	-
G	57 29½	11 51	1790	1924	14	015	SS	-
H	57 29	11 32	2000	2140	14	016	SS	-
I	57 28	11 19	743	2326	14	017	SS	-
J	57 27	11 05	570	0100	15	018	SS	-
K	57 24	10 52	728	0225	15	019	SS	-
L	57 22	10 40	1800	0410	15	020	SS	-
M	57 18	10 23	2220	2300	15	021	SS	-
N	57 14	10 03	2090	1834	16	022	SS	-
O	57 09	9 42	1870	0041	17	023	SS	-
O'	57 07½	9 33½	1750	0205	17	024	SS	-
P	57 06	9 25	1305	1505	17	025	SS	-
P'	57 04½	9 19	583	1653	17	026	CB/SS	-
Q	57 03	9 13	213	1839	17	027	CB/SS	-
Q'	57 01½	9 06½	152	2030	17	028	CB/SS	-
R	57 00	9 00	150	2213	17	029	CB/SS	+
S	56 57	8 47	-	1100	19	-	SS	-
C9	56 53	8 30	-	1200	19	-	SS	+

Table 2. (Continued)

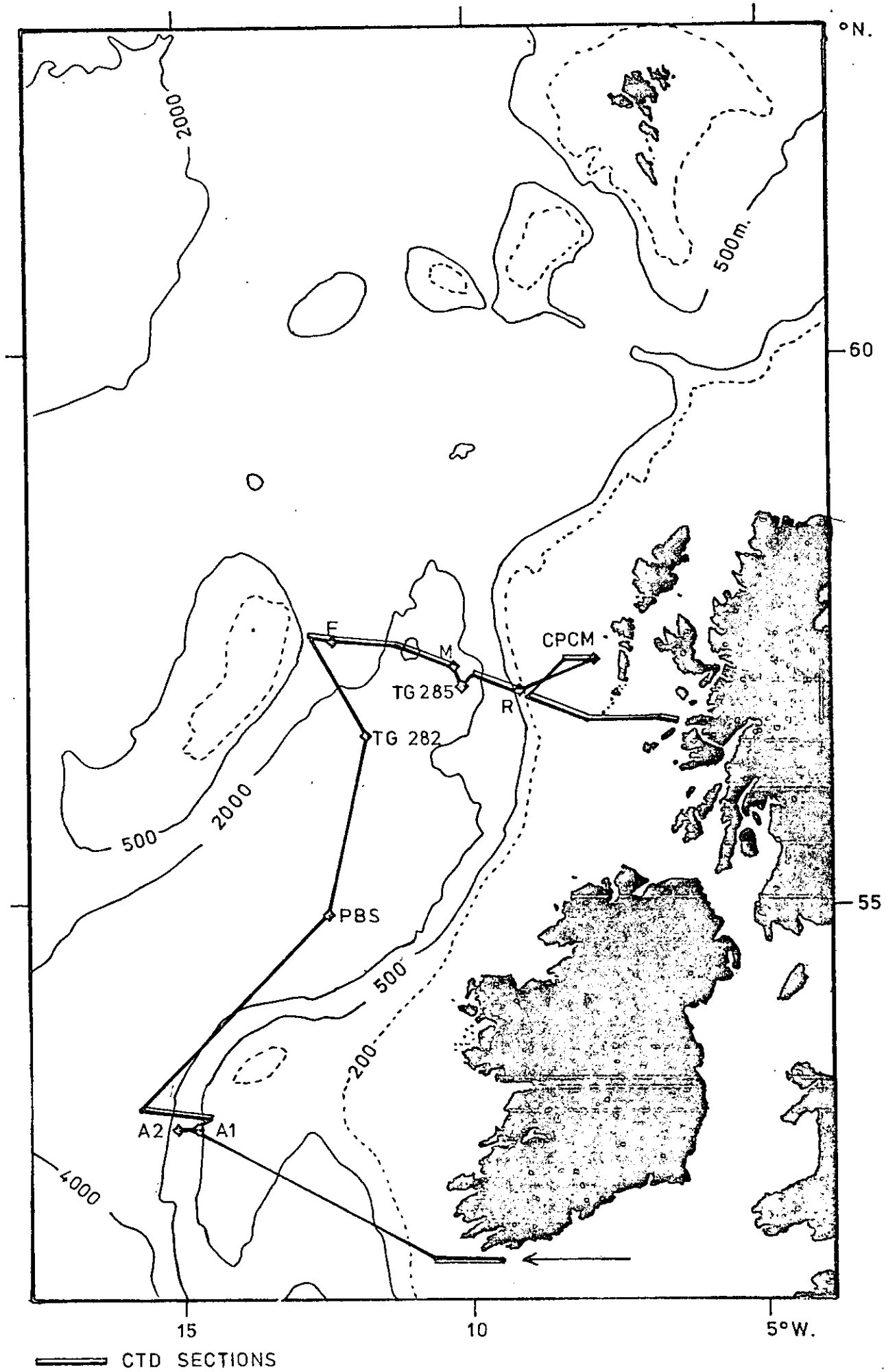
T	56 51	8 20	-	1242	19	-	SS	-
C8	56 47	8 00	-	1454	19	-	SS	+
C7	56 44	7 40	-	1600	19	-	SS	+
C6	56 44	7 20	-	1630	19	-	SS	+
C5	56 44	7 00	139	1750	19	038	SS	+
C4	56 44	6 45	47	1919	19	039	SS	+
C3	56 44	6 27	155	2055	19	040	SS	+
C2	56 41	6 17	40	2153	19	041	SS	+
C1	56 40	6 07	70	2250	19	042	SS	+
B1	57 18	7 44	76	1245	18	030	SS	-
B2	57 18	7 54	95	1406	18	031	SS	-
B3	57 18	8 03	106	1540	18	032	SS	-

Table 3. Agassiz Trawl 198 . Species List

Pennatulacea.	Distichoptil um gracile. Verrill
Gorgonacea.	Acanella ? arbuscula (Johnson)
Actinaria.	sp. (on Acanella)
"	Phelliactis robusta Carlgren
Porifera.	3 species
Madre poraria	Fungiacyathus marenzelleri. Vaughan
Crustacea.	Munidopsis tridentata (Esmark)
"	sp.
"	sp.
Polychaeta.	Lagisca hubrechti. McIntosh
? Nemertea	sp.
Gastropoda.	Colus marshalli (Iredale)
	Trophon sp.
	Natica sp.
Scaphopoda.	Dentalium sp. shells
Asteroidea.	Bathybiaster vexillifer (Wyv. Thomson)
	Benthopecten simplex. (Perrier)
	Plutonaster bifrons (Wyv. Thomson)
	Zoroaster fulgens. Wyv. Thomson
	Pectinaster filholi Perrier
	Hymenaster membranaceus Wyv. Thomson
	Pseudarchaster parelii (Düben & Koren)
Ophiuroidea.	Ophiomusium lymani Wyv. Thomson
	Ophiacantha bidentata (Retzius)
	Ophiura ljungmani (Lyman)
	Ophiura irrorata (Lyman)

Table 3. (Continued)

Echinoidea	Echinus ? affinis Mortensen
Holothuroidea	Ypsilothuria talismani Perrier
	Trochostoma blakei Theel
Fish	Antimora rostrata Gunther
	Coryphaenoides guentheri Vaillant
	Synaphobranchus kaupi Johnson



CHALLENGER CRUISE 15/81.6–20 Oct 1981. Fig. 1