

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

1982 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 Grimsby 1250 h 5 January

Arrived Grimsby 1210 h 18 January

AIM:

To study the spawning behaviour of plaice in relation to gonad maturation stage, lunar cycle, time of day, and state of tide.

PLAN:

Three research vessels worked together on this exercise: ripe plaice fitted with acoustic transponding tags were tracked by sector scanning sonar from RV CLIONE; RV CORELLA fished for plaice in midwater with an Engel trawl; and RV CIROLANA determined the distribution of plaice eggs in early stages of development, monitored their abundance in a selected area, and fished for plaice with a bottom trawl.

NARRATIVE:

RV CIROLANA left Grimsby at 1250 h on 5 January and steamed to the Southern Bight. A tin tow net survey covering the area bounded by latitudes $52^{\circ}00'N$ and $52^{\circ}40'N$, and longitudes $02^{\circ}30'E$ and $03^{\circ}20'E$ was completed by 1000 h on 7 January. This survey showed that stage 1a plaice eggs were most abundant in an area centred about the position $52^{\circ}10'N$, $02^{\circ}45'E$, and the greater part of the work was carried out within 5 n. miles of this position. A second grid survey carried out on 12-13 January confirmed that stage 1a eggs were still most abundant close to the original position. Work continued in the area until late on 16 January. A third and final tin tow net survey was then started, taking in a line of stations along latitude $51^{\circ}50'N$. The grid was completed at 2042 h on 17 January, and RV CIROLANA returned to Grimsby to enter port at 1210 h on 18 January.

RESULTS:

1. Distribution and abundance of stage 1A plaice eggs.

Plankton samples collected up to and including those taken on the second grid (12-13 January) were worked up on board. Stage 1A eggs were most abundant within an area bounded by latitudes $52^{\circ}15'N$ and $52^{\circ}00'N$, and longitudes

02°30'E and 02°52.5'E. Their abundance was relatively low and maximum densities were close to 10 eggs/m². Detailed surveys within the area of maximum abundance showed little change before and after the Full Moon (and its total eclipse) on the night of 9 January.

2. Numbers of plaice.

It was not possible to use the Granton trawl in the immediate area of maximum egg abundance. Standard tows were therefore made 10 n. miles to the north east between positions 52°16.6'N, 02°48'E and 52°16.6'N, 02°57'E where the bottom was known to be suitable for trawling (CIROLANA, 1/81). In 12 1 h tows, catches of plaice ranged from $\frac{1}{3}$ to $1\frac{1}{2}$ baskets. The numbers of male fish exceeded those of female fish, the male to female ratio being 5.4 to 1 for all fish, and 11.4 to 1 for mature fish only. Of 766 male plaice caught, 751 (98%) were mature and 749 of these fish were in maturation stage VI. Of 143 female plaice caught, 66 (46%) were mature. Of these 66 females, 53 were in gonad maturation stages III to V, 9 in stage VI, and 5 in stage VII (spents)

3. Spawning activity.

The relatively low abundance of stage 1A plaice eggs and the small number of stage VI and stage VII (spent) female plaice taken in the Granton trawl suggest that spawning was not fully underway by 16 January.

4. Commercial fishing.

From 11 to 14 January a fleet of beam trawlers (up to 45 vessels) was fishing within a 10 n. mile radius centred about our standard tow. A small vessel appeared to be working tangle nets about a wreck near the centre of maximum egg density at 52°10', 02°45'E.

5. Other activities.

(i) Bottom survey. A trough with depths up to 64 m lies to the NW of the area of maximum egg abundance along longitude 02°40'E and between latitudes 52°12'N to 52°20'N. An echo survey showed that the ground within the trough was too rough to work a Granton trawl. Lowerings of the Guildline CTD package into the deepwater did not give convincing evidence of any temperature and salinity anomalies.

(ii) 'Benthos' camera. Thirteen trial hauls were made with a plankton camera on hire from Benthos, Falmouth, Mass., USA. The camera system, mounted on a 60 cm Bongo net frame, operated successfully. Three failures were attributable to operator error. Some difficulty was experienced in directing plankton concentrated by the net through the photographic chamber. Nevertheless identifiable plankters do appear on many of the 8000 frames taken.

(iii) 24 h TTN station. Twenty four consecutive hauls with the 30" TTN, made at hourly intervals, were taken in the centre of the plaice egg patch at 52°07.5'N, 02°45'E, to examine a possible diurnal rhythm in plaice spawning.

(iv) Herring larvae. Herring larvae were abundant in some stations at the southern edge of the survey area, south of latitude 52°00'N. Over 100 larvae per haul (about 15/m²) were found at the position 51°50'N, 02°30'E. The total length of the larvae ranged from 6 mm to 42 mm with a mode at 9 mm.

- (v) Shrinkage of herring larvae. The presence of herring larvae led to 6 special TTN hauls being made to collect material for a series of experiments to determine the effects of fixatives and fixation methods on larval length. Samples collected during the 24 h TTN station previously mentioned were also fixed in various ways to supplement this material.
- (vi) Histological and biochemical studies. Mr Witthames tested a connective tissue enzyme as a quick, non-toxic alternative to Gilson's Fluid for use in fecundity studies. Female plaice were frozen whole for cryostat sectioning in connexion with studies on the changes in the ovary during spawning. Blood plasma samples were taken to measure plasma urea, ammonia, and sex hormones to study nitrogen metabolism during egg maturation and spawning.
- (vii) IMER. Mr Coombs made 11 hauls with the Longhurst-Hardy Plankton Recorder to study the vertical and horizontal distribution of plaice eggs. Three trial tows were made with the Undulating Oceanographic Recorder but failure of the sensor and recording systems prevented its further use. Measurements were made of the density, rate of vertical drift and coefficient of thermal expansion of wild plaice eggs.
- (viii) Marine intelligence. Water temperatures within the traditional plaice spawning area were 6.2° to 6.3°C, about 1.0°C less than those recorded in January 1981. Three spined sticklebacks (Gasterosteus aculeatus) were taken in the Granton trawl and in the TTN.
- (ix) Material collected for outside bodies. Sole parasites were collected for Dr Graham Kearn (UEA) and a sample of ungutted fish was frozen for parasite studies in response to a request from Cambridge University.

F R Harden Jones
Naturalist in Charge

25 January 1982

SEEN IN DRAFT: M J Willcock Master
 W J Saxby Fishing Skipper

INITIALLED: DJG

DISTRIBUTION:

Basic List +

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