SCOTTISH MARINE BIOLOGICAL ASSOCIATION

Dunstaffnage Marine Research Laboratory

Cruise Report

R.R.S. CHALLENGER

Cruise 9/1978

31 May - 10 June 1978

RRS CHALLENGER, Cruise 9/1978

Duration of cruise : 1359 h 31 May - 0920 h 10 June 1978.

Times BST unless specified otherwise.

Locality: Rockall Channel and Scottish continental shelf.

Staff : D.J. Ellett

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Aims: a) Hydrographic

1) To service SMBA current meter moorings in 57°N, 9°W and 57°30'N, 12°15'W.

2) To work the Anton Dohrn Seamount CTD section.

3) To make CTD sections on the Scottish shelf and in the Sea of the Hebrides.

4) To collect 50 litre water samples at standard positions for radiocaesium analysis.

b) Benthic

5) To obtain an epibenthic sled sample of the abyssal macrobenthos of the SMBA permanent station in 54°40'N, 12°16'W at 2900 m depth in order to continue a long-term time series.

7) To obtain hauls of the benthic megafauna using an Agassiz trawl in order to continue seasonal studies.

8) To obtain samples of deep plankton at the permanent station using the small rectangular mid-water trawl (RMT 1).

Narrative : CHALLENGER sailed from Barry at 1359 h 31 May in fine weather, and made a smooth passage westwards to Fastnet. The Skelligs were rounded during the evening of 1 June, and the benthos sampling site was reached at 1504 h 2 June. Surface salinity samples had been taken en route across the St. Georges Channel and after leaving the west coast of Ireland. An epibenthic sled haul was made from 1525 to 1950 h and was followed at 2020 to 0012 h 3 June by a tow with the small rectangular mid-water trawl (RMT 1) to a depth of about 2500 m. A second RMT 1 haul was taken at 50 m depth between 0029 and 0135 h. Subsequently the ship steamed back to the standard position, where a CTD lowering was made to 2850 m. At 0650 h the spade box corer was lowered, and recovered with a good sample at 0853 h. Two lowerings of the Glasgow University Rieneck box corer followed, but neither secured a sample, and the corer sustained a certain amount of damage due to implosion of its tubular frame. A second spade box corer lowering from 1500 to 1700 h, using a subdivided box was also unsuccessful, and course was set for the position of the westernmost deep mooring. Surface salinity samples were taken on passage.

On arrival in the vicinity of deep mooring F at 1030 h 4 June the small overside transducer was streamed and the ship proceeded at 2 kt. from the Loran-C fix of the mooring towards the satellite navigator fix, a distance of about $2\frac{1}{2}$ n.ml. The release responded about 2 n.ml. from the satnav fix, and was fired at 1204 h, the sub-surface float surfacing close to this position. The float was recovered at 1234 h

and all gear was inboard by 1328 h. The ship steamed 4 n.ml. from the position to jettison used wire and crop 2500 m of damaged main warp, returning to station F to re-lay the mooring between 1920 and 2040 h. The release was observed to bottom at the latter time, and after it had switched off at 2100 h CHALLENGER set course for Rockall in the continuing calm weather with force 2-3 winds.

Station A of the Anton Dohrn Seamount CTD section was begun at 0146 h 5 June and work proceeded steadily to station L, after the completion of which at 2239 h the Agassiz trawl was shot to a depth of about 2180 m. This was retrieved at 0252 h, 6 June with a good catch, and CTD station M was worked. Between 0540 and 0800 h an attempt was made to locate the deep mooring in the vicinity of station M, due for renewal in July, but no contact was made with the acoustic release, and it was decided to continue the section in order to reach the shelf mooring at R before nightfall. During the afternoon the wind increased to force 5, south-westerly, and upon arrival at R swell had begun to rise. However, after completing a CTD lowering, the replacement mooring was laid without incident between 1805 and 1828 h, and its predecessor raised between 1911 and 1938 h. The ship steamed northward to commence a shelf CTD section in towards the Sound of Barra at 2303 h, by which time winds had reached force 7.

Upon completion of the shelf section at 0741 h 7 June, CTD stations were worked northwards to the Monach Is. and from thence northwestwards past St. Kilda to deep water. Despite a slight lull to force 6 during the morning, the westerly winds again reached force 7 by evening, with an accompanying moderate swell.

After working station B10 off the continental shelf at 0224 to

to 0258 h 8 June the ship turned southward with a view to making a systematic search for the deep mooring at station M, but after a night of uncomfortable steaming it became apparent that no rapid improvement in the weather was likely, and at 0845 h course was altered towards station R in order to carry out radiocaesium sampling and CTD observations at standard positions towards the Sea of the Hebrides. This was begun at station R at 1424 h. but the high following swell caused difficulties in heaving-to for CTD work, and after station S radiocaesium and surface salinity samples only were collected en route to station C6, east of Barra Head. Upon leaving this station at 2118 h CHALLENGER steamed to a station off Loch Boisdale to commence at 0025 h 9 June a line of CTD stations towards Loch Moidart, together with five stations between the third station of the line and Loch Bracadale, Skye. This was completed at 1337 h and radiocaesium sampling recommenced at station C5 at 1812 h. The westerly wind had decreased to force 6 and CTD lowerings were made at stations C5 to C2. Station C1, in the Sound of Mull, was sampled at the surface only at 2227 h and the ship steamed for Dunstaffnage. Preparations to enter Dunstaffnage Bay were being made at 0600 h 10 June when a forecast of increasing wind made this inadvisable, and scientific staff and delicate gear were disembarked to m.y. KYTRA at 0920 h. CHALLENGER docked at Liverpool during the morning of 11 June.

Results: a) Hydrographic

Aim 1) The deep current meter mooring in the vicinity of station F ($57^{\circ}30'N$, $12^{\circ}15'W$) of the Anton Dohrn Seamount section was retrieved on 4 June and another mooring laid on the same day. The current meter at approximately 1000 m depth had lost its rotor, and

its central suspension rod had been bent in two places. It is suspected that this may have happened at launching, during the descent of the anchor, and it will be confirmed when the tapes are translated. The recording mechanism of all four meters appeared to have functioned correctly during the previous 120 days. All meters had temperature sensors, and the upper three had pressure sensors. Details of the replacement mooring are given in Table 1.

The shelf mooring in 57°N' 9°W was recovered on 6 June, subsequent to the deployment of its replacement, of which details are also given in Table 1. The sub-surface float of the recovered mooring was waterlogged, and may have sunk well below the surface. The lower current meter was entangled in the meter wire and the fin was missing, suggesting that it had lain on the bottom for part of the time. Again, translation of the tapes from both meters, which appeared to be recording correctly, will be necessary before the history of events during the previous 50 days is clear.

Aim 2) Stations A to R of the Anton Dohrn Seamount section were worked between 0146 h 5 June and 1739 h 6 June. Stations R & S were also worked on 8 June. Surface temperatures were low over Rockall Bank (ca. 10°C), rising to about 12.5°C at the Scottish shelf-edge. The calm weather had encouraged surface heating, and at many stations there was no surface mixed layer.

Aim 3) Two CTD sections were completed on the shelf to the west of Benbecula and the Uists during 6-8 June and eighteen CTD stations were worked in the Sea of the Hebrides on 9 June. The same stations had been worked in early February and mid-April 1978. By comparison with the previous surveys the bottom temperature pattern

had reversed, with warmer water (ca 10°C) to be found in the homothermal conditions near the coasts and the lowest temperatures (below 8.5°C) on the outer shelf. Surface temperatures, on the other hand, ranged from 12.5°C on the outer shelf to about 10°C inshore.

Aim 4) 50 litre surface water samples for radiocaesium determination by the Fisheries Radiobiological Laboratory were collected at all ten standard positions between the shelf-edge and the Sound of Mull on 8 and 9 June. Swell conditions prevented the making of CTD observations at stations C9 to C6, and as usual they were not taken at C1 in the restricted waters of the Sound of Mull.

b) Benthic

Aim 5) A single good haul of benthic macrobenthos was obtained from the SMBA benthic permanent station continuing the seasonal time series initiated in 1975. (See Table 2 for details of all biological hauls during the cruise). Preliminary examination of the sample after washing on deck revealed a rich sample with specimens of the species under current study present in good numbers.

Aim 6) A test lowering of the Mk II 0.25 m^2 box corer at the permanent station recovered a good core about 20-25 cm deep. Although the water overlying the core surface was slightly cloudy, the sediment surface was later found to have been only slightly disturbed - probably as a consequence of handling the heavy gear back on deck. The problem of the box not resting correctly against the spade, and thus causing sample loss during recovery, encountered on the previous cruise (Challenger 6/78), was evidently solved by the SMBA workshop having enlarged the arm slots at the fulcral axis of the gear. A further

lowering of the corer with the subdivided box fitted was, however, unsuccessful. This again appeared to have been caused by poor seating of this box against the spade.

Two attempts at obtaining cores with the Reineck box corer for comparison with the 0.25 m^2 box corer were also unsuccessful.

Aim 7) A single haul with the Agassiz at the position between the Anton Dohrn seamount and the Hebridean slope which was fished previously on Challenger cruise 6/78 again yielded a rich haul of mainly epibenthic megafauna, including some fish, (see Table 3). Many echinoderm species were again present in sufficient quantities to obtain a sample for assessing reproductive activity (Dr P.A. Tyler, Univ. Coll. Swansea in collaboration with Dr Gage). These included Ophiomusium lymani, Ophiocantha bidentata, Echinus elegans and Ypsilothuria sp.

Aim 8) The single deep haul made with the RMT 1 in the vicinity of the benthic permanent station for pelagic larvae of benthic species yielded a good sample which included some, probably recently metamorphosed, juvenile brittlestars; these probably represent young of Ophiura ljungmani (a species common in the benthic samples, and for which specimens of a pluteus larva are thought to have been caught in an RMT haul in April). The presence of these post-larvae, if confirmed as O. ljungmani, agrees well with previous finds of pelagic post-larvae of this species in RMT-1 hauls taken previously in summertime from this area by Dr J. Hauchline (SMBA). Preliminary examination of a small part of this deep haul has also, interestingly, revealed the presence of larvae of a species of bivalve mollusc.

D.J. Elliott & J.D. Gage.
21 June 1978.

Table 1. Details of current meter moorings set during CHALLENGER cruise 9/1978

Station	F	R
Position	57° 30.1'N 12° 16.0'W	56° 59.5'N 08° 58.3'W
SMBA Mooring no.	41	42
Sounding (m.)	1807	134
Nominal depth of sub-surface float (m.)	78	26
Nominal meter depths (m.) (P : pressure sensor) (All have temperature sensors)	89 P 500 P 1000 P 1750 P	39 109
Sampling frequency	20 mins	10 mins
Laid at (GMT)	1940 h 4 June 1978	1727 h 6 June 1978

Table 2. Biological sampling stations worked (all depths given corrected using Mathews (1939) 'Tables of the velocity of sound in pure water and sea water')

Date	Biological operation no.	Approx. times gear on bottom (hrs BST)	SMBA benthic stn. no.	Positions at start and finish of haul	Depth (m)	Gear	Result
2 June '78	1	1740 - 1820	147	54°36'N 12°19'W to 54°35'N 12°15'W	2923-2926	Epibenthic sled (ES)	Good sample; three large Benthodytes sp.
" " "	2	N/A	148	Approx 54°30'N 12°15'W to 54°40'N 12°16'W	N/A	Rectangular mid-water trawl (RMT - 1).	Good sample (deep haul)
" " "	3	N/A	149	54	N/A	RMT 1	Good sample (surface haul)
3 " "	4	0756	150	54°37.3'N 12°13.1'W	2916	0.25 m^2 Box corer Mk II (SBC)	Good core
6 " "	8	0100 - 0130	151	57°21.4'N 10°21.6'W	2175	Agassiz trawl (AT)	Large, rich sample (see Table 3)

Table 3. Listing of preliminary indentifications of benthic fauna in Agassiz Trawl haul (AT 151) on 6 June 1978.

Porifera

Hexactinellidae sp.

sp. indet.

Gorgonacea

Acanella arbuscula Johnson

Pennatulacea

Distichoptilum gracile Verrill

Madreporaria

Fungiacyathus marenzelleri (Vaughan)

sp. indet.

Actinaria

Phelliactis ?robusta Carlgren

sp.

Nemertea

sp. (from old gastropod shell)

Polychaeta

Lagisca hubrechti (McIntosh)

Ophelina (= Ammotrypane) sp.

? Pauveliopsidae sp.
Terebellidae sp.
Hesionidae sp.
sp. indet
} from burrows in old gastropod shells.

Sipuncula

sp. indet.

sp. "

sp. "

Table 3 continued.

Crustacea

Malacostraca sp. (probably pelagic)

Eryonidae *Polycheles sculptus* S. I. Smith

Galatheidae *Munidopsis ?curvirostris* Whiteaves

Pycnogonida

Collossendeis collossea Wilson

Gastropoda

Buccinidae *Colus* sp.

Fasciolaridae *Troschelia berniscensis*

Turridae Brachytominae *Belomitra paradoxa* Fischer

Gymnobela friclei Verrill

Pleurotomella sp.

Leucosyrinx verrill Dall

Muricidae *Trophon* sp.

Scaphandridae *Scaphander* sp.

Trochidae *Calliotropis regalis* Verrill & Smith

Bivalvia

Malletiidae *Malletia obtusa* G.O. Sars

Cuspidariidae *?Cuspidaria* sp.

Scaphopoda

Dentaliidae sp. indet.

Asteroidea

Bathybiaster vexillifer Wyv. Thomson

Pseudarchaster parellii (Duben & Koren)

Dytaster grandis

Pontaster tenuispinus (D & K)

Hymenaster ?pellucidus Wyv. Thomson

Table 3 continued

Ophiuroidea

Ophiomusium lymani Wyv. Thomson

Ophiacantha bidentata (Retzius)

Ophiacantha ?abyssicola M. Sars

Ophiocten ?latens Koehler

Echinoidea

Echinus elegans D & K

sp. indet (frags. only)

Holothuroidea

?Ypsilothuria sp.

Pisces*

Polyacanthanotus rissoanus (Filippi & Verany)

Lionurus carapinus Goode & Bean

Antimora rostrata Günther

Chalinura mediterranea Giglioli

Symphobranchus kaupi Johnson

spp. indet (2)

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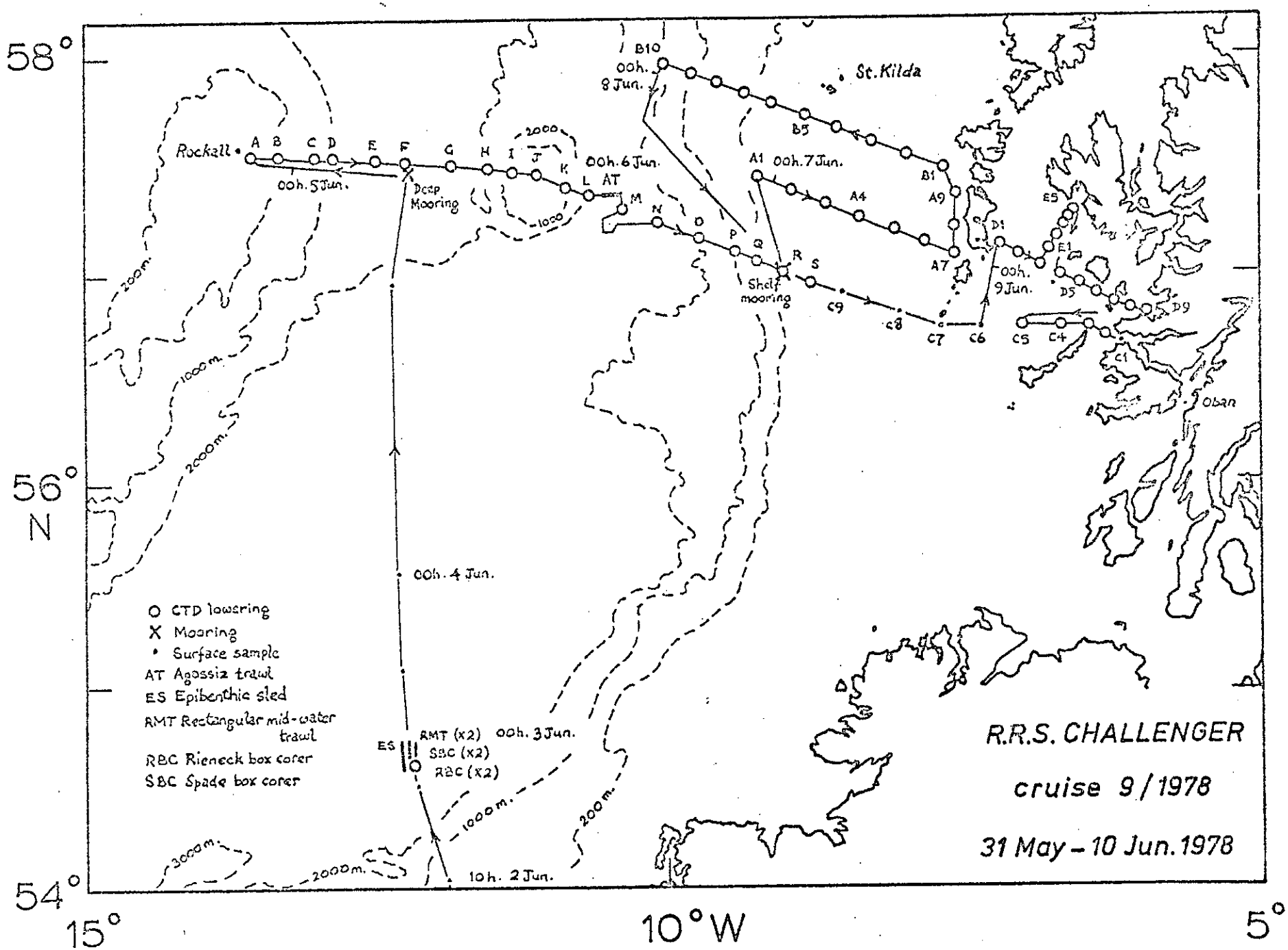
* We are grateful to Mrs J. Duncan for assisting with the identifications of fish.


58°
56° N
54°
15°
10° W
5°
Rockall
A B C D E F G H I J K L AT M N O P Q R S
00h. 5 Jun.
Deep Mooring
00h. 6 Jun.
2000
1000
200m
1000m
2000m
B10
00h. 8 Jun.
St. Kilda
B5
B1
A9
A1 00h. 7 Jun.
A4
A7
Shelf mooring
C9
C8
C7
C6
C5
C4
C1
D1
D5
D9
E1
E5
00h. 9 Jun.
Oban
00h. 4 Jun.
ES
RMT (x2) 00h. 3 Jun.
SBC (x2)
RBC (x2)
10h. 2 Jun.
3000m
2000m
1000m
200m
O CTD lowering
X Mooring
• Surface sample
AT Agassiz trawl
ES Epibenthic sled
RMT Rectangular mid-water trawl
RBC Rieneck box corer
SBC Spade box corer
R.R.S. CHALLENGER
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