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

1976 RESEARCH VESSEL PROGRAMME

REPORT: RV CORELLA: CRUISE 5

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

STAFF

J H Nichols
N Reynolds
P G W Jones
A R Folkard
Mrs B M Thompson

DURATION

Left Lowestoft 1800 h, 26 March

Arrived Lowestoft 0830 h, 13 April

(All times British Summer Time)

LOCALITY

West Central North Sea: north coast of Norfolk to 56°N and the River Humber.

AIMS

1. Investigate the distribution and abundance of planktonic fish eggs and larvae, zooplankton predators and competitors and the phytoplankton, using the Lowestoft multi-purpose plankton sampler.

2. Monitor the sub-surface water continuously along the ship's track for temperature, salinity, transparency and chlorophyll 'a'.

3. Collect water samples from the pump for salinity and nutrient analysis; calibrate the fluorometer with chlorophyll 'a' extracts; measure phaeophytin; and identify the phytoplankton contribution to chlorophyll 'a' fluorescence, including the preparation of slides for electron microscope examination of the micro-flagellates.

4. Collect surface and bottom water samples at selected grid stations for analysis of selected trace metals.

5. Collect surface water samples between the mouth of the Humber and Goole, and over a 13 hour tidal cycle at Goole, for analysis of selected trace metals.

6. To test the rig of, and calibrate the small Boothbay net and to sample young fish with it.

7. Use the changing net sampler to investigate vertical distribution of fish eggs and larvae and the zooplankton, alternating with water bottle casts for phytoplankton, chlorophyll 'a' and phaeophytin in relation to temperature and light penetration into the water column over a 26 hour period.

8. To carry out replicate hauls with the multi-purpose plankton sampler near a parachute drogue, in areas of high and low larval densities, to estimate haul-to-haul variation.

9. To survey a grid of 10 to 15 stations twice, near an egg/larval density gradient at the centre of the patch, to estimate sampling errors.

10. Collect samples of fish for stomach content analysis, using the young gadoid trawl in midwater.

11. Collect live plankton as required.

NARRATIVE

RV CORELLA sailed at 1800 h, 26 March. The environmental monitoring systems and the 30" Multiple plankton sampler, were calibrated en route to the first sampling station which was reached at 2315 h, 26 March. Continuous monitoring of the surface sea water, and discrete plankton, nutrient salt and trace metal sampling, began on the survey grid and continued without interruption until 0430 h, 29 March. CORELLA then steamed to the position of JONSIS 1 current meter station, the sub-surface float of which had been reported 2 miles off Filey Brigg in the previous week. The toroidal buoy was sighted at 0530 h one mile from its correct position, and after successfully laying a new array on station, the wayward toroidal buoy and two anchors were retrieved. Two hours were then spent searching unsuccessfully for the sub-surface float off Filey Brigg. This float and one current meter were subsequently reported ashore in Bridlington Bay.

Sampling on the survey grid recommenced at 1240 h, 29 March. Inclement weather conditions caused some minor modifications to the planned station sequence and temporary suspensions of the work between 0215 h and 1430 h, 30 March and between 0300 h and 0745 h, 1 April. The survey grid was completed at the southern end of the Farne Islands at 1930 h, 3 April.

At 0130 h, 4 April sampling began on a grid of nine selected stations covering a plaice egg and larval gradient near the centre of the patch. This grid was sampled twice, and in addition one station where plaice larval numbers were low was sampled ten times consecutively. This exercise in replicate sampling was completed at 0715 h, 5 April when passage was made for North Shields to take on water and supplies, and to re-rig for trawling. CORELLA sailed from North Shields at 0830 h, 6 April and began trawling, with the young gadoid midwater trawl at 1740 h, in an area where heavy mid-water echo traces had coincided with high egg numbers three days earlier. Two hauls were completed in this area before moving thirty miles south at 0030 h, 7 April. Echo traces in the second area were poor and the two hauls yielded poor catches. Consequently an echo survey grid covering the centre of the plaice egg and larval patch was begun at 1045 h, 7 April. Heavy echo traces were found by mid-day in an area where about ten Russian trawlers were working. Three hauls were made in this area before continuing the echo-grid southwards at 2330 h, 7 April. One further haul was made at 0540 h, 8 April at the end of which a potentially dangerous flaw was noted in the port trawl door. A crack in the fin had opened through to the securing eye for the dog chain shackle making further trawl hauls impossible.

CORELLA then made passage for Bridlington Bay at 0830 h to re-rig for plankton sampling. Rigging was completed by 1400 h, 8 April, and en route back to the plaice larval patch, the new 2 sq. metre 'Boothbay' frame net was calibrated for depth against warp out using the main trawl warp, and was used to sample fish. At 1750 h a series of ten replicate hauls with the 30" multiple plankton sampler, in an area of high numbers of plaice and ammodytes larvae, was begun. These hauls were completed by 0230 h, 9 April when passage was made for the River Humber to begin trace metal sampling.

Sampling in the Humber began at 0700 h, 9 April off Spurn Point. Surface water samples were taken in the river up to CORELLA's navigable limit, three miles upstream of Blacktoft, before returning to Blacktoft and starting hourly sampling over tidal cycles at 1530 h. CORELLA left Blacktoft at 1430 h, 10 April and

proceeded to Immingham to sample over another tidal cycle. At 0430 h, 11 April CORELLA had to move from her anchorage at Immingham and completed sampling off Grimsby by 0830 h. On leaving the Humber to return to the plaice larval patch, a 'Boothbay' frame net haul was made between Clee Ness buoy and the Bull Light.

The centre of plaice larval patch was relocated 25 miles off Flamborough Head, after 4 hauls with the 30" multiple sampler. These hauls were also used to collect plaice larvae for deep freezing. At 1600 h a 26 hour station, sampling with the vertical layer plankton sampler, Nansen water bottles and the spectral radiometer, began. Live plankton for return to the laboratory was collected during this station, which was completed at 1930 h.

Course was then set for Lowestoft stopping only to collect plankton for Dr Dodge. CORELLA docked at Lowestoft at 0830 h, 13 April.

RESULTS

All 102 stations of the planned survey grid were completed (Fig. 1). In addition to the 30" multiple plankton sampler hauls, surface bucket samples, for dissolved trace metals and nutrient salt analysis, were taken at each station. Bottom water samples, for dissolved trace metals analysis were taken at 27 stations by using the 12 litre Niskin bottle. Preliminary examination of the plankton samples shows the main plaice egg patch to be of similar density to that on the previous cruise, and still centred some 50 miles east of the Tees (Fig. 1). The patch located on a previous survey at the northern edge of the grid has now intensified. Plaice larval numbers have increased with up to 70 stage I-III larvae per haul at the patch centre, and with lower numbers of later stage larvae in the south east (Fig. 1). Cod eggs and larvae were still abundant in the survey area, coinciding mainly with high plaice egg and larval counts (Fig. 2). At the northern edge of the grid eggs indistinguishable in size from those of cod, but containing haddock embryos were noted. Haddock larvae were also present. The gelatinous houses of Oikopleura were probably responsible for most of the net clogging which occurred on many stations within the plaice egg and larval patch. Oikopleura was abundant on many stations within the patch.

Owing to an early failure of the Turner Fluorometer no chart record of "in vivo" fluorescence was possible.

Samples were taken at each station on the grid, "in vivo" fluorescence background fluorescence, chlorophyll 'a' and phaeopigments 'a' for both total and nannoplankton were measured. Similar observations at 0, 10, 20, 40 metres depth were made at 4 hourly intervals at the depth station at the end of the cruise. Preparations were made for E.M. examination, and material was collected on 10 µm mesh and on filter membranes for examination ashore.

Total chlorophyll values are shown on the chart (Fig. 2). The highest values, over 2 µg/l, were found at a few stations towards the east of the grid. Most of the area sampled yielded 0.2-0.5 µg/l. Over the whole area the amounts of phaeopigments were greater than those of chlorophyll, 1.5-7 x as great. In the Humber at Blacktoft, water fully fresh, 1.8 µg/l of chlorophyll were accompanied by 13.5 µg/l of phaeopigments.

Nannoplankton made up from 50-100% of the total plankton. Small diatoms appeared to dominate at most stations but at some a very small, green, biflagellate organism appeared to dominate.

On 13 of the survey stations and at one in the Humber sludge dumping area, a total of 700 sea bed drifters were released.

8 hauls were made with the young gadoid trawl in areas where good mid-water traces had coincided with the plaice egg or larval patch during the survey. Catches were mainly very small, with the highest being about 2 baskets of small sprats. Samples

from each haul were preserved for stomach contents analysis.

18 surface water samples were taken on passage, in the River Humber, and tidal cycle sampling at Blacktoft and Immingham produced a further 38 samples. These were suitably filtered for both dissolved and particulate trace metals analysis, back at the laboratory.

The new 2 sq. metre 'Boothbay' frame net was used successfully from the 'A' frame and calibrated on the trawl warp. The net was used to sample small fish, with one such haul in the Humber estuary yielding 20 small whiting and other small fish and crustacea. These were all deep frozen for Dr Portmann.

Observations from the sea surface down to 65 metres were made with the spectral-radiometer at 5 positions over the survey grid and on 3 occasions during the vertical distribution series. During the spectral scans simultaneous observation of the solarimeter and quantum deck cell records were made.

Surface temperature, salinity, pH, dissolved oxygen and transparency were monitored continuously throughout the cruise. The solarimeter and quantum deck cell were also run daily with the exception of the Humber sampling period.

62 deep frozen plaice larvae were collected for Dr Purdom.

Live plankton was collected for Mrs Thompson and both live and a preserved sample were collected on passage to Lowestoft for Dr Dodge.

10 packs of deep frozen sprats were collected for the fish food production unit.

J H Nichols
23 April 1976

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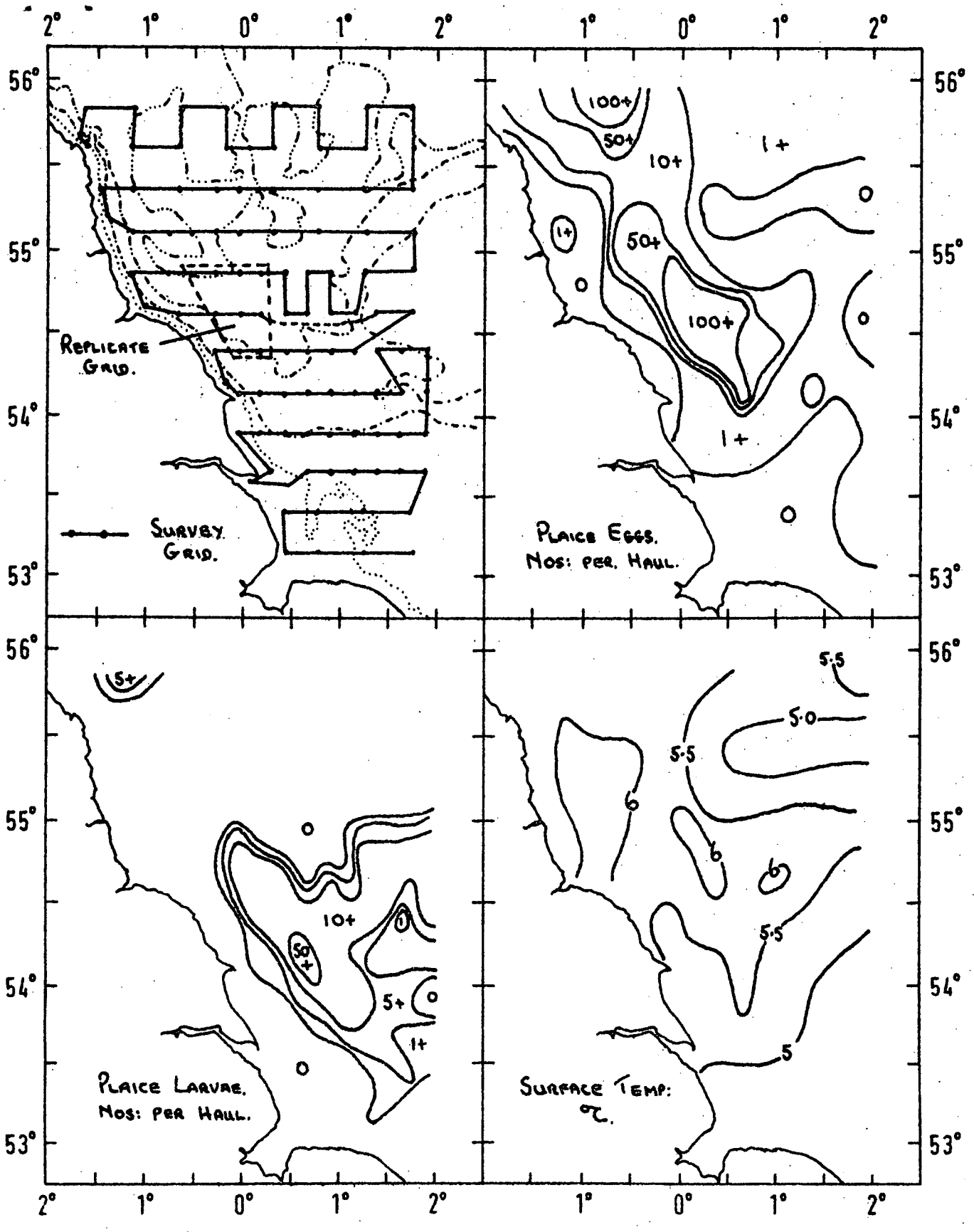
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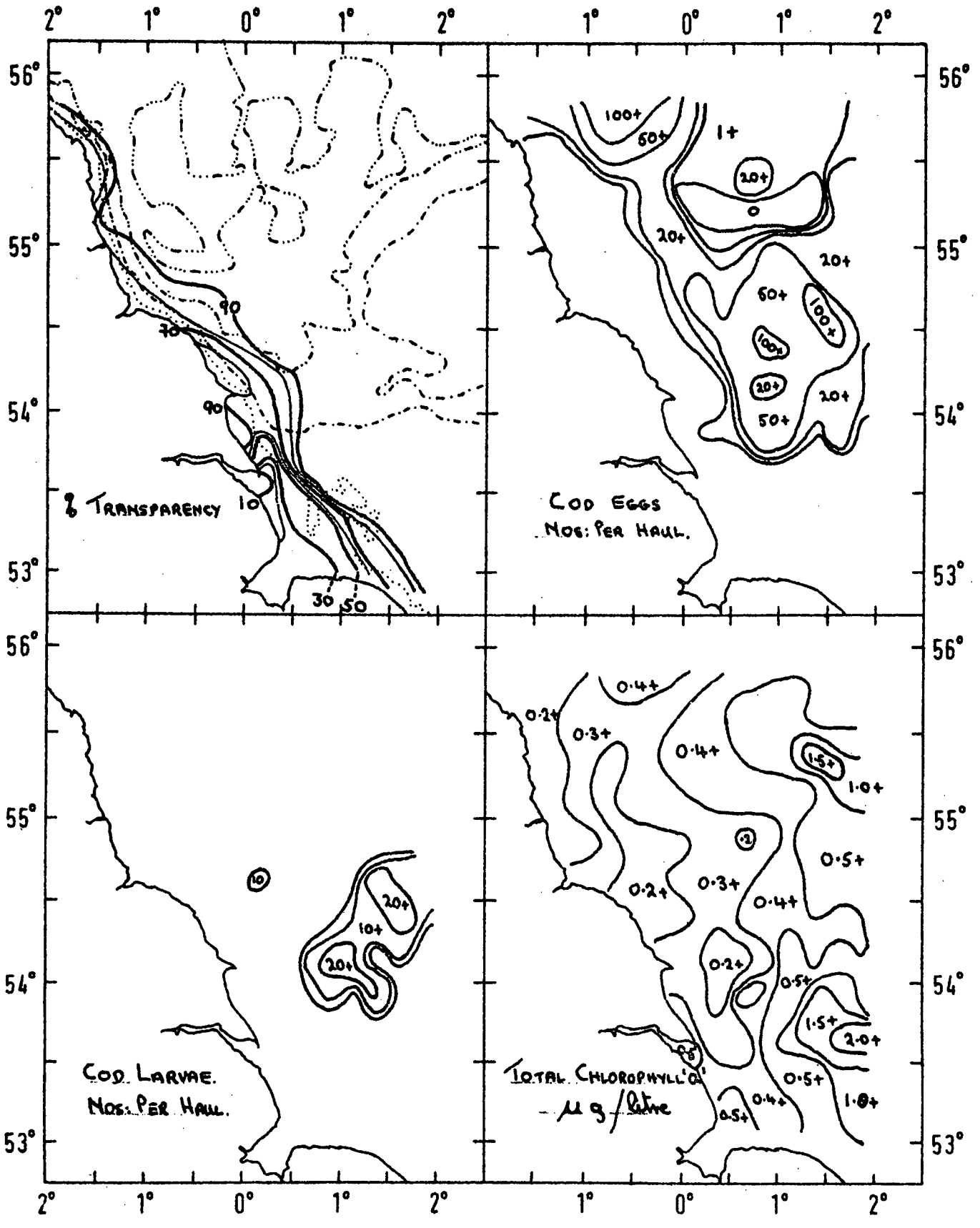
FIG: 1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COD LARVAE.
NOS: PER HAUL.
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TOTAL CHLOROPHYLL 'a'
μg/litre
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0·4+
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FIG: 2