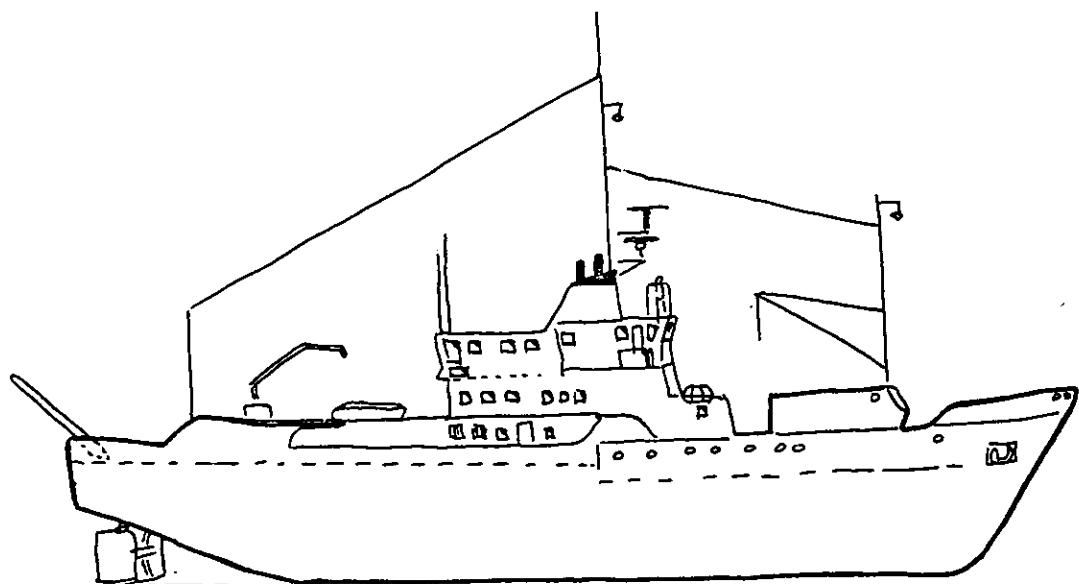


# PRELIMINARY REPORT

Challenger 11/81

M. I. A. S.  
24 NOV 1981  
(WORMLEY)



Dr. T P Scoffin

Univ. of Edinburgh

August 1981

Challenger 11/81. Preliminary Scientific Cruise Report

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13 August 1981

1. Area

Porcupine Bank and West Irish Shelf. The cruise track is shown in Figure 1 and the data sheets in the Appendix indicate station positions and data collected at each.

2. Purpose of research and methods

The purpose of this work was to observe and collect samples of sediment and organisms from the sea bed on the shelf and shelf edge west of Ireland. The observations were made by u/w TV and film cameras and the sediment samples collected by grabbing, dredging and coring. Information on the bedforms and thickness was obtained by geophysical profiling including side scan sonar, pinger, sparker and depth recording. Further data on the deep structure will be interpreted from gravity meter recordings. Water samples were collected and filtered and the suspended sediment will be analysed in conjunction with water temperature measurement to aid interpretation of overall hydrography of the area of Porcupine Bank.

3. Operational conditions

The first two days of the cruise were stormy with winds up to force 8 prohibiting sampling along part of the first leg of the cruise track. Thereafter weather was good allowing sampling gear and the TV system to be operated

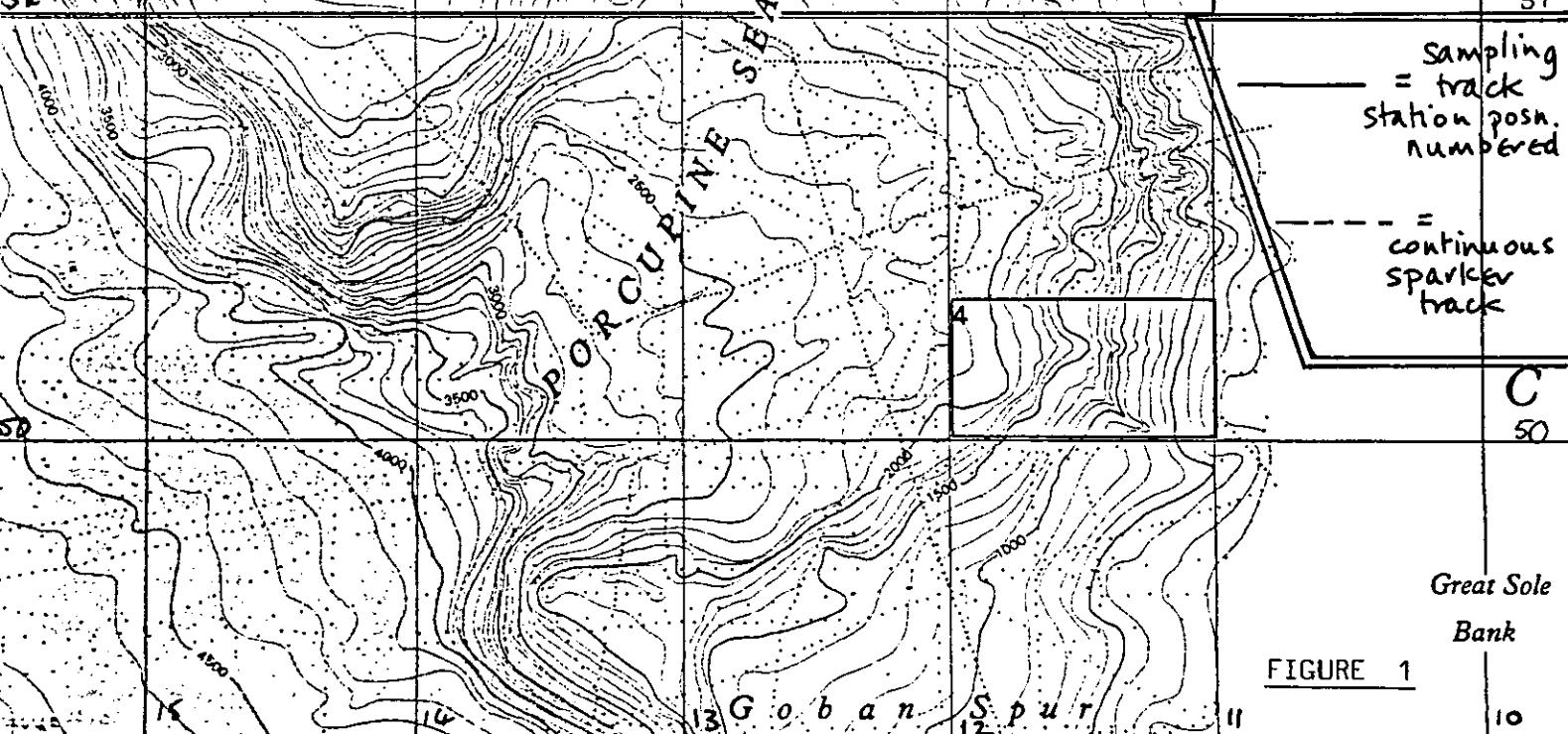
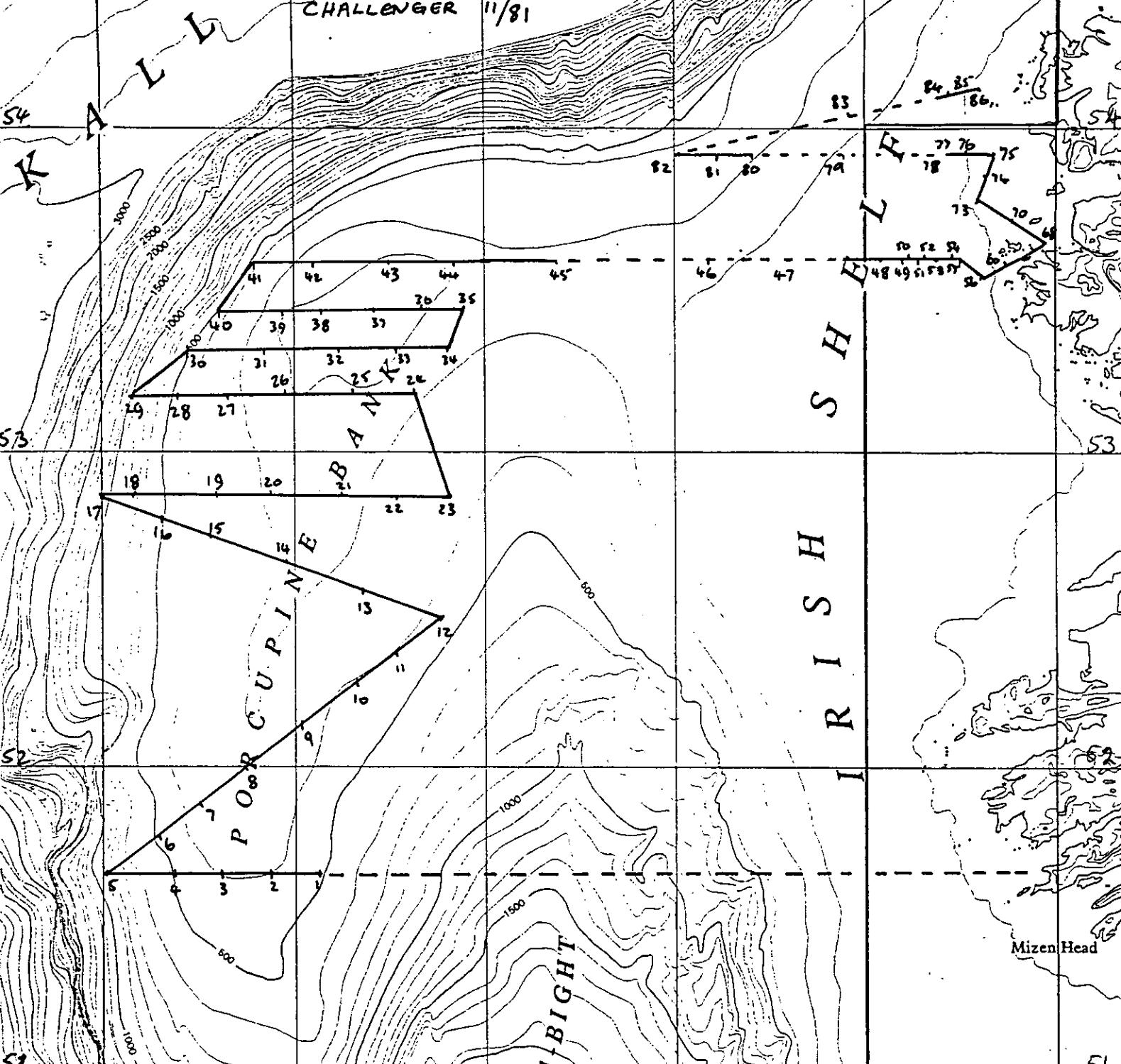


FIGURE 1

whenever required. Problems with the grab sampler meant that sea bed sampling (by dredging) took longer than expected so that a portion of the cruise track had to be omitted in order to sample Porcupine Bank adequately.

#### 4. Personnel

<u>Name</u>	<u>Institution</u>	<u>Role</u>	<u>Main scientific interest listed in 5 below</u>
T.P. Scoffin	Univ of Edinburgh	Principal Scientist	i,iii,vi,vii,viii Coordinator
G.E. Bowes	Univ of Strathclyde	Scientist	i,viii
J.J. Clokie	Sphere Environmental Cons.	Scientist	iii,iv,v,vi
S. Smith	Royal Scottish Museum	Scientist	iv,viii
G. Blackbourne	Univ of Strathclyde	Res Student	ii
S. Brooks	Univ of Southampton	Student	ix
J. Barling	Univ of Edinburgh	Student	
I. Curle	Univ of Edinburgh	Student	
R. Hope	Univ of Edinburgh	Student	
R. Powell	NERC Barry	Technician	
S. Howells	NERC Barry	Technician	
R. Keary	Irish Geol Survey	Irish Observer	

#### 5. Preliminary scientific results

##### Introduction

The remarks below are based on the observations made during the cruise. Only cursory sediment and organism analyses were possible on the ship and are recorded in the appendix; the results of laboratory analyses will be completed in some months' time.

##### (i) Carbonate sediment composition

###### a) Porcupine Bank. (depth 161-1096 m)

Globigerina foraminifera dominate the deep waters west of the Bank with local occurrences of barnacles and corals near rocky outcrops. Towards the Bank top benthic foraminifera are introduced. At the less than 200 m contour, fragments of molluscs (mainly Nucula and Abra), bryozoans (mainly Sertella, Porella, and Domopora), and echinoderms increase in number.

There is an influence on skeletal type by both depth and substrate. The lithofacies relate closely to those found on Rockall. No barnacles or red algal facies exist on the Bank.

b) Shelf NW of Ireland (depth 24 - 360 m)

In the near-shore shallow (< 50 m) zones shelly gravels with the calcareous red alga Phymatolithon occur. In the depth zone 50 to 80 m bryozoans add to the molluscan fragments. West of the rocky ledge that runs N-S at about 80 to 120 m depth along this stretch of NW Ireland, there is a rapid transition into fine quartz-rich sand (this is reflected in the living fauna).

(ii) Terrigenous sediment

On the southern part of Porcupine Bank there is a distinctive suite of pebbles of Palaeozoic sediments and metamorphic rocks suggestive of a west Ireland origin by ice rafting. Glacial striations are common. The coarse cobbles, and boulders of fairly consistent metamorphic composition, abundant on the Bank top and the NW, may be of local origin and relate to rock outcrops seen on the TV.

Concretionary iron stained rocks were regularly located at about 500 m depth on the western margin of the Bank. These are exceedingly fossiliferous containing molluscan, brachiopod and foraminiferal skeletons. This rock has probably been forming since Tertiary times.

The Seabight and Slyne trough have abundant fine quartz sand and some clay minerals; these may be Pleistocene and Recent in origin. In shore terrigenous clasts have the appearance of glacial outwash sands and gravels mainly of a local source.

(iii) Occurrence of Lophelia coral patches

The distribution of Lophelia patches relates to depth and substrate. Rock outcrop or exposed cobbles appear essential for coral attachment. Lophelia fragments were found between 955 m and 225 m with living specimens occurring at both extremes. A smaller polyped variety may take over at the greater depths. Side scan records suggest that patches are 10 to 25 m wide, occur in clusters of 3 to 10 over about a hundred meters and these clusters are widely separated by several hundred metres. This distribution may merely reflect the occurrence of pebble patches. Lophelia patches abound more on the western than eastern margins of the bank. The solitary coral Caryophyllia is also fairly common on rocky areas.

(iv) Fauna

Below 100 m there is low variety and number of animals. On the southern and western margins between 600 m and 400 m echinoids (Cidaris, Spatangus) and anemones are common. Near 300 m burrowing crustacea are common especially Netrops and these animals thoroughly bioturbate the silty sediment over much of the bank. The fine quartz-rich sediment of the Seabight and Slyne Troughs has fewer animals but is characterised more by polychaete worms. Mollusc distribution is controlled by both depth and substrate type. The top of the bank and inshore areas have a gravel associated fauna of crabs, bryozoans, browsing chitons and sponges. Overall, the fauna has a northern aspect with some southern varieties present.

(v) Flora

Porcupine Bank lacks a benthic flora, it is too deep for light to penetrate. The photic zone as defined by the depth limit of living benthic algae appears to be about 68 m 30 kilometres offshore western Ireland and 58 m within 5 kilometres of the coast.

(vi) Breakdown of skeletons

In waters deeper than about 180 m there is a noticeable scarcity of shell fragments even though dredging reveals the presence of living molluscs on the sea bed. This skeletal breakdown could relate to several factors:- a) Hermit crabs occupy and 'wear out' all available gastropods; b) Anemones and sponges attach to and dissolve gastropod shells; c) Predatory crustacea, gastropods, fish, echindoerms and worms eat bivalves; d) Scavenging gastropods, echinoderms, amphipods, holothurians clean up shell debris; e) Boring organisms attach and corrode shells, these borers include clinoid sponges, worms, bryozoans, fungi and Natica gastropods; f) Chemical solution on the sea bed or within the sediment; g) burrowing organisms rework sediment exposing shells to renewed chemical or biological attack.

(vii) Temperature

Warm bank top temperatures of 12 to 14°C indicated an absence of upwelling on the western margin of the Bank (unlike Rockall Bank).

(viii) Sedimentary structures (Data from TV and side scan sonar)

Traction current structures were noted only in the less than 80 m zone close to shore. In the silts of Porcupine Bank a plethora of bioturbation structures - of crustacean, fish, echinoid and worm origin are found.

(ix) Subsurface results (Data from sparker)

The margins of the Celtic (trial run on route to W. Ireland) Porcupine Seabight and Slyne Troughs were revealed on the sparker profiles. The gravity data will take some time to interpret.

Possible publication topics

1. Sedimentation on Porcupine Bank and the NW Irish Shelf.
2. Molluscan assemblages of Porcupine Bank.
3. Occurrence of Lophelia on Porcupine Bank.
4. Photic limits at 54°N west of Ireland.
5. Gravity results on Porcupine Bank.
6. Role of aphotic organisms in the destruction of shells.

Appendix

The data collected for each Station is shown in the appendix which was prepared during the cruise. Note all depths should be reduced by 4m to correct for the depth of transponder of the precision echo sounder. Abbreviations are as follows:-

Rd = rock dredge, Ad = anchor dredge, Pd = pipe dredge, G = grab,  
D = dead, A = alive, L/s = limestone, S/s = sandstone.

Station	Date/ time	Position (Lat. / long)	Depth (m)	Bottom sample	Water sample	T.V. / still camera	constituent composition, percent.	6 O R A L	Biota (dredge / T.V.)	Terrigenous pebbles	Remarks	
											a = alive	a = clean
1	23.7.81 21:30	51° 40.2' N 13° 49.5' N	510	g	ws	Rd.	Mud. Pelagic & benthic forms, echin spines. Glaucite	Rd. Polychaetes common 1 halothamia; burrowing amphipods Lisaea? 2 small hermits 2 calc. eggs, dead shells hammer, clams, oyster shells, Echinus? 3 oysters large fragments	Rd. 6 cm abundant pebbles corals (pink), greenish grey, grey-green, brown gravel, sand, oysters white, cream			
2.	24.7.81 03:10	51° 39.8' N 14° 10.4' N	400	g				No biota	No terrigenous pebbles		70%	
3	24.7.81 05:00	51° 39.7' N 14° 25.3' N	410	g			Mud. Pelagic, benthic forms, Echin. Spines. Molluscs debris etc.	No biota	No terrigenous pebbles		75%	
4	24.7.81 06:40	51° 39.6' N 14° 41.6' W	490	9.4 faded			Fine sand - mud Pelagic, benthic forms Echin spines. Moll. debris	No biota	No terrigenous pebbles		80%	
5	24.7.81 10:00	51° 40.2' N 15° 00.7' N	925	Rd. 755 Pd		Silt - sand	Globigerina, forams, benthic Sponges & spicules. Ols., glauconite	Rd. Rd. Brittle stars (a); burrowing (D) anemones; 1 crab; 1 meadow worm; 1 oblong, pinkish (A) barnacles; calcareous, articulated algae (greenish); 1 red starlet; 1 red starlet; 1 grey shell; 1 white algae; 1 burrowing worm; 1 small bivalve; 1 brownish; 1 glaucite bryozoan; small large worm - severe rust.	Rd. Rd. 5 cm oblong, pinkish red starlet; 1 grey shell white; 1 small brownish; 1 glaucite bryozoan; small large worm - severe rust.			75
6	24.7.81 13:00	51° 46.5' N 14° 44' N	485	grained			Lage benthos or dredge	Rd. Rhabditopoda (macrocercus) (S) 2 spp. pennatulids; 1 abraded (D) 1 lg. crab; 2 sea crabs; cluster tubeworms; dendrites shells (sand, sandal) echinoids; burrowing worm; 1 mollusca; 1 polychaete; 1 abraded Pennatula?	Rd. Rd. 5 cm abraded - sandal; 1 abraded grey reef; grey sh.; sandal brown; 1 greenish grey; 1 white grey; 1 brownish brownish; 1 grey; 1 sandal mollusca; 1 polychaete; 1 abraded Pennatula?			70
7	24.7.81 15:40	51° 52.3' N 14° 31.7' N	370	Rd. Pd			Fine Sand.	Rd. (a) 2 mm. straight sh. 1 piece Lygophis? 1 holothurian; many few pebbles grey slate; 1 prawn; many red sh.; 1 stiff shrimps 1 tube worm; another grey, sh.; 1 pr. burrowing worm; burrowing anemone (large); 1 greenish; 1 sand 1 sepiophorid; 1 astarte; 1 sandal; 1 nudibranch; 1 poriferous;	Rd. Rd. 5 cm grey; 1 holothurian; many few pebbles grey slate; 1 prawn; many red sh.; 1 stiff shrimps 1 tube worm; another grey, sh.; 1 pr. burrowing worm; burrowing anemone (large); 1 greenish; 1 sand 1 sepiophorid; 1 astarte; 1 sandal; 1 nudibranch; 1 poriferous;			60

a = alive  
d = dead

m/s limestone

Station	Date / time	Position (lat / long)	Depth (m)	Bottom sample	Water sample	T.V. / still camera	Constituent composition: percent	G	Biotia (dredge / T.V.)	Terrigenous	CaCO <sub>3</sub> % in sand	Remarks Geophysics	
8	24.7.81 21:20	52° 00' 6" N 14° 27' W	350	Rd				(L) (D)	Rd: (a) admetes; (b) bivalve; (c) brittle stars; (d) echinoids; (e) forams; (f) globular; (g) hard corals; (h) large forams; (i) med. forams; (j) molluscs; (k) organic; (l) oysters; (m) polychaetes; (n) sand; (o) shells; (p) sponges; (q) starfish.  Fine sand - Silt. Glob. & Bank forams. Ech spines. Br & glass.	Rd/Pd: 1 - Demiplane of coke			DWSS FISH in 17.20 - 21.20
9	25.7.81 00:00	52° 08' N 13° 53' 6" W	370	Rd				(L) (D)	Rd: (a) barnacles (juv. polychaetes); (b) crinoids; (c) organic; (d) sand; (e) shells; (f) starfish; (g) sponges.  PL: (a) Moll., univalved; (b) bivalve; (c) forams; (d) globular; (e) med. forams; (f) molluscs; (g) organic; (h) sand; (i) shells; (j) starfish; (k) sponges.	Rd/Pd: 1 cm 1 coke 1 bulk bag.		70	
10	25.7.81 02:30	52° 15' 7" N 13° 39' 5" W	390	Rd				(L) (D)	Rd: (a) brach. corals; (b) crinoids; (c) organic; (d) sand; (e) shells; (f) starfish; (g) sponges.  PL: (a) Asterias; (b) Murex	Rd + Pd: 8.5cm 1 coke 1 bulk bag. - no pink 'crust' - red sand; iron pyrite - white sand		60	
11	25.7.81 04:40	52° 22' 5" N 13° 25' 2" W	425	Rd				(L) (D)	Rd: (a) Bivalves; (b) ceramids; (c) gonopods; (d) nephrops; (e) organic; (f) polychaetes; (g) sponges.  PL: (a) Asterias; (b) Murex; (c) other molluscs.	Rd/Pd: 4.2cm - no pink 'crust' - red sand; iron pyrite - white sand		60	
12	25.7.81 07:40	52° 26' 9" N 13° 16' W	460	Pd				(L) (D)	Pd (a) Nephrops; (b) crab; (c) fish; (d) sand; (e) shells; (f) starfish; (g) sponges.  PL: (a) few crusts; (b) crab; (c) fish	Rd/Pd: 6.4cm - some pinkish - red sand; iron pyrite - white sand		30	
13	25.7.81 11:20	52° 30' 5" N 13° 40' 7" W	310	Rd				(L) (D)	Rd: (a) Bivalves; (b) ceramids; (c) gonopods; (d) organic; (e) polychaetes; (f) sponges.  PL: (a) usual dead molluscs & bivalves; (b) hard ground spec. Monira; (c) shells	Rd/Pd: 4.4cm - pinkish - red sand; iron pyrite - white sand		50	sparkler out
14	25.7.81 14:40	52° 39' 6" N 14° 04' 2" W	285	Pd	W.S.	T.V. 15:50 → 16:10 (tape 1 0-360)		(L) (D)	Rd: (a) Gasterosteidae (b) Ophidion; (c) halibut; (d) muraenidae; (e) percidae; (f) gobiidae; (g) blenniidae; (h) apogonidae; (i) scophthalmidae; (j) few dead shrimps.	Rd/Pd: 4.4cm - pinkish - red sand; iron pyrite - white sand		50	sparkler out
			-315		9.0.83							12.30 → 14.40	gravimeter to low speed.

C16 : reworked - burrowed  
calc. conglom -  
or ↓ put in later.

Station	Date / time	Position (lat / long)	Depth (m)	Bottom Sample	Water Sample	T.V. / still camera	Constituent composition - percent	E. Biota (borehole / T.V.)	Terrigenous	CaCO, % in sand	Remarks Geophysics
15	25.7.81 21:20	52° 44' N 14° 29' W	405	Rd			Mud. Pelagic forms + benthic forms, ech. spines, O.R. + glass.	Rd (a) echinoids (40%); (b) oyster shells (3); oysters; corals (3); 100+ small shells; 50+ bivalves; 60+ polychaetes; 10+ crustaceans; 10+ fish skeletons	Rd + Pd; 25cm red & brownish; scattered calcareous concretions.	sparkler out 19.10 → 21.00	
B16 cont. 16 (at 30 spp of animals found common: brachiopods; asteroidea; serpulids; C.N. similar to CW)	25.7.81 23:50	52° 45' N 14° 43' W	490	Rd				Rd (a) pelagic forms + benthic forms (40%); (b) oysters; 100+ small shells; 50+ bivalves; 60+ polychaetes; 10+ crustaceans; 10+ fish skeletons	Rd + Pd; 25cm brownish; scattered calcareous concretions.		
				Pd				Rd (a) many brittle stars; some sponges; sparse greenish algae; 100+ small shells; 50+ bivalves; 60+ polychaetes; 10+ crustaceans; 10+ fish skeletons; 10+ echinoids.	Rd + Pd; 25cm brownish; scattered calcareous concretions.	80	
17	26.7.81 03:10	52° 49' N 14° 58' W	1100	Rd	W.S.		Mud. Pelagic + benthic forms, ech. spines, bivalves, O.R. + glass.	Rd (a) many brittle stars; some sponges; sparse greenish algae; 100+ small shells; 50+ bivalves; 60+ polychaetes; 10+ crustaceans; 10+ fish skeletons; 10+ echinoids.	Rd + Pd; 25cm brownish; scattered calcareous concretions.		
18	26.7.81 08:10	52° 49' N 14° 47' W	600	Rd			Mud. Pelagic forms + benthic forms, ech. spines, bivalves, O.R. + glass.	Rd (a) branching barnacles; 40+ small shells; 40+ brittle stars; 30+ corals; 10+ sponges; many bivalves; 10+ polychaetes; many echinoids; 10+ crustaceans; 10+ fish skeletons; 10+ echinoids.	Rd + Pd; 65cm brownish; scattered calcareous concretions; 45% sand; 35% silt; 10% clay; 10% gravel; 10% greenish algae; 10% brownish green; 10% white; no fossils.	90	
19	26.7.81 11:00	52° 50' N 14° 25' W	385	Rd			Silt. Glob. forms, benthic forms, ech. spines, shell frags., O.R. + glass.	Rd (a) 50+ corals; 100+ planaria; 100+ bivalves; 30+ corals; 30+ shells; 10+ sponges; 10+ brittle stars; 10+ echinoids; 10+ polychaetes; 10+ crustaceans; 10+ fish skeletons.	Rd + Pd; 55cm brownish; scattered calcareous concretions; 45% sand; 35% silt; 10% clay; 10% gravel; 10% greenish algae; 10% brownish green; 10% white; no fossils.	80	
20	26.7.81 17:30	52° 50' N 14° 06' W	240	g				g. (a) few sm. errant worms; shell frags.	NETTNG		
21	26.7.81 15:30	52° 48' N 13° 49' W	210	Rd	W.S.	T.V. 18:10 + 19:50 (Tape 1) S60° fm	S/T. Pelagic + benthic forms, ech. spines. 70% O.R. - glass.	Rd (a) many anemones; 100+ corals; 100+ bivalves; 50+ polychaetes; 50+ crustaceans; 10+ echinoids; 10+ fish skeletons.	Rd + Pd; 200cm + 1 cont.	20	
				Pd		S.C. (b/l) 50/60 S/T. Pelagic + benthic forms, ech. spines. 50% O.R. - glass.	(b) many shells				
										10	

Station	Date / time	Position (lat/long)	Depth (m)	Bottom sample	Water sample	T.V. / still camera	constituent composition: percent	S R L	Biota (dredge / T.V.)	Terrigenous		CaCO <sub>3</sub> % in sand	Remarks Geophysics	
22	26.7.81 21:10	52°49.9' N 13°28.6' W	250	Rd Pd			90% silt 9% gtr., clay minerals, r. fine calcareous & some forams	sal sd sd	Rd: 500+ round granules; 10% aggregates; 0% ophiurids; 30% sandy granules; 1% scratches; 1% calc. oyster corals.	No samples recovered.				
23	26.7.81 23:20	52°49.9' N 13°11.0' W	365	Rd Pd	WS				Rd (sd) 10% ophiurids & asteropeltids			10		
24	27.7.81 03:50	53°09.6' N 13°21.5' N	225				Silt. Pct. v. bent. forams. Cal. spines. Gtr. + 5% glauc.		g: (a) 1 brittle star; 1 red tube several other tiny spp.; particularly 10 mm.	NOTHING		50		
25	27.7.81 06:00	53°09.8' N 13°42.4' W	185				Silt. Mainly gtr. Pct. bent. forams, shells & glauc.		g: (a) 10% brittle stars; 10% juv. crinoids; many sand worms; sea sm. molluscs; + amphipods; 1 sandy anemone. (d) 7 various benthic forams	In 5cm granules of metamorphic rock.				
26	27.7.81 08:00	53°09.0' N 14°02.5' N	185				Silt. Mainly gtr. & forams		g: (a) many polychaetes; amphipods; 1 juv. wrinkle	NOTHING		20		
27	27.7.81 10:10	53°10' N 14°20.5' N	235	Rd Pd			Silt. Mainly gtr. & lithics Benthic + some glob. forams	sd sd	Rd: 200+ sandy, antimony Rd + Pd: 1-5 cm 1. calce. fragments; 10% core, shells pyrenoidoids; 7 compacted firm sandy mud 10% aggregates; 10% hard mud 15% lithoclasts; 10% benthic bases; 10% metac. 10% angular fragments	core, shells firm sandy mud yellow-green brownish yellow bases; very metac. angular fragments			20	
28	27.7.81 13:30	53°09.9' N 14°36.9' N	150	Rd Pd			Silt. Glob. ooze, dark forams, lith. + sponge spines, gtr. glauc.		Rd; 100% silt; 10% lith. 10% limnoids; 5 sand grains many other spp.	Pd: 415cm abundant fragments of dolomite grey; 1% sand; 1% quartz; 1% yellow greenish grey green; 1% brownish yellowish pink brownish grey	pieces of calcareous shells 1. 16.	10		
												80		

Station	Date / time	Position (lat/long)	Depth (m)	Bottom Sample	Water Sample	T.V. / still camera	constituent composition: percent	C O R A L	Biota (dredge / T.V.)	Terrigenous		$\text{CaCO}_3$ % in sand	Remarks: Geophysics	
29	27.7.81 16:50	53° 19' 2" N 14° 45' 8" N	83.5	Rd Pd				sol (a)	Rd: macroalvea common; Ed. Rd. 5-20cm silts dominant; Reg. benthic + holoplankton; organic anomomolous but Vg. 5% chrysophytes; 10% algae; 10% microalgae; well granular; lithology calcareous; substrate very massive.				16:20 - 16:30; planctes on slope. dredge caught on seabed.	
30	27.7.81 20:20	53° 16' 8" N 14° 35' 1" N	530	g W.S. (core 2) Rd Pd	T.V. 27:50-00:30 5 C	Glob. ooze (90%) 5% silt 5% lithics		sol (a)	Rd: 1000s limestone; 1000s Rd. Rd. 5-20cm granular; benthic; 1000s organism; 1000s benthic; 1000s quartzitic; 1000s calcareous; 1000s gravelly; 1000s			90	side scan 021000CS1	
31	28.7.81 06:00	53° 18' 2" N 14° 12' 5" N	215	Rd Pd			Benthic forams, shell debris + lithic spines	sol (a)	Rd: (a) (concentrated)チャコテ shells tube; suspended; charcoal; coralline algal fragments; sandy bottom many worms & hermit crabs.			70		
32	28.7.81 09:40	53° 18' 3" N 13° 44' 1" N	165	Rd Pd Pd			Q12 + benth. forams, bryozoans shells, lithic spines.	sol (a)	Rd: many benthic infa. echinoids (8) cup + saucer sponges; 10% burrowing organisms many hermit crabs with aggregates; 10% shells; Pd (a): few feather animals bivalve spp.	Rd: 5-10cm yellowish patches granular substrate relics rare or absent calcareous rocks; 10% fine gravel yellowish patches Momas		30		
33	28.7.81 13:20	53° 18' 1" N 13° 24' 6" N	206	g (4) (1 mm size up)			Q12 + forams & shells fine sand		nothing recorded				no planctes	
34	28.7.81 15:20	53° 18' 5" N 13° 07' 5" N	155	g (4) W.S. Rd Pd			Q12 + benth. forams fine sand	sol (a)	Rd: (a) 1 g. white; many sol. Rd. corals + white anomomolous; many serpulids; many vesicular; white sedimentary; 10% stained s/ 12% white; 2% benthic	Rd: Rd. 5-15cm abundant in 20m by depth. 10% red & white greenish mass; rare bld. patches up to 1mm thick char. 2-3 cm; tan met. 1-1 cm.			40	
35	28.7.81 18:10	53° 26' 7" N 13° 01' 8" N	240	Rd Pd	T.V. (19:55-20:30) (Eo. po. 2) 900-1000			sol (a)	Rd: many macroalgae; adansonia; many g. spines abundant in 10 m by depth; 5 cm thick; 10% molluscs; 1 g. calcareous mud.	Rd: Rd. 5-15cm abundant in 20m by depth. 10% red & white greenish mass; rare bld. patches up to 1mm thick char. 2-3 cm; tan met. 1-1 cm.			100%	

Station	Date/ Time	Position (lat / long)	Dept. (m)	Bottom sample	Water sample	T.V. / still camera	Constituent composition: percent	G R A L	Biota (dredge / T.V.)	Terrigenous material	COC % in sand	Remarks Geophysics	
36	28.7.81 22:50	53°27.3' N 13°24.4' W	170	Rd					Pelagic sand; benthic; sandy anemones; 10 barnacles; nudibranchs; 2 small diatoms; 1 small amphipod; 1 small tunicate; 1 small diatom; 1 small amphipod; 1 small bivalve.	Rd (Pd); 655 cm granular sand; 10% gravel; 10% stones; 20% silt; 10% sand; 10% fine gravel; 10% fine sand; 10% silt; 10% fine sand;			sweeper out:- 21/20 - 22/40
37	29.7.81 01:10	53°26.8' N 13°38.6' W	175	Rd					Courte Sand. Bivalves, bryozo. oans, Gob. spines benth. forms.	Rd (Pd); 200 cm granular sand; 10% gravel; 10% stones; 20% silt; 10% sand; 10% fine gravel; 10% fine sand;			85
38	29.7.81 03:10	53°27.3' N 13°54.3' W	225	Rd					Sand. 95%; ORE benthic forms of Gob. sp.	Rd (Pd); 100% sandy anemones; 2 small amphipods; 2 tiny amphipods; 1 small bivalve; 1 small amphipod; 1 small amphipod; 1 small bivalve; 1 small amphipod;	Rd (Pd); 640 cm granular sand; 10% gravel; 10% stones; 20% silt; 10% sand; 10% fine gravel; 10% fine sand;		85
39	29.7.81 05:20	53°26.8' N 14°10.1' W	280	Rd					Sand. 90%; ORE benthic forms, Gob. sp.	Rd (Pd); 50% sandy anemones; 20% benthic organisms; few echinoderms; few spiders; 10% corals; 20% sand; few small organisms; 10% sand;	Rd (Pd); 640 cm granular sand; 10% gravel; 10% stones; 20% silt; 10% sand; 10% fine gravel; 10% fine sand;		5
40	29.7.81 07:40	53°28.09' N 14°25.69' W	890	Rd					Sand.	Rd (Pd); 10% barnacles; 10% sand; some sand; some sand; some echinoderms; few small organisms; 10% sand; 10% sand; 10% sand;	Rd (Pd); 650 cm granular sand; 10% gravel; 10% stones; 20% silt; 10% sand; 10% fine gravel; 10% fine sand;		10
41	29.7.81 12:00	53°35.0' N 14°11.7' W	510	Rd					Ore + Pd. forms planktonite	Rd (Pd); 30% diatoms; 10% sand; 10% sand; 10% sand; 10% sand; 10% sand; 10% sand; 10% sand; 10% sand; 10% sand;	Rd (Pd); 670 cm granular sand; 10% gravel; 10% stones; 20% silt; 10% sand; 10% fine gravel; 10% fine sand;	planktonite calcareous cf. GIA	sweeper out:- 10:10 + 11:20
42	29.7.81 15:00	53°35.5' N 13°50.9' W	290	Rd					Sand. ORE. Pd. forms	Rd (Pd); 30% sandy anemones; 10% sand; 10% sand; 10% sand; 10% sand; 10% sand; 10% sand; 10% sand; 10% sand;	Rd (Pd); 670 cm granular sand; 10% gravel; 10% stones; 20% silt; 10% sand; 10% fine gravel; 10% fine sand;		sweeper out:- 14:00 + 15:00
													20

Ad = Anchor dredge.

Station	Date/ time	Position (lat/long)	Depth (m)	Bottom sample	Water sample	T.V./ Still camera	constituent composition percent	C/ O/ R/ A	Biota (T.V. /dredge)	Ferrigenous		$\text{CaCO}_3$ % sand	Remarks Geophysics
43	29.7.81 18:10	53°35.3' N 13°28.6' W	226	Rd		T.V. 1005-20:10 (TAPE 8)			Top Rd (a) 2 benthopelagic; 11 hairy, 15 hairy, (b) 1 brittle star; 1 burrowing; 1 viviparous anguiform, 1 irregular, 1 lobate, 1 granular, + coralline, 1 calles; + siphonophore; (c) 1 shells incl. natica	Red Rd: 515cm green alga + brown + yellow + green + greyish. Det. E.S.; grainy; ten. metres			Sparkler out: 16:03 → 18:00
							50%		+ benthi forms and shell debris			50	
44	29.7.81 23:10	53°34.6' N 13°07.6' W	225	Rd					Top Rd (a) many pelecypods; 1 o-frag. (b) 1 echinoid; 1 anguiform; 1 poriferous 2 goniozoa; 2 coralline red-tinted cardinal sp.; 1 early aplanulid 2 ceropagids; 1 coralline (c) 1 calles; 1 prawn; 1 square nautilus (d) 1 siphonophore; 1 calcareous tubes, few calcareous	Red Rd (d) 6 cm greyish yellowish, some greyish pink, granular + yellowish. Det. E.S.; grainy; ten. metres			Sparkler out 21:20 → 22:10
							50%		+ benthi forms, shell + eth. species			50	
45	30.7.81 02:20	53°34.9' N 12°44.1' N	275	Rd					Rd (a) 30% sclerobionts; 0% calcareous echinoids; 1% prawn; 1% urchins bivalves; 2% coralline red 1% hydroids; 3% benthi forms 20% mollusc; 10% coralline brownish red; 1% bivalves (brownish) bivalve shells; 1% coralline brown + greyish. Det. E.S.; grainy; ten. metres	Red Rd: 6 cm yellowish, some greyish brown, granular + yellowish. Det. E.S.; grainy; ten. metres			sparkler out 00:15 → 02:20
							80%		+ 10% benthi forms			20	
46	30.7.81 08:40	53°34.3' N 11°49.6' W	280	Pd					Pd (a) 10% benthi forms; 10% detritus 10% pebbles; 10% sandy bottom 20% gravel; 10% sand; 10% silt 10% fine sand; 10% coarse sand (d) 10% pebbles	Pd (d) 6 cm greyish, some greyish brown; 6 cm pebbles; 2% pebbles, 1% pebbles; 1% sand; 1% detritus; 1% gravel			Sparkler out 03:20 → 08:05
							90%		+ benthi forms + some pedogen.			10	
47	30.7.81 12:30	53°34.0' N 11°21.5' W	190	Rd					Rd (a) 60% migration; 10% burrowing 30% detritus; 10% coralline 10% (c) 10% benthi forms; 10% detritus 10% gravel; 10% sand; 10% silt 2% silt; 1% sand; 1% gravel; 1% silt other than that; 1% others unknown 1% coarse material; 1% pebbles	Rd (a) Rd: 6 cm greyish, some yellowish 2% granular; 30% sandy bottom 30% detritus; 10% coralline 10% (c) 10% benthi forms; 10% detritus 10% gravel; 10% sand; 10% silt 2% silt; 1% sand; 1% gravel; 1% silt other than that; 1% others unknown 1% coarse material; 1% pebbles			sparkler out 09:30 → 12:22
							80%		+ benthi forms + pelagic + eth. species			15	M547 out 13:20 →
48	30.7.81 16:40	53°35.4' N 10°55.2' W	135	Rd					(a) 10% burrowing + 10% detritus 10% (c) 10% benthi forms; 10% detritus 10% gravel; 10% sand; 10% silt 2% silt; 1% sand; 1% gravel; 1% silt other than that; 1% others unknown 1% coarse material; 1% pebbles	(a) 10% burrowing + 10% detritus 10% (c) 10% benthi forms; 10% detritus 10% gravel; 10% sand; 10% silt 2% silt; 1% sand; 1% gravel; 1% silt other than that; 1% others unknown 1% coarse material; 1% pebbles			M547 still out
							95%		Calcareous sand shells + bryozoans			5	
49	30.7.81 18:40	53°34.7' N 10°47.1' W	110	Ad					Ad (a) 10% benthi forms + 1% detritus	No. pebbles			M547
									+ 1% calcareous				
									Calcareous sand				

Station	Date/ time	Position (lat / long)	Depth (m)	Bottom sample	Water sample	TV/ Still Camera	constituent composition: percent	C O R P	Biota (TV / dredge)	Terrigenous		Carb, % insol	Remarks Geophysics
50	30.7.81 19:20	53° 35.2' N 10° 42.0' W	125	Pd					Sand. lithic + shell frag.	Ad (1) mud, 25% sand, 15% silt, 10% gravel. Ad (2) blue benthos; Ad (3) small sponge. Ad (4) benthos; many small size benthos; hydroids lots of diatoms.	Ad. 1 25 cm v. angular grain no cementation grey 5%; grey 10%; Dif. 35% rock matrix. Poorly sorted grain 25% angular 25% rounded.		MS 47
51	30.7.81 20:30	53° 35.1' N 10° 42.6' W	110	Pd		TV. 2150-2250 (Tape 3 + 40 mins)			Lithic Gravel -		incl. in 600.		MS 47
52	30.7.81 23:40	53° 34.9' N 10° 37.3' W	120	Pd					No benthos recorded by TV	Red Pd. Pd. 53cm v. angular cobble quartzite, red sandstone, etc. rocks & minor carb. vs.			MS 47
	Rd + Pd @ 05:11-31781												30
53	31.7.81 01:00	53° 34.9' N 10° 34.6' W	120	Pd					No benthos recorded by TV	No benthos			MS 47
													50
54	31.7.81 02:40	53° 35.2' N 10° 31.0' W	128	Pd	WS		50% lith + 50% moll. frags. benth. diatoms, Gob sp., Byggsy			No benthos recorded by TV			MS 47
													50
55	31.7.81 03:40	53° 35.0' N 10° 28.2' N	120	Pd			50% sand + mollusca frag.			No benthos recorded by TV	On a few scattered gravelly patches.		MS 47
													50
56	31.7.81 07:50	53° 31.1' N 10° 23.6' W	100	9+7			Coarse shelly lithic Sand.			No benthos recorded by TV			MS 47
													80
							10% ar 10% lithic, moll frags, Byggsy, carb. sp., benth. diatoms						

Station	Date/ time	Position (lat/long)	Depth (m)	Bottom sample	Water sample	T.V / still camera	Constituent composition: percent	C O R L	Biota (T.V./dredge)	Terrigenous	$\text{CaCO}_3$ % in sand	Remarks
57	31.7.81 09:30	53°32'9"N 10°19'4"W	90- 95	g x 6					No biota recorded by T.V.			MS47
58	31.7.81 10:35	53°33'4"N 10°18'6"W	83- 86	g x 3					No biota recorded by T.V.			MS47
59	31.7.81 11:00	53°33'7"N 10°18'3"W	70- 75	g x 5					No biota recorded by T.V.			MS47
60	31.7.81 12:30	53°34.5'N 10°15.0'W	60- 72	g x 7					No biota recorded by T.V.			MS47
61	31.7.81 13:40	53°35.0'N 10°13.6'W	57 58	g x 2					No biota recorded by T.V.			MS47
62	31.7.81 14:20	53°35.1'N 10°12.2'W	55	g x 2					No biota recorded by T.V.			MS47
63	31.7.81 14:40	53°35.1'N 10°11.7'W	55	AD					Sand, 15% Ooids, 10% Arkos Moll, Barnacles, spines + forams			75
									90% Moll. frags + calc spines biocerous, samples			95

Station	Date / Time	Position (lat / long)	Depth (m)	Bottom sample	Water sample	T.V. still Camera	constituent composition: percent	E R	Biota (T.V./dredge)	Terrigenous		$\text{CaCO}_3$ % in sand	Remarks Acophysics
64	31.7.81 14:50	53°35.1' N 10°12.0' W	6	Ad					Mostly teeth shells & molluscs + some broken coral fragments & some organic debris. Some clippings. Tefline.				MS47
							Molluscs, Barnacles, Br. coh. spine, + suspended debris						
65	31.7.81 15:02	53°35.2' N 10°10.6' W	38	Ad					No fauna recorded by TV.				MS47
									Shelly sand.				
66	31.7.81 15:42	53°35.6' N 10°07.7' W	35			T.V. 25 mins (Tape 4)			T.V. fauna common				MS47
						S.C. (col) some	No Sample						
67	31.7.81 16:45	53°35.8' N 10°05.9' W	28	Ad		T.V. (a) 10 mins (Tape 4)			T.V. fauna common + other ectenozoans. Many stalked bivalve shells. Ophiocoma very abundant. Many molluscs but not as common as expected.				MS47
						S.C. (col) none	Calcareous algae, Moll. slugs, Gravel -						
68	31.7.81 18:10	53°38.2' N 10°04.9' W	40	Ad x 7					Large ectenozoans are absent (no ophiocoma) crust. Recent rocks. Large bryozoan life. Pyr. domes.				MS47
69	31.7.81 20:50	53°40.5' N 10°09.8' W	60	Rd					No fauna recorded by TV.				MS47
				Pd									
				R.H.									
				Pd			Boulders + some shells.						
70	31.7.81 22:20	53°43.3' N 10°15.7' W	90	Rd					No fauna recorded by TV.				MS47
				Pd			Qz + moll. debris						

Station	Date / time	Position (lat / long)	Depth (m)	Bottom sample	Water sample	T.V. / still camera	constituent composition - percent	CORAL	Biota (T.V./dredge)	Terrigenous	CaCO <sub>3</sub> % insand	Remarks Geophysics	
71	31.7.81 23:00	53° 45.7' N 10° 00.1' W	90	Dredge lost Pd					No sample			MS47.	
									Only little benthos				
72	1.8.81 00:40	53° 45.0' N 10° 25.6' W	95	Pd					1 benthos			MS47	
									Clean Sand, Moll. bryozo. soft sponges, Serpulids				
73	1.8.81 02:00	53° 45.9' N 10° 28.9' W	50 - 82	Pd 9.20		T.V. 0225-0225 (page 5) 5.C (col 1)			Rust/dredge, Sponges, sp. Hydroids, bryozo., small molluscs esp. gasteropods Moll. benthos, soft bottom Tridacna, Tridacna Calyptrophis smooth Ophiuridae, amphipods common Asterias rubens.			90	MS47
									Sand, Molluscan frags (co.) + teeth sponges + bent. form.				
74	1.8.81 11:40	53° 52.4' N 10° 24.2' W	104	Pd					Rust dredge, Sponges, sp. Bryozo. Corals, common Sponges common Ambergris found 3			MS47	
									Bivalve fragments (+ benthos)				
75	1.8.81 12:40	53° 54.1' N 10° 21.0' W	85	Pd					No biota recorded by rms.			MS47	
									Air frags + gashes, Serpulids benth. form., hydroids, sponges				
76	1.8.81 13:50	53° 55.0' N 10° 27.2' W	120	Pd, 12					(a) Many brownish brittle stars recently broken, small echinoids (spines), some corals & decapods + tridacna shells + Tridacna moll. + sponge column 13. Dentition erratic (b) Many white shells broken.			90	MS47
									Benthic forms, Moll frags, Sponges				
77	1.8.81 14:50	53° 55.3' N 10° 34.6' W	150	Pd					(a) Many broken shells 16. decapods (spines), some poriferans, many brittle star + decapods 5. Many decapods, few echinoids, shells (b) broken moll. form. 150 shells + few other fragments			10	MS47
									Benth. forms, bryozoans, Moll sponges.				

Station	Date / time	Position (lat / long)	Depth (m)	Bottom sample	Water sample	T.V. / still camera	constituent composition - percent	G/A/L	Biota (T.V. / dredge)	Terrigenous	CaCO % in sand	Remarks
78	1.8.81 16:10	53°54.8' N 10°43.5' W	135	Rd			Sand. 90% OR + Mud frags.		Many Sponges & Anemones 4 Anemone, 1 Hydroid + 4 Barnacles 1 acc. sin. virginia			MS47 OH at 16:30
79	1.8.81 19:10	53°54.9' N 10°44.2' W	195	Rd			Sand. 70% OR with some lith. Benth. frag + shell.		20% large benthic, 20% benthic Benthic forams, 6 clams 10% sponge many hydroids Hydroids, corals, ascidians 10% small sponge, 10% coral 10% small forams	10		Sparker out - 16:40 - 19:07 gravity meter high speed - 17:30
80	1.8.81 23:00	53°55.1' N 10°35.7' W	320	Rd			50% OR 30% ? clay min. Pell. + benth. forams + glass		20% sand, 20% s. small forams, 20% lith. forams 10% large forams 10% small forams, many mud, 20% sand, 10% glass 10% small forams	10		Sparker out - 20:10 - 23:10
81	2.8.81 00:40	53°54.6' N 10°45.9' W	340	Rd			80% OR 10% ? clay Pell. + benth. forams. Cor. sp.		10% s. small forams, 30% sand 80% sand, 30% s. small forams, 30% lith. forams 10% pelagic, 10% lith. forams 20% sand	20		grainometer, orange to low speed out
82	2.8.81 02:50	53°54.5' N 10°57.6' W	365	Rd	WS	T.V. 00:10 - 02:50 (tapes 5) S.C. (opt.)	70% + benth. forams, 80% OR shell frags, Cor. sp., glass.		20% 30% sand, 40% s. small forams, 10% lith. forams 10% Anemone, 10% corals, 20% sand 10% hydroids, 10% sponge 10% Anemone, 10% s. small forams, 10% lith. forams 10% sand, 10% glass	20		Sparker out in high speed OR
83	2.8.81 11:30	54°02.9' N 10°59.2' W	220	Rd			70% OR, 10% + benth. forams 1 shell frags + Cor. sp.		20% 30% sand, 40% s. small forams, 10% lith. forams 10% Anemone, 10% corals, 20% sand 10% hydroids, 10% sponge 10% Anemone, 10% s. small forams, 10% lith. forams 10% sand, 10% glass	15		Sparker out - 08:00 - 10:45
84	2.8.81 14:10	54°05.0' N 10°34.7' W	155	Rd			90% OR + sand frags + corals		10% 10% sand, 8% s. small forams, 10% hydroids 10% Anemone, 10% sponge 10% Anemone, 10% s. small forams, 10% lith. forams 10% sand, 10% glass	5		Sparker out - 12:20 - 14:12

Station	Date / time	Position (lat / long)	Depth (m)	Bottom sample	Water sample	T.V./ still camera	constituent composition: percent	E R	Biota (T.V./dredge)	Terrigenous		Caco <sub>3</sub> % in sand	Remarks Geophysics
85	2.8.81 15:50	54°05.6' N 10°20.3' W	-	urede 105 ft	9 x 21				No sample				
86	2.8.81 20:30	54°06.7' N 10°16.6' W	78	9 x 5					Flora sample				
87									Flora Sample				
88													
89													
90													
91													