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

1985 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA: CRUISE 1

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

STAFF:

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DURATION:

Left Lowestoft 0730 5 January
 Arrived Lowestoft 1115 22 January
 All times are Greenwich mean time

LOCALITY:

Southern North Sea and Eastern English Channel

AIMS:

1. To participate in the ICES coordinated herring larval survey of regions IVC and VIID during the two sampling periods 1-15 January 16-31 January.
2. To sample herring larvae and their potential food organisms in a study of their diet.
3. To sample potential herring larvae predators and to examine their gut contents on board.
4. To sample herring larvae, other zooplankters and phytoplankton for lipid analysis, with emphasis on polyunsaturated fatty acids.
5. To take water samples using the ships pump and analyse on board for dissolved sulphur gases using gas chromatography.
6. To monitor sub-surface water continuously for temperature, salinity and chlorophyll 'a' fluorescence.
7. To run the MS44 echo sounder continuously throughout the plankton survey and to fish for herring on suitable traces using the Engel trawl.

NARRATIVE:

Minor problems with the ships engine caused a delay in sailing until 0730h, 5 January. The first herring larvae grid, figure 1(A), was started 20 n.ml. south east of Lowestoft at 1115 h on the same day. Sampling progressed until 2345h, 6 January when RV CIROLANA hove to in a north easterly gale in the Bay of the Seine. The plankton survey re-started at 0020 h, 8 January. After completing four more sampling stations an echo-sounder search was made in the centre of the Bay of the Seine to re-locate possible herring traces seen there two days earlier. Light traces were found but attempts to sample them were thwarted by major problems with the rig of the trawl and a netsonde transducer. That attempt to fish was abandoned and a spare transducer, which only fired downwards, was fitted to the cable. Plankton sampling was resumed at 1650 h on the same day and proceeded uninterrupted until completion of the grid 30 n.ml. east of Great Yarmouth at 1430 h, 12 January. RV CIROLANA then steamed to an area 25 n.ml. to the south-east, where heavy echo traces had been seen earlier. These traces were quickly re-located and the Engel trawl was shot on them at 1840 h. The changed transducer indicated a gape of only 5 metres and the trawl was hauled immediately for inspection. After careful examination the fault, a crossed bridle, was rectified and the net shot again at 2050 h and towed through light traces for one hour. After obtaining a sample of herring, course was then set for the first of a series of twenty four stations in the Southern Bight and eastern Channel on which herring larvae were collected in bulk for lipid analysis, using the 76 cm sampler. These stations were completed by 0900h, 14 January, and were followed by an echo sounder survey between 1030 h and 1830 h in the centre of the Bay of the Seine. The Engel trawl was shot in this area at 1900 h and towed through light traces for one and a half hours. At 2355 h a series of eleven Isaac's Kidd trawl stations was started on a line running through the highest herring larvae concentrations in the eastern Channel. The final herring larvae sampling grid, figure 1(B), was started at 1810 h, 15 January in the straits of Dover. Forty three stations had been completed in the eastern Channel before a rendezvous with RV ANTON DOERN at 0800h, 18 January. The two vessels then proceeded to work fourteen comparative plankton sampler tows together, maintaining station ca. 0.25nml apart in line astern. During this exercise exchange visits were made by members of the scientific staff to observe each others sampling procedures. The final comparative tow was made at 1900 h, then the standard survey was continued completing the last four Channel stations at 0145 h, 19 January. The survey continued in poor visibility into the Southern Bight until its completion at 2145 h, 21 January at latitude $52^{\circ} 35'N$ longitude $02^{\circ} 50'E$. RV CIROLANA then steamed to Lowestoft docking there at 1115 h, 22 January.

RESULTS:

Aim 1. Ninetyfive stations were completed on the first larvae survey, 52 in the Southern Bight and 43 in the eastern Channel, using the 53 cm sampler. Samples were sorted and counted during the cruise and worked up to total larvae per M². (figure 2A). Larvae less than 15 mm in length were abundant in the Channel east of the Greenwich meridian, but virtually absent from the Bay of the Seine. The provisional abundance index for the eastern Channel, 564×10^9 larvae, is about double the index for the corresponding period in 1983.

Larvae numbers in the southern North Sea however, were low with few larvae occurring North of latitude $51^{\circ} 40'N$. The provisional index for this area, 186×10^9 larvae is about one fifth the abundance recorded at the corresponding time last year.

On the second survey of the eastern Channel 15-19 January, larvae distribution was similar to that found on the first survey (Figure 2(B)). Total larvae numbers from the forty six stations had however gone down, to a provisional abundance index of 423×10^9 larvae.

Similarly, on the second survey of the Southern Bight the distribution pattern remained the same, but total abundance had halved to 80×10^9 since the first survey.

Provisional results of the comparative tows with RV ANTON are given in table 1. They indicate some major differences on some stations. These data must be analysed in relation to larval length distribution, total volume filtered and the sampled depths before any firm conclusions can be drawn. One problem which came to light after the comparisons had been completed, was that the 'In chthai' net transducer was malfunctioning. After re-calibration it appears that the comparative tows from "ANTON DOWN" may have been down to only 5-10 metres from the bottom whereas the "CIROLANA" tows were all to within 2 metres of the bottom or closer. Other operational problems resolved during these comparisons, were the intercalibration of the vessel's logs, and differences in positional fixes which at one point had the two vessels, which were steaming close together, about 3 n.mls. apart on their Decca charts.

Aim 2. Specific samples for herring larvae stomach analysis were not taken, neither was the auxiliary fine net used to collect potential food organisms. Samples of larvae from the standard survey will be used for this purpose instead.

Aim 3. Eleven double oblique Is²⁶'s Kidd trawl hauls were taken in an area of high herring larvae concentrations in the eastern Channel. Catches were very small consisting of only one or two post-larval fish per haul. These samples were fixed but not examined in detail on board.

Aim 4. Relationship between lipids in phytoplankton, zooplankton and herring larvae, with emphasis on polyunsaturated fatty acids.

A total of approximately 4000 herring larvae were taken at 25 different positions in the Southern Bight and Eastern Channel for lipid analysis and histology. Samples of Mysids, Sagitta and Temora were also taken using the 53 and 76 cm samplers.

During 19 of the larvae collection tows with the 76 cm sampler, the 325 mpi auxiliary net sample was retained for lipid analysis and histological examination.

Five samples of seawater taken at different points were filtered through glass fibre papers and the solids retained, also for lipid analysis and histology.

Those samples for lipid analysis were fixed in a 2:1 mixture of Chloroform:Methanol containing 0.01% Butylated hydroxytoluene. The histological samples were fixed in a solution of 2.5% glutaraldehyde, 1% formaldehyde in 0.1M phosphate buffer.

Subsequent analyses will be carried out at the Institute of Marine Biochemistry, Aberdeen.

Aim 5. Approximately 200 water samples were taken using the shipboard pump for sub-surface (3m) samples and hydrocasts to sample from the surface down to 40 metres. All samples were analysed on board immediately for sulphur gases. Identified 'species' were Dimethyl sulphide (DMS) and lesser amounts of Carbonyl sulphide, Methane thiol and Carbon disulphide. DMS concentrations were low relative to other times of the year and were in the range 1-10 ng.L⁻¹. Patterns of spatial variability were found, and higher concentrations of DMS were generally associated with river outflows where salinities were about 34.5%. Profiles from hydrocast samples showed little or no change with depth suggesting a well mixed water column, (confirmed by the CTD profiles on the plankton sampler), and no significant benthic sulphur production. Duplication of the eastern Channel samples one week later showed minor changes in DMS distribution especially in the Seine basin. Replication of the North Sea samples was not possible because the liquid nitrogen supply was exhausted.

This programme was part of a study by the UEA to examine the contribution of the North Sea and western approaches to the UK, to the atmospheric sulphur burden. The sulphur is derived from sea salt particles, (excess sulphate), and volatile 'species' such as DMS, from algae and bacteria.

Aim 6. Both Turner MK10 fluorometers became unserviceable within forty eight hours of sailing therefore no records of chlorophyll 'a' fluorescence are available for this survey. Sub-surface sea water was monitored continuously for temperature and salinity using the Guildline system in a flow box on deck. A careful watch was kept on the underwater unit on deck, but none of the corrosion problems experienced with this system on CIROLANA in the past, were observed.

Surface salinity and temperature charts were prepared on board and the data made available to the UEA, to be used in conjunction with the sulphur gas analyses (aim 5).

There was a significant drop in surface temperature in the Southern Bight between the two surveys with temperatures generally falling by about 2°C. Along the Belgian and Dutch coasts the surface temperature fell from ca: 5°C in early January to less than 3°C some ten days later. Similar decreases were also noted in the eastern Channel.

The surface salinity pattern in both areas remained the same throughout the sampling period. The tongue of higher salinity water in the Southern Bight appeared to be displaced to the west in comparison with other years.

Aim 7. Problems were experienced with the MS44 bridge echo sounder from the start of the cruise. Poor marking was partially attributed to the paper quality, and also to the general condition of the sounder which required servicing, for continuous use.

There was little evidence of herring shoals over the survey area during either the first or second surveys. Some heavy concentrations of single fish traces were seen close to the French coast in the Channel and sporadically over the Southern Bight on both surveys. Traces found close to the coast were in depth too shallow for mid-water trawling. The one successful Engel trawl haul in the North Sea at latitude 52° 14'N longitude 2° 52'E yielded just 1½ baskets of herring ranging in length from 15.5 cm to 30 cm. Three baskets of whiting and a few other fish were also taken. The haul in the Bay of the Seine on 14 January at latitude 49° 36'N longitude 00° 30'W produced mainly sprats (154 fish) with a few other fish but no herring.

J H Nichols
15 February 1985

Seen in Draft:

Capt M J Willcock Master
R F Graham Fishing Skipper

Initialed:

D J G

Distribution:

Basic List +

J H Nichols	R T Harrop	S Turner (UEA)
I L Davies	G M Haynes	A I Mitchell (Institute of Marine Biochemistry)
C L Whiting	A Lawler	
B R Riches	M Johnson (SCS)	

Table 1. Provisional results of comparative hauls Anton Dohm (AD)/Cirolana (C). E Channel

Station Vessel	182(a)		183(b)		184(d)		185(d)		186(e)		187(f)		188(g)	
	C	AD	C	AD	C	AD	C	AD	C	AD	C	AD	C	AD
Duration (secs)	972	785	902	805	801	688	827	700	800	634	800	645	708	530
depth (metres)	43	39	43	43	41	42	41	42	38	39	39	39	35	36
Vol ₃ filtered (M ³)	68.14	82.9	60.88	54.8	55.37	52.4	57.76	51.3	54.42	48.0	56.32	48.2	47.26	38.5
Total herring larvae	30	46	43	37	196	81	70	47	85	70	122	101	86	47
Number M ⁻²	18.9	22	30.4	25	145.1	65	49.69	39	59.35	57	84.49	82	63.69	44
Number M ⁻³	0.44	0.56	0.71	0.58	3.54	1.55	1.21	0.93	1.56	1.46	2.17	2.10	1.82	1.22
	189(h)		190(i)		191(j)		192(k)		193(l)		194(m)		195(n)	
	C	AD	C	AD	C	AD	C	AD	C	AD	C	AD	C	AD
Duration (secs)	610	500	624	445	639	430	648	425	640	415	604	465	621	475
depth (metres)	32	35	33	33	34	33	37	38	37	38	33	31	33	34
Vol ₃ filtered (M ³)	39.35	34.8	44.49	38.6	44.21	32.8	46.68	32.7	44.86	32.7	41.01	36.7	41.25	39.1
Total herring larvae	122	113	249	150	63	70	44	28	82	43	67	45	49	52
Number M ⁻²	99.2	113.7	184.7	128.2	48.45	71	34.88	33	67.63	51	53.92	38	39.2	45
Number M ⁻³	3.1	3.25	5.6	3.9	1.43	2.15	0.94	0.87	1.83	1.34	1.63	1.23	1.19	1.32

FIGURE 1A

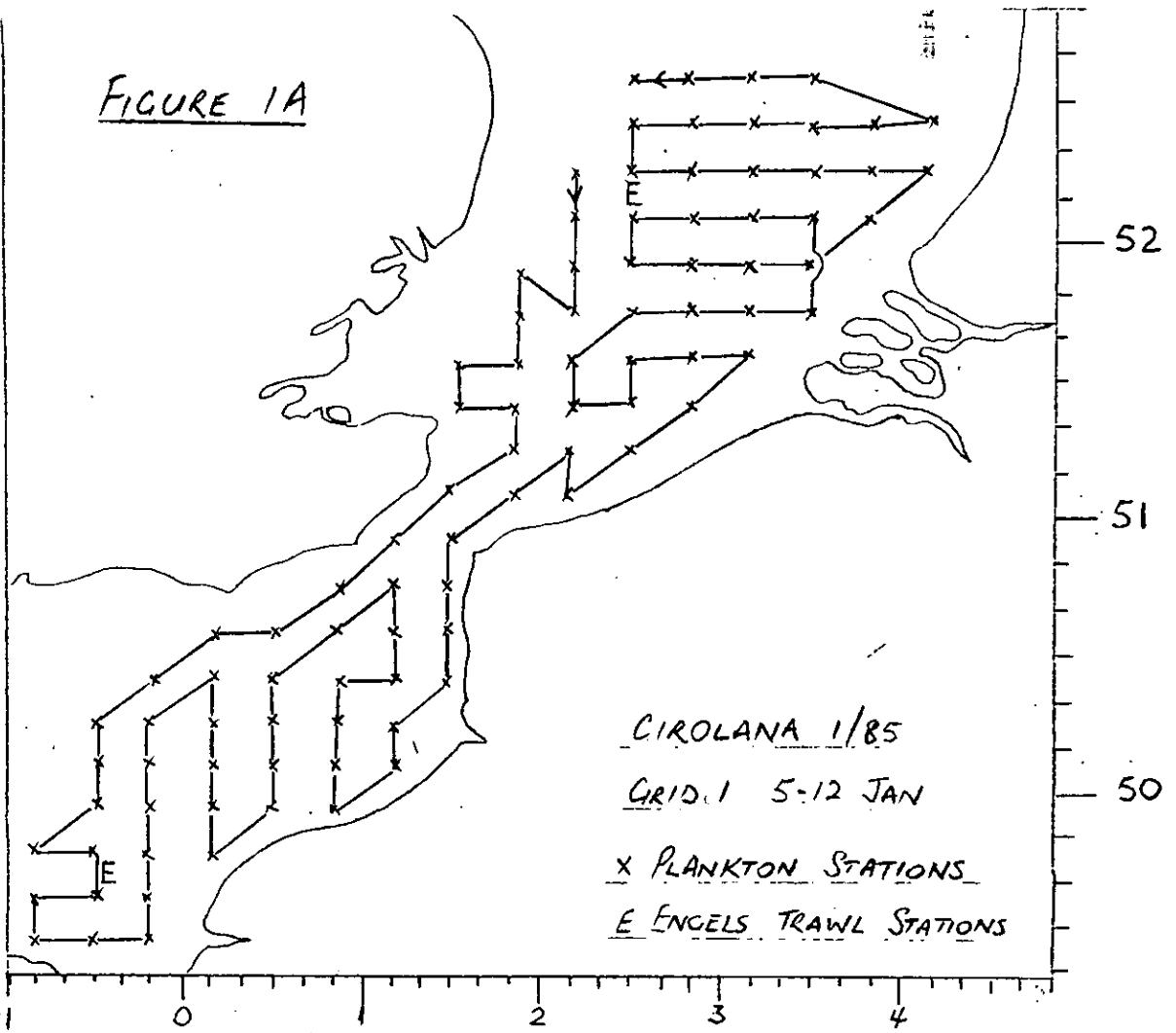


FIGURE 1B

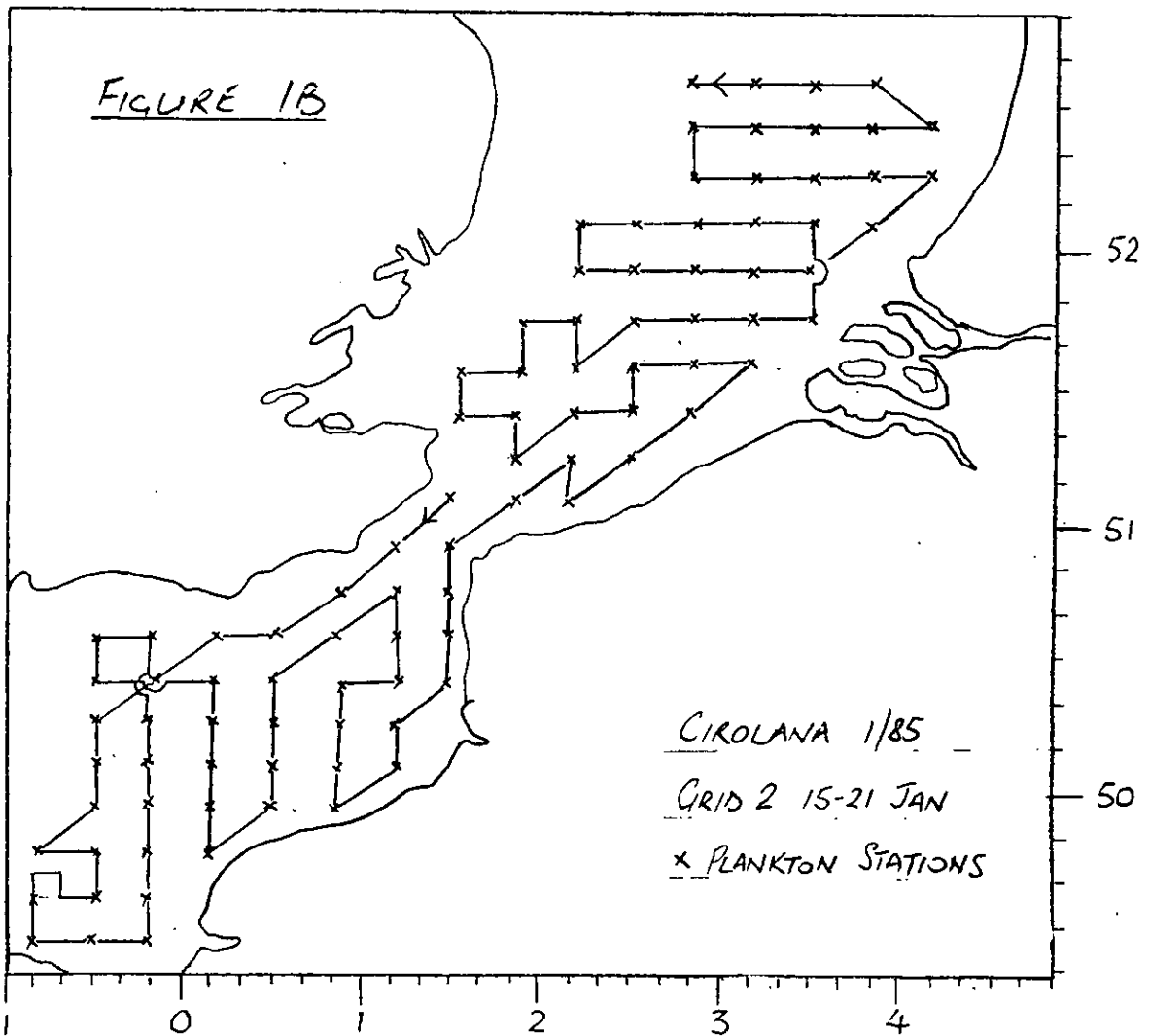


FIGURE 2A

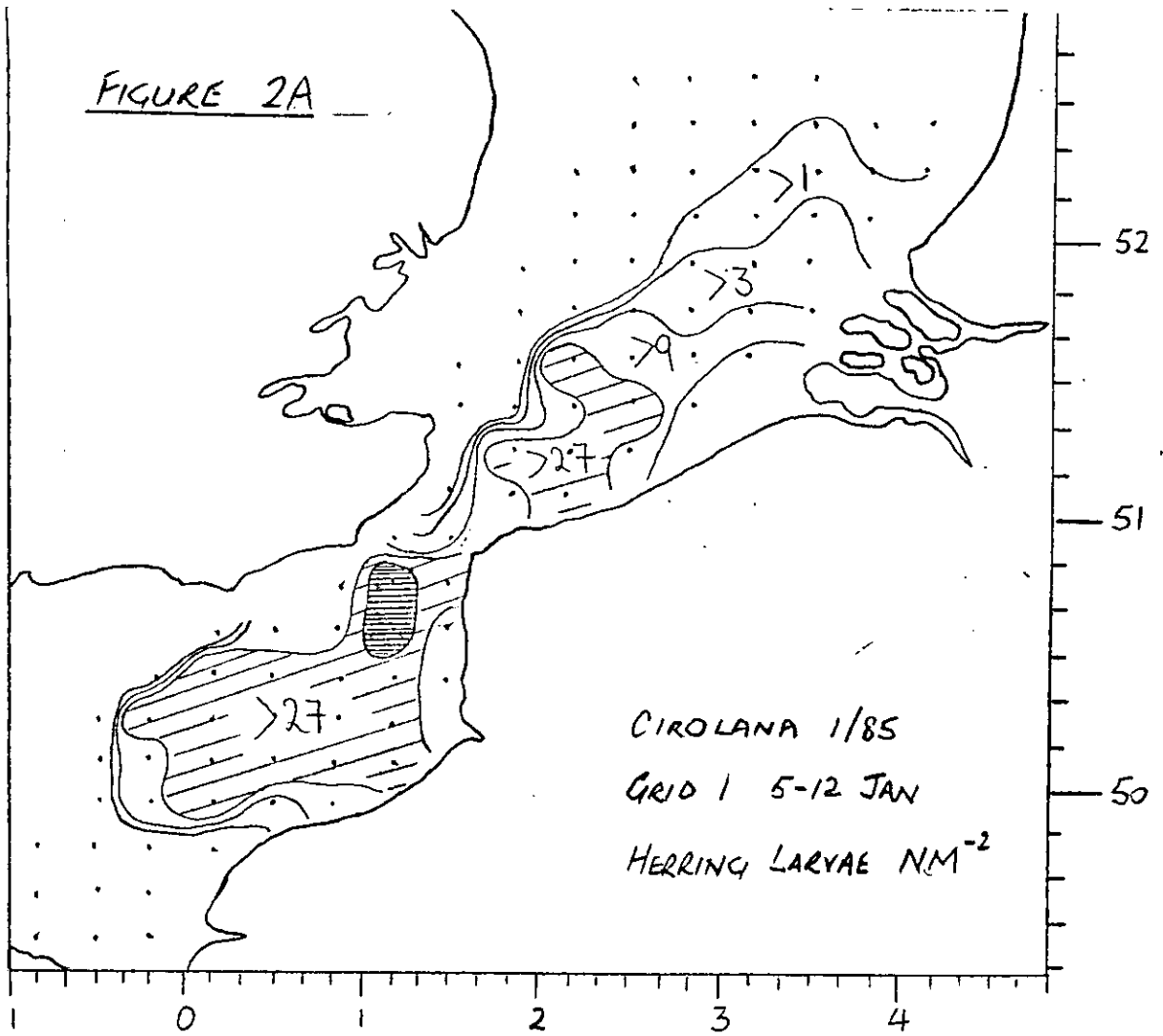


FIGURE 2B

