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MINISTRY OF AGRICULTURE, FISHERIES AND FOOD
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND

1983 RESEARCH VESSEL PROGRAMME

REPORT: FRV CIROLANA: CRUISE 4

(PROVISIONAL: Not to be quoted without prior reference to the author)

STAFF:

- J H Nichols
- P D Wallace
- B P Riches
- M W Easey
- D R Eaton
- D W Palmer
- S P Milligan
- S Warnes
- B C Bedford 16-28 March
- G E Moore 16-28 March
- L Motos (Spain) 29 March-12 April

DURATION:

Left Grimsby 1730 h 16 March
Arrived Grimsby 1630 12 April
(All times are GMT)

LOCALITY:

Continental slope - Celtic Sea and Biscay

AIMS:

1. To conduct a plankton survey of the area to assess the abundance of mackerel eggs.
2. To sample mackerel on the spawning grounds using either bottom or midwater trawls, and to sample other groundfish from the bottom trawl.
3. To use the 2 m neuston net to sample mackerel larvae at the surface.
4. To rendezvous with FRV ANTON DOHRN and do comparative hauls between the Lowestoft 53 cm samplers and the nackthai net.
5. To take surface water samples for shipboard analysis of chlorophyll 'a' and phaeophytins.
6. To test run the software package for data logging all sensors on the plankton sampler Guildline and to develop programmes as required for data handling.
7. To obtain fertile eggs of Microchirus variegatus and to rear them at a relevant range of temperature and observe development.

NARRATIVE:

CIROLANA sailed from Grimsby at 1730 h 16 March and made a good passage through the English Channel to the first plankton sampling station at latitude $48^{\circ} 45' N$, longitude $6^{\circ} 45' W$ by 1900 h 18 March. After short trial tows with the new MAFF/Guildline 53 cm plankton sampler and the 2 m neuston net, the mackerel egg survey began at 2100 h 18 March. Forty-three plankton hauls had been completed, working southwards over the shelf by 1530 h 24 March when north-westerly gales forced CIROLANA to dodge. During the same period five groundfish trawl hauls and eleven neuston net tows were made. A Nansen bottle series down to 100 m depth was made on 20 and 24 March. The survey was resumed in improving weather at 0845 25 March. A further five plankton hauls and one neuston tow were completed before the weather again intervened causing a cessation of work between 2330 h 25 March and 1030 h 26 March. The four remaining plankton sampling stations at the southern end of the grid, plus two additional ones along the north Spanish coast were completed by 1130 h 27 March. One bottom trawl haul and one neuston net tow were also made in this area. In worsening weather no further stations were possible west of latitude $43^{\circ} 38' N$, longitude $5^{\circ} 48' W$ and CIROLANA steamed to Santander at 1500 h 27 March, to disembark Messrs Bedford and Moore and to embark Snr L Motos, a Spanish observer. CIROLANA left Santander at 0800 h 29 March and steamed 10 n ml north to an area where dense mid-water echo traces had been seen two days earlier. The traces were relocated over a very rough bottom varying from 80 m to 140 m in depth. One half an hour and one five hour Engels trawl haul was made in an unsuccessful attempt to identify the traces, before resuming the plankton survey at 2120 h. Three plankton stations and one neuston net haul were completed along the shelf edge close to the north Spanish coast by 0500 h 30 March. CIROLANA then began a 200 n ml steam northwards to latitude $46^{\circ} 45' N$, longitude $6^{\circ} 15' W$ where sampling on the main mackerel egg survey grid was resumed at 2220 h on the same day. A further seven plankton stations and one neuston tow were completed by 2315 h 31 March when gale force north westerly winds forced a cessation of work at 0215 h 1 April. CIROLANA dodged to a position, latitude $47^{\circ} 45' N$, longitude $6^{\circ} 45' W$ and have to until the wind abated sufficiently to restart the survey at 1800 h 2 April. Ten plankton hauls two neuston tows, two trawl hauls and one Nansen bottle cast were completed, many in marginal working conditions before a severe westerly gale halted the proceedings at 1720 h 4 April. By 1550 h on the following day the weather had improved slightly allowing the plankton sampler to be towed before the wind. The survey was restarted on a westgoing leg at latitude $47^{\circ} 45' N$, $09^{\circ} 15' W$ (J.17) and proceeded uninterrupted for the next four and a half days. In this time thirty-six plankton stations, six neuston tows and two bottom trawl hauls were completed. Twelve of the plankton hauls were in rectangles N 18 and N 19 (Figure 1) where mackerel eggs had been found in high numbers in April 1980. The final haul in this comparative series had been completed when a severe easterly gale forced us to terminate the work three stations short of our target, at 2200 h 9 April.

An uncomfortable passage up the English Channel, first in an easterly gale and subsequently in a west to south westerly gale, was made on 10 April. A relatively calm passage through the Dover Straits on 11 April was followed suddenly by a severe north to north easterly gale for the final uncomfortable leg of the journey to the Humber. RV CIROLANA docked in Grimsby at 1630 h 12 April. Staff returned to Lowestoft on the following day.

RESULTS:

1. A total of 110 hauls were made with the 53 cm plankton sampler (Figure 1), five of which were along the north Spanish coast, outside the designated survey area. Six hauls were made in each of two sampling rectangles over the Great Sole Bank, to examine spatial variation in egg abundance within a rectangle. Weather conditions did not permit any extensive sample sorting at sea and only a few samples from over the whole area were examined. As in 1980 mackerel egg numbers were high over the Great Sole Bank (Figure 1, N 19, N 20) but the peak concentration on this survey was in rectangle K 16 in the vicinity of the Little Sole Bank. Mackerel egg numbers were also high off the Spanish coast in rectangle A 7 outside the survey area, where dense unidentified midwater shoals were seen on the echo sounder (see 2).

2. Nine hauls distributed evenly along the continental shelf edge from 100 metres to 190 metres depth were made with the Portuguese high headline trawl. Catches of demersal fish in these hauls were very small and only 48 hake otoliths, 3 Angler fish otoliths, 4 whiting otoliths and 14 megrim otoliths were taken. Horse mackerel were dominant in most of the catches with 57.5 baskets being taken in a one hour tow on the Little Sole Bank (K 16). The biggest catch of mackerel, 23 baskets was also taken in this haul. Blue whiting were only present in numbers in three of the hauls with catches of 3 baskets, 13 baskets and 0.5 baskets in rectangles J 11, K 14 and N 19 respectively. Catches in the two Engels hauls both made in A 5, were disappointingly small. Some eight hours were devoted to locating and fishing on some dense midwater traces first seen in the area before the mid-cruise break in Santander. A very rough bottom and a tight distribution of the shoals in association with large bottom peaks combined to make sampling them very difficult. The two hauls, one of almost five hours duration yielded just 5.5 baskets of pilchards and 2 baskets of Boops boops.

Otoliths, length measurements and maturity stages were collected from 690 mackerel in three assessment areas and from 660 horse mackerel in four assessment areas.

3. A tow with the neuston net was attempted at about midday and midnight throughout the plankton survey. On numerous occasions conditions were too rough for the operation of the surface net which has to be towed in a large circle out of the ships wake. Twenty-two half an hour hauls were made but no mackerel larvae were seen. Catches generally consisted of the ubiquitous 'Onos', swimming crab larvae and other fish larvae including blue whiting.

4. Considerable difficulty was experienced in establishing contact with FRV ANTON DOHRN because of transmitter problems on the German vessel. Contact was eventually made on 7 April when ANTON DOHRN was fishing on the Porcupine Bank some 300 n ml north of CIROLANA. The planned rendezvous at latitude 49° 45'N on or about 8 April, to work comparative plankton hauls together had to be cancelled. Useful exchanges on 8 and 9 April concerning the plankton survey and fishing were made between us and Dr Dohmhiem and Dr Brenda Thompson who was sailing as an observer on the German vessel. A further unsuccessful attempt to make contact was made on 10 April when CIROLANA was steaming home. This was to inform her that three rectangles remained unsampled at latitude 49° 45'N. RV CLIONE who was hove to in storm force winds in the Celtic Sea at the time, agreed to attempt to pass on the message.

5. Sub-surface sea water was continuously pumped through a fluorometer to measure 'in vivo' chlorophyll 'a' fluorescence throughout the survey. At each plankton station, two 250 ml surface water samples were filtered for subsequent acetone extraction of total chlorophyll, nanoplankton chlorophyll and phaeophytins. These samples were extracted and analysed on board as weather permitted. Discrete depth samples were taken using Nansen water bottles down to 100 metres. Only three series of Nansen bottle casts were made for chlorophyll analysis. Further discrete depth samples were not taken due to a shortage of membrane filters which also resulted in fewer samples being taken on the two most northerly lines of stations. These data will be shared with IMER Plymouth and should provide useful comparisons with the satellite imagery of near surface chlorophyll distribution obtained from the coastal zone colour scanner.

Discrete surface salinity samples were taken on each plankton station and at each depth from the Nansen bottle casts. These samples will be returned to the laboratory for analysis.

The sea surface thermograph was run continuously throughout the cruise.

6. The new 53 cm MAFF/Guildline sampler was used for the first time on a survey. Serious problems were experienced with the Braystoke/Riches flowmeters which had been tried and tested on the 76 cm sampler in 1982. Considerable damage was done to many meters and to their fixing bars during the first half of the survey resulting in the complete loss of flow data on most stations. Stronger mounts fitted at the rear of the nose cone, instead of at the front, were made up in Santander. These were eventually modified to move the meter forward to its original position after which no further problems were experienced. This has proved conclusively that the broken flowmeter shafts were the direct result of a weakness and flexibility in the mounting, which allowed water pressure to be exerted on to the side of the blade thus causing additional strain.

Additional depression is required on this sampler for successful operation down to 200 metres. This was obtained by fitting two Scripps depressors and reducing the towing speed to 4 knots.

With the exception of the PH sensor the Guildline package on the sampler performed well and withstood the rigours of operation in marginal weather conditions. The PH sensors all leaked at 200 metres or shallower and should be returned to the manufacturers with a refund demand. For the future it is recommended that measurement of this parameter be abandoned and an 'in vivo' chlorophyll 'a' sensor be fitted in its place.

The Guildline CTD deck unit was designed with a standard computer interface which considerably simplified the task of providing a complete logging package for this device. The MBM data logging package, designed by RSG 3 for use on RV CIROLANA, and developed by a software house, provided all the basic acquisition facilities required. Changes were made to this logging software to enable it to accept data from the Guildline deck unit.

Although some of the proposed facilities either were not implemented or failed to function, basic requirements to be able to log selected sensors at a user selectable rate and to tabulate and extract the raw data, were achieved. However occasional corruptions of depth readings did occur, which represented a considerable burden in man hours, to edit the files before the data could be accessed for tabulation and plotting. The editing procedure was made even more laborious by the failure of the VDU. In future a

dedicated terminal should be provided for the Guildline, with the shipboard unit acting as a spare.

Recent enhancements to the logging software enabled ships position (from the Magnavox satellite system) to be recorded with every data logged reading.

Two additional programmes were developed to provide visual presentation of the collected data. The first produces a graph against depth of four of the CTD unit sensors, temperature, salinity, dissolved oxygen and PH. The second produces flow rates and volumes filtered over a ten metre depth band for the internal and external flowmeters.

As a result of the considerable data logging experience gained on this cruise, a number of constructive suggestions for modifications to the package will be put to RSG 3. Most of these are related to simplification of the operating procedures in order to minimise operator errors.

7. Only six small Microchirus variegata were taken in the trawl hauls, none of which were approaching maturity. An intended trawl haul at the western end of the English Channel, with a bunt end tickler fitted to the trawl, had to be cancelled due to severe weather in the area on the 10 April.

8. Miscellaneous

Ovaries from thirty mackerel and thirty horse mackerel were removed and fixe in a specially prepared formalin solution. These samples were taken for L Maraduena (visiting student, Ecuador) for histological studies of oocyte development in the two species.

Three random mackerel samples of about 200 fish in each were deep frozen for Dr McKenzie, DAFS. These samples are for microscopic examination in search of the plerocercus stage of the cestode parasite Grillotia angeli. Records of its occurrence are being assessed for use as a biological tag. In addition, two deep frozen mackerel samples were collected from the Fisheries Institute in Santander and transported back for Dr McKenzie.

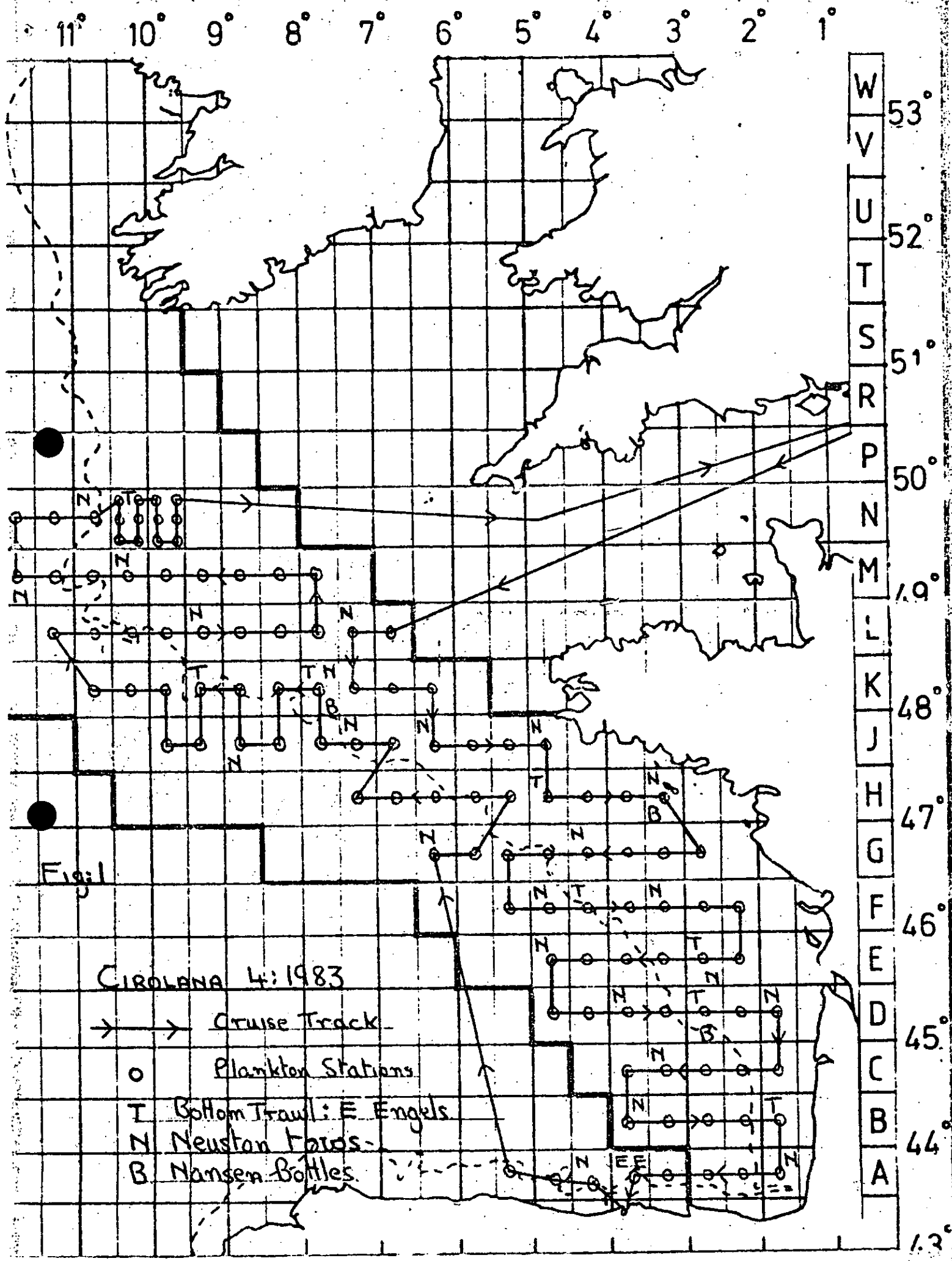
J H Nichols
20 April 1983

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