G/6/68

JOHN MURRAY CRUISE

Report.

4/68. 3.12.69 - 19-12.69

UCW Aberystwyth

Celtic Sea (St George's channel)

CONTENTS

UNIVERSITY COLLEGE OF WALES,

ABERYSTWYTH.

GEOLOGY DEPT.

JOHN MURRAY CRUISE 4. 68. MARCH 12th - APRIL 4th.

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OBJECTS - CRUISE PROGRAMME.

1. To examine the Solid Geology, using Magnetometer and continuous Reflection Profiling, in the area north and west of Anglesey in Caernarvon Bay and south of the Lleyn Peninsula as far as Tremadoc Bay.

   This was selected as the main project of the Cruise because there are reasonable and predictable geological tie ups between Anglesey and Lleyn. The Aerial Magnetic Map indicates the presence of sharp anomalies in Caernarvon Bay and running as a ridge SW from the western tip of Lleyn.

2. The sediments, macro and micro fauna of the seafloor around Anglesey and the Lleyn peninsula.

   As the area falls within the U.C.W. Aberystwyth, Irish Sea project it forms part of the general research and primary mapping programme. The investigation will use gravity cores, dredges and grabs and an underwater camera.

3. Objects 1 and 2 will be integrated by gravity coring in the very deep pits in St. George's Channel in an attempt to penetrate solid rock; positions being selected according to Sparker results.

4. The solid geology in the vicinity of the Mochras Horehole, using continuous reflection profiling.

   As a result of geophysical work in the early 1960's it was indicated that a borehole would penetrate Pleistocene and possible

Mesozoic rocks at depth. These deposits have now been proved and it is hoped to investigate the form of deposition in the immediate vicinity of the boring site. Finally it is hoped to run C.R.P. lines westwards to link up with a known basin in central Cardigan Bay.

5. Faunal variations in long piston cores from the muddy hollows of Tremadoc Bay, coupled with an assessment of the relative effectiveness of piston and gravity covers.

Investigations of short gravity cores collected from these hollows indicate that cold water faunas occur at depth.

6. The Local Magnetic Anomalies south of Mynydd Rhiw.

Layered picrite sills dip S.W. out to sea along the southern Lleyn Coast. It is hoped that Magnetometer runs will indicate their possible extent.

7. The detail of the supposed Mesozoic Basin, and the form of the Pleistocene deposits along the western margin of Cardigan Bay using both Magnetometer and C.R.P.

The area will also be investigated by coring at 5 mile intervals, and by bottom photography, and latter helping to calibrate subsequent Asdic surveys.

8. Geophysical traverses between Arklow and Dublin east of the coastal sand banks to delimit the high Magnetic ridge that extends

from the Lleyn.

Sparker runs to indicate the depth of superficial cover, and the form of the solid rock platform. Coring and camera survey between Arklow and Dublin.

During 1967 the area around Arklow was investigated using grab sampling and Asdic. It is hoped to supplement this survey by coring to penetrate the gravel veneer and by camera to indicate if possible on film the ribbon style of transport so common in this area.

9. During the general programme it is hoped that water samples will be taken at selected core stations so as to gather information about the phytoplankton population of the southern Irish Sea. Ship-board analysis of plant pigments and phosphate and sampling for later analysis of nitrates and silicates will also be included.

Oxygen and salinity profiles are also intended at these stations.

10. Drifter Project. 300 surface and bottom drifters to be dropped in the Central part of the Irish Sea.

11. Reference grab samples every 15 miles from Plymouth to the Smalls.

Objects 4, 5 and 6 are linked together to form the 1st leg which will also serve as a working up period.

Objects 1, 2 and 3 are grouped together as the 2nd leg.

Object 8 will be the 3rd leg, and Object 7 will be the 4th leg.

Objects 9, 10 and 11 to be completed as convenient.

Equipment :

Supplied by N.E.R.C.

1000 Joule Sparker
Varian Magnetometer
10 K/C P.D.R.
N.I.O. reversing water bottles
Gravity cover
Piston Corer
Shipek Grabs
Hydro Products Camera
Dredge

Supplies by U.C.W.

Salinometer
Oxygen meter
Spectrophotometer
Microscopes
Calculater
Oven
Storage equipment
Chemicals

SUMMARY OF RESULTS :

Despite the almost continuous gales all the Welsh Coast programmes were completed.

Leg 2, the main programme of the Cruise, was very thoroughly covered.

Leg 1, this was also completed although here it was necessary to repeat part of the run because of equipment failure.

Objects 9, 10, 11 were all successfully completed.

Leg 4, Weather prevented the camera programmes from being completely successful, otherwise this leg was finished satisfactorily.

Leg 3 was not completed in its original form. Equipment failure and atrocious weather prevented even the modified programme from being finished.

CRUISE REPORT :

The John Murray left Plymouth on schedule at 4 p.m. on the 12th March in calm weather and made for the Smalls via the Longships Light. During this first 24 hours water and bottom samples were collected at 15 mile intervals thus completing object 11. During this time the P.D.R. was checked cleaned and started, this instrument worked well and continued to do so throughout the Cruise.

During the run from Grassholm to the Smalls the Magnetometer was checked and tested. The Line Marker was found to be unconnected. After 20 minutes the alarm bell indicated overloading was occurring on the Polarizing Circuit. Both Senors were checked at this time and found to be working. The 0881 diode in the Polarizer switch circuit was found to be unbiassed.

The Magnetometer was not repaired at this time, but left so that the Sparker could be worked up. The weather was freshening rapidly at this time and a gale warning given at 4 p.m., by the time the Sparker was ready for testing a full gale had developed.

It was decided therefore to abandon the Cardigan Bay survey for the present and take advantage of the protection of the east Irish Coast.

During the evening of 13th, and after the amplifier on the main winch had been repaired a programme of coring was initiated. Whilst the coring programme was continuing the geophysical equipment was repaired.

As gales prevented the ship going to seaward of the Irish Coast

sand banks a modified survey was attempted. This was designed to keep the Ship inshore of the banks.

Modified Leg 3.

1. Attempt gravity cores in the vicinity of Arklow, in the previously surveyed area (Moneyweights bank to Breaches shoal). Concentrate the coring in the zone Breaches Shoal to Drogheda Bay. The Northern area is within a zone of tidal slack and muddy deposition. There was also the chance to core in the Lambay Deep for solid rock.

2. Camera, workup to take shots in areas of known sandribbons, helping to calibrate previous asdic work.

3. Dredging and grab sampling to extend the sample cover as far north as Drogheda Bay. Examine the Codling bank and the Lambay Deep.

4. Magnetometer run so as to cross the high anomaly ridge that extends from the Lleyn.

5. Sparker runs to indicate depth of Pleistocene cover, and any postpleistocene drainage patterns.

Coring was continued during the night of the 13th. Early on the morning of the 14th the Servo blower on one of the main engines failed and we were required to come to anchor in Brittas Bay. Whilst at anchor both the Magnetometer and Sparker were repaired, the camera was also worked on. The freefall trip rig was used to obtain a good gravity core. This was a very long process and it is intended to abandon the trip rig and rely on fast payout instead. Engine tests were completed by 15.00 hours. A sampling run northwards was initiated, but runs between stations were

very long as the maximum speed available was 5 Kts. Sampling was continued until 22.30 by which time the weather had so deteriorated that geophysical runs only could be carried out.

During the night of the 14th-15th the Magnetometer ran intermittently this was due to the following:

1. Spare Sensor Cable - coiled caused local induction giving spurious readings.
2. Phase lock breakdown - taken out of circuit as advised in Manual..
3. Diode in polarizer was forward biased.

At this time it was not appreciated that the Sparker at low power(1000 - 500 joules)could be run at the same time as the Magnetometer. However, at 7.30 a.m. on the 15th the Sparker was trailed and it was found that both pieces of equipment worked well even though there was current pulsing as a result of capacitor recharging. A better arrangement would be to have the magnetometer working from the Ship's AC, and the Sparker running directly from the D.C. Supply.

Before the Sparker would function properly it was necessary to remove the isolating section from the hydrophone as it was found to be on open circuit. A 40 lb. weight was added to the cable to retain the effect of the removed negatively buoyant isolating section.

The geophysical equipment was run successfully throughout the 15th and only turned off at 20.30. One unfortunate feature of running the Magnetometer on an extended cable at only 5 Kts. was that the Sensor touched bottom at sometime. The effect was to break the Retro section,

although the results were not affected. During the night of the 15th-16th both the Codling bank and the Lanbay deep were sampled and a line of samples stations occupied between the two.

The geophysical runs were recommenced at 4 a.m. on the 16th only the Sparker and P.D.R. were run since the Sensor took all day to repair as time was needed for the resin to set.

The sparker run was stopped at 15.00 mainly because of a hydrophone fault. Whilst this was repaired sampling was recommenced along a course from the South Kish to Dublin Bay, the sampling line was continued northwards to Drogheda Bay. The weather at this time was Force 9-10 making sampling difficult. The last sampling station was occupied at 2 a.m. on the 17th March. The forecast was again storm 10, so it was decided to make for Dublin Bay.

It was hoped that coring could be attempted in Drogheda Bay as the area has a muddy bottom, conditions prevented this. The Sparker only was trailed, though the Magnetometer was repaired it could not be streamed because of the combination of slow speed and shallow water.

A zig-zag course was adopted so as to give east-west and north-south legs. Unfortunately the Sparker only worked for a short time. Arrived in Dublin at 16.00 17.3.68, and stayed until the morning of the 19th March. During this time both pieces of geophysical equipment were checked and cleaned.

Professor Wood disembarked and flew back to Manchester.

Left Dublin 10.30 on the morning of the 19th, making for Holyhead, both Sparker and Magnetometer being streamed once the Burford Shoal had

been passed. A continuous record was obtained until 12 miles from Holyhead. The records were generally good although with a following 10' sea there was a lot of noise, and the hydrophone was too close to the surface.

The sparker was stopped early because the mini switch on the capacitor bank fell to pieces. The vessel arrived in Holyhead at 21.00.

The engine repairs were completed by 22.00 on the 20th March, and it was decided to start the first run of the 2nd leg early the next morning.

At 7 am. on the 21st a Sparker Magnetometer run was started in good weather conditions. The Magnetometer became erratic and at 12.15 stopped, but was repaired within 10 minutes. The geophysical run continued until 14.00 when the Magnetometer again broke down. The Sparker was continued with two minor (Mains fuses) stoppages until 19.00. This first run of the 2nd leg covered 100 miles. This was followed by 3 hours sampling in Caernarvon Bay. After cleaning and checking the Sparker was started at 22.40 and continued to function until 2.30 a.m. 22nd. 3.68, when hydrophone trouble necessitated cutting the length by half removing one preamplifier and one coil. As the vessel was in shallow water the power was cut to 500 joules, and with the reduced hydrophone the equipment continued to run until 09.30. This second run covered another 100 miles.

For 12 hours during the 22nd sampling was concentrated in the coastal zone from Nevin to the South Stack, the last station was occupied at 20.00. Sparker P.D.R. and Magnetometer were started, the intended survey lines running from Bardsey Island to Holyhead, however, a force 9 gale which blew up within one hour forced the vessel to return to Holyhead 8 hours ahead of schedule. The vessel anchored in the outer harbour, bunkering

commenced at 8 am. Saturday 23rd March.

Scientific Personnel left the first Cruise.

Whilst the 24th had been planned as a day for changing personnel, a request by Dr. Tooms of I.C. to experiment with the piston corers required the vessel to anchor in the outer harbour.

During most of the day experiments were conducted using both Moore free fall corers and the piston corers. The Moore cores were failures even though the bottom was muddy. Evidence from the returned liner indicated that the barrel had penetrated, but that the catcher was faulty.

The piston corer recovered a 1 metre core of muddy silt. These experiments were concluded at 15.30 for the main winch clutch had failed, this was attributed to it being out of alignment and due in part to the 18 tons of bunkering taken on the previous day.

So as to make full use of the calm weather the Jolly boat was used to collect 16 grab samples from the outer harbour. (The samples will be useful as an M.Sc. Project in Micropalaeontology.) The fixes were by horizontal sextant.

It was intended that during the first part of this Second Cruise leg one be attempted. Consequently a course was laid that initially followed the coast from the South Stack to Bardsey Island and east into Tremadoc Bay.

The vessel left Holyhead at 18.15, all the Geophysical equipment being streamed immediately.

The run was reasonably successful a Magnetometer pen failure cost one hour, but part of this run was repeated.

Sparker stopped at 5 a.m. as 115 v. tapping from the main transformer had failed. The run into the middle of Tremadoc Bay was completed using only P.D.R. and Magnetometer.

The vessel came to anchor to allow coring experiments to be conducted.

Muddy Hollow Core Experiments Position 1.

1. 12' piston Corer + Trip
2. 12' Gravity Corer + Trip

Total length of Shipek Grab + rope trip 34'6"

Total length of barrel + Corer 17'3"

12 lead weights used on each Corer, depth 10 fathoms.

Piston Core - Water in ball mechanism failed to trap the piston chain, thus piston rose to top of tube leaving an 18" gap. Corer penetrated the mud to ¾ way up the Fin, - 8" above Piston Head.

Length of Piston Core 10'9"= 89.58% barrel length.

Repeat with Gravity Corer using the same trip.

Length of gravity core 7'9" = 64.58% barrel length.

In this case the Corer penetrated to the top of the Fin.

Muddy Hollow Core Experiments Position 2.

Depth 15 fathoms

The Gravity Corer performed as before.

Length of gravity core 7'8" = 63.88% barrel length.

Moore free fall corer tried at this Station.

1. First attempt with additional weight was seen to have 2' core in the 3'10" tube. Core lost due to the catcher falling out.
2. Second Moore free fall corer without added weight had polythene added to catcher. Seen to have 9" to 1' core, but all lost as both polythene and catcher fell out. The spheres came to the surface unaided each time and worked well.

The coring experiments were completed at 15.30. A series of grab and dredge stations were occupied every 3 miles along the line of the Geophysical run until 22.00, when the Magnetometer was put out. Repeated attempts were made to repair the Sparker, but they all failed for the high tension Spark in the capacitor bank would not function.

During the night of the 25/26th, two complete North south Magnetometer runs were completed and finished at 11.0 a.m. The run was continued until 11.00 to allow repairs to be completed on the camera. The main lead assembly was found to be faulty and had to be replaced.

Sampling continued until 18.30 even though a gale had gradually developed during the day.

During the last two days one of the Scientific Personnel had been continuously sea sick and he asked to be put ashore. The fact that the vessel was in need of sterntube oil, and that there was now a need for another Sparker Capacitor bank caused us to make for Holyhead to arrive at 8 a.m. Wednesday morning. An earlier decision to put into Aberystwyth on Thursday

28.3.68 was abandoned owing to high seas.

During the sampling run the drifter release programme was completed. The Magnetometer P.D.R. run on the night of the 26/27th started in a full gale, and its length was such that it would be completed at Holyhead by 8. a.m.

The equipment functioned well throughout the night and the vessel anchored in the outer harbour at 8.30 a.m. The sick man was taken off in the Pilot boat, the oil and Sparker was brought from Aberystwyth by road and arrived at 16.00. Dr. Whatley left the ship at this time.

The S.W. gale had eased by the evening, and a course was set north and east of Anglesey. During the day the Sparker had been repaired by taking a separate 115v. Tapping from the main supply.

The long geophysical night run was completed by 09.30 a.m. finishing just west of the South Stack all equipment having run without interruption.

Sharp sea bed features off the South Stack prompted a dredging and coring programme to determine whether the sea floor was solid rock, the Sparker evidence being uncertain. The results showed the ground to be gravel ridges and mussel banks.

Anticyclonic weather allowed a full days sampling and the opportunity to core the 96 fathom pit in St. George's Channel. For this and subsequent coring the short 1 metre barrel was found to be adequate.

A geophysical run was started at 21.00 and completed by 11.0 a.m. the following morning, both pieces of equipment working well.

Sampling continued throughout the 29th the weather being calm but overcast and coring was again attempted in the deep pits in St. George's

Channel; no solid rock was reached. The Sparker had earlier indicated that the solid rock interface came very close to the sea floor, the actual position being obscured by the pulse multiples. From the Geophysical evidence there is a strong case for limited drilling in these pits.

As leg 2 had now been completed, the evening geophysical track ran south to Bardsey and east into Tremadoc Bay. The run started at 19.30 and continued all that night and the following day 30.3.68. The very calm conditions in Tremadoc Bay allowed a very close inshore run to be made along the lines of the borehole.

Shallow water in Tremadoc Bay caused the magnetometer to be taken inboard in the vicinity of St. Tudwal's Island. During the afternoon and evening the Barmouth Bay Survey was completed. Leg one had thus been finished and sufficient time was left to attempt the fourth Leg in outer Cardigan Bay.

Because of the limited time left, it was agreed to complete the Survey by running the Geophysical equipment between the sample stations; the sampling being restricted to gravity coring and camera shots. This arrangement was continued until 6 a.m. of the 31st when it was decided to abandon the system as the geophysical equipment was receiving poor treatment as it had to be drawn inboard so often. The Sparker and Magnetometer were, therefore, withdrawn, and sampling only continued. During the afternoon the wind freshened and the camera had to be withdrawn, coring continued to be very successful. Coring on Leg 4 was completed by midnight and the Geophysical return run was started immediately.

The early Magnetometer failure was found to be due to a voltage leak in the Main Cable; the Sparker continued to function well throughout the night. The Magnetometer was repaired by the morning so that the Survey was able to continue without interruption throughout the day. By 18.00 the weather was very bad and the vessel made for Fishguard, arriving there at 21.00.

It was intended to go alongside to put off scientific equipment, unfortunately the anchor dragged the following morning and going alongside was abandoned.

Anchoring was proving difficult at this time because the relay circuit in the D.C. power to the anchor winch had failed. At 14.00 on 2.4.68, four of the Scientific Personnel were taken off.

The wind and sea moderated during the afternoon and the vessel put to sea at 16.00, the geophysical equipment was streamed immediately. The Magnetometer was erratic, the noise level on the Sparker record was very high so much so that the candles and helix had to be cleaned frequently to obtain results. The run ran west crossing the survey line of Leg 4 and due south to the Smalls, after which all the equipment was recovered.

The Long Ships Light was reached by 09.00 on the 3rd April, and the vessel arrived in Plymouth at 17.00.

PROJECT REPORT

(a) Sediments

Sediments were collected along the Irish Coast in Caernarvon Bay and along the flanks of St. George's Channel in the vicinity of Cardigan Bay.

These sediments, as has been said, augment work that has been in progress since 1962, the object being a textural map of the Southern Irish Sea based on the Wentworth Classification. As the whole area is floored by Pleistocene deposits, which are in the process of being reworked, information tends to be restricted to forms and styles of transportation, origin and nature of the exotic material and degree of stability of the present sea floor. Experience indicates that large areas are platform lag gravels, and deposition is restricted to protected bays and areas of tidal slack.

Dredging revealed that the Codling Bank is most likely a Moraine composed of massive boulders and associated flint pebbles. Coring has conformed that the St. George's Channel area is largely a thin pebble or sand floor underlaid by compacted boulder clay. Apart from restricted and protected zones in Caernarvon Bay there was little evidence of sand on the Welsh side; the flanks of St. George's Channel were either exposed boulder clay, this was fairly common, or boulder clay veneered by coarse shelly sand or pebbles.

Coring in the very deep pits in the Central Irish Sea failed to reach solid rock and usually returned coarse sand or boulder clay.

Tremadoc Bay, an area of Holocene sedimentation, provided long cores of reworked boulder clay.

In future it is hoped to be able to core the filled in river valleys revealed by the Sparker, and complete the sample cover for the South Irish Sea.

(b) Geophysics

A detailed Sparker and Magnetometer coverage of Caernarvon Bay was achieved even though bad weather reduced the available cruise time. The fact that both pieces of equipment could be streamed at the same time not only allowed the Geophysical programme to be completed but also ensured that the sampling programme was not reduced.

Preliminary results from the Sparker records confirm that the area is floored by 150 - 200 feet of Pleistocene boulder clay. The solid rock beneath revealed no obvious structures except for a marked synclinal development on the northern side of Anglesey, probably associated with the Carboniferous basin in the central part of the island.

The Sparker records from Cardigan Bay were altogether more encouraging. Lines run in the vicinity of the borehole at Mochras which had at the time of the survey just penetrated Mesozoic showed a marked interface at 150 - 200 feet followed by well bedded older rocks. These had previously been recorded by Birmingham University west of a line from Towyn to Strumble Head. Penetration at 500 joules were approximately 1000' and a whole series of anticlines and synclines were recorded along a North South leg between Strumble Head and Bardsey Island. It would seem that these Tertiary - Mesozoic ? rocks can be related to those in the borehole thus giving a picture of a fault bounded folded basin occupying most of Cardigan Bay west of the extended Bala fault. Folded rocks were recorded along St. Patrick's Causeway only four miles from the borehole site, and westwards as far as St. George's Channel.

The Pleistocene cover was seen to have been cut into by large river valleys noticeably on a line extending towards the Glaslyn river, and from this evidence it is hoped that the early boreal drainage pattern of the Bay can be established.

The preliminary results from the Magnetometer Survey are more difficult to evaluate. Very marked anomalies were recorded along the northern side of Anglesey, although these did not extend far out to sea. The marked negative anomaly in the vicinity of the Carmel Head Thrust was clearly recorded although no complementary anomaly was found along the north coast.

The coverage will allow a very detailed magnetic map to be drawn for the Bay. The results from Tremadoc and Cardigan Bays were as expected, no sharp anomalies being evident. Certainly the Picrite Sills on the coast at the southern tip of the Lleyn Peninsula were not apparent two miles away.

The next step in the mapping of the solid geology of the southern Irish Sea would be the establishment of more points of reference from which the Geophysical records could be interpreted.

For this two opportunities are available. Excessive scouring in the central part of St. George's Channel has produced very deep pits, some in excess of 96 fathoms. Geophysical evidence at these points indicates that the solid rock interface comes within 20 feet of the sea floor. Vibro-coring or sea bed drilling to obtain a sample would allow the results so far collected to be much more accurately evaluated. Similarly along the flanks of St. George's Channel in the vicinity of Cardigan Bay the Pleistocene cover is again thin in places (approximately 70') and equipment like that used in Alluvial Mining could rapidly penetrate to the solid rock.

Reference points like these should be supplemented by having additional shallow drills on shore.

Geophysical runs on the Irish side were generally disappointing, the Sparker records show a Pleistocene cover in excessive of 200' for most

areas whilst the solid rock appears to display no structure. The magnetometer run confirmed the continuation of the positive ridge that extends from the Lleyn towards Carnsore Point.

(c) Plankton

Seasonal observations on the phytoplankton of the inshore waters of Cardigan Bay have been in progress now for some three years. The data has been collected mainly from the neighbourhood of Aberystwyth, and the opportunity to collect information from other regions in the Bay and the Irish Sea was invaluable. From the samples taken during the recent cruises of the John Murray we will be able to build up a more comprehensive picture of the distribution and drift of organisms in different parts of the Bay, and also obtain some data of comparative value for the inshore study. The facilities on the John Murray for collecting plankton samples was most satisfactory, and in particular we wish to express our thanks to the crew who assisted in all the deck work for sampling by water bottles. Their willing co-operation at all times of the day was much appreciated. During the course of the two cruises regular sampling of the sea for data on nutrients (nitrate, phosphate, silicate) was carried out, and chlorophyll and xanthophyll estimations also were made. Samples of the same sea water were preserved and are being studied for their plankton content. Over 200 such samples were taken, and a similar number of isolates of the sea water samples were inoculated into sterile enriched sea water media. These cultures were brought back to Aberystwyth and are being maintained in our culture room under controlled experimental conditions. From this source we hope to obtain data on the nannoplanktonic algae, particularly to obtain records of the genera and species present and their relative abundance. Comparative data over successive years would constitute a valuable series of contributions to our knowledge of the plankton biology of this region - a region for which there is a dearth of information.

(d) Fauna

The purpose of collecting bottom sediment samples from the Irish Coast and Caernarvon Bay is to augment and expand work already in progress by micropalaeontologists at Aberystwyth concerning the ecology and distribution of microfauna in the southern part of the Irish Sea. Previous researches have been concerned with Foraminifera and Ostracoda but the samples from the John Murray cruise will, in addition, be used to study the ecology of the total invertebrate fauna collected, with particular reference to its relationship with the substrate. Although this type of work falls within the realm of marine biology or ecology, it is being undertaken by palaeontologists with the expressed aim of attampting to resolve certain palaeoecological problems by reference to the present day.

Samples from numerous different facies and environments were collected from the John Murray, and although this material has yet to be processed, certain interesting details are already apparent. Off the east coast of Ireland, in the region of Arklow and Kish banks, strong tidal currents seem favourable to the prepondenance of the Lamellibranch genus Nucula. This occurred in great numbers in all samples from silt to gravel grades but the genus does not occur in similar samples from the Welsh coast where the tidal currents are much weaker. The Welsh coast is a rich collecting ground for deal shells and until this cruise we had very little knowledge of the areas in which they were living. The areas in which Apporhais pes-pelecani, Donax vittatus, Glycimeris glycimeris and Arctica islandica live are now known in some detail. A Ph.D. student will commence work on the micro and macro faunas of Caernarvon Bay in October and it is hoped to have a further student working on the material collected off the Irish Coast in the near future.

The long cores collected from the "Muddy Hollow" in Tremadoc Bay will be used in an attempt to substantiate an interesting vertical distribution of Ostracoda from similar cores taken previously in the same area. In these cores, below a certain depth, certain ostracod species such as Trachyleberis dunelmensis occurred and dominated the fauna. These species have not been found living or dead in the numerous surface samples examined in the sea and as they are common today in the colder waters of the North Sea and the North Atlantic, it is thought that in the cores that they may represent a post glacial cold period.

When detailed examination of these samples has taken place it will almost certainly prove necessary to collect further material both to give a closer network and to extend the observations. It is hoped that the John Murray will be made available for this, in the future.

Conclusions

The results from this trip, the work of previous departments, and the indications from the Mochras borehole clearly suggest that the Southern Irish Sea may well be economically important.

On behalf of the Geology Department, U.C.W., Aberystwyth, and especially those who accompanied the Cruise, I should like to thank N.E.R.C. for the opportunity to use the John Murray. Very special thanks go to Captain Perry, his Officers and Crew, whose remarkable good will, help and understanding made the Cruise a most successful and happy one.

25.4.68

M. R. Dobson