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

1983 RESEARCH VESSEL CRUISE PROGRAMME

REPORT: RV CIROLANA : CRUISE 2

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

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DURATION:
Left Grimsby : 0955h 21 January
Arrived Grimsby: 0830h 1 February
All times are Greenwich Mean Time

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 G A REAY fished for plaice in mid-water with an Engel trawl; and RV CIROLANA determined the distribution of plaice eggs in early stages of development, regularly monitored their abundance in a selected area, and fished for plaice with a bottom trawl.

NARRATIVE:

RV CIROLANA left Grimsby at 0955h on 21 January and steamed to the Southern Bight. Using the 76cm High Speed Plankton Sampler (fitted with the Guildline Environmental Monitoring System), a survey of the area bounded by latitudes 52° 00'N and 52°40'N, and longitudes 02°30'E and 03°15'E was completed by 1825h the following day. Stage 1a plaice eggs were most abundant at the position 52°10'N, 02°45'E (which was also the centre of the egg distribution in 1982), and the greater part of the work was carried out close to this position. Regular close HSPS surveys and trawling stations were completed between 21 January (and so through the Full Moon on 28 January) and 30 January until 50 knot westerly winds made further work imprudent. RV CIROLANA moved west to shelter for the night near the Suffolk coast. The next morning a short lull allowed the vessel to return to the working area and complete a final HSPS survey before an expected increase in wind strength brought work to an end. In view of the adverse weather, and with no prospect for improvement in the next 24-36h, the cruise was abandoned at 1600h on 31 January and RV CIROLANA steamed before a southerly gale to enter Grimsby at 0830h on 1 February.

RESULTS:

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

In the initial HSPS survey the highest concentration of stage 1a plaice eggs was found at the position 52°10'N, 02°45'E, the number being 23 eggs/m^2. This position was selected as the centre for a 6 station HSPS box survey which was completed daily between 2030h and 0030h from 23 to 29 January inclusive (the 30 January survey could not be carried out owing to bad weather, but a survey was completed between 1030h and 1340h on 31 January; the samples from the final survey were not worked up on board).

The provisional results for the single grid station and the 7 consecutive close surveys (each comprising 6 stations) are summarised in Table 1. There is a clear trend for the abundance of stage 1a eggs to increase up to the night of 27/28 January, but there was a marked fall in abundance on the 28/29 January (Full Moon), followed by a recovery the following night. The night of 28/29 January was the first night in which we experienced gale force winds, together with heavy cloud and the sampler had to be towed before the wind; the following night conditions were very much better and there was brilliant moonlight. Taken as a whole, the results are not inconsistent with a lunar periodicity in spawning, but they demonstrate the practical difficulties in securing an unbroken set of observations.

2. Numbers of plaice

Standard 1h tows with a Granton trawl were made some 11km to the north of the centre of the egg distribution between positions 52°16'N, 02°36'E and 52°16'N, 02°45'E: in 31 tows the gear was damaged on 7 occasions, and in only 2 instances was serious mending required. Catches of plaice ranged from ½ to 1½ baskets of plaice. The number of male fish exceeded those of female fish, the male to female ratio being 11.3 to 1 for all fish, and 18.7 to 1 for mature fish only. Of 2908 male plaice caught, 2857 (98%) were mature, and 2852 of these fish were in stage VI. Of the 257 female plaice caught, 153 (60%) were mature. Of these 153 females, 98 (64%) were in gonad maturation stages III to V, 36 (24%) in stage VI, and 19 (12%) in stage VII (spents).

3. Spawning activity

The exceptionally high numbers of stage 1a eggs, and the high male to female ratio (a characteristic of plaice on their spawning grounds) suggests that spawning was fully underway during the period of the cruise. The present results may be compared with those obtained on CIROLANA cruise 1/82 (5-18 Jan, Full Moon 9 Jan). The details are summarised in Table 2, which shows that over the period of the late Full Moon in 1983 the proportion of mature females was greater, and the gonad maturation stages of the mature females were higher. In 1983, 55 females were caught in maturation stages VI to VII; 33 of these fish were caught in 21 tows before 28 January (1.6/tow) and 22 in 10 tows on 28 Jan or later (2.2/tow).

4. Commercial fishing

Very few beam trawlers were fishing in the working area; exceptionally, on the night of 24 January, 12 beamers were fishing with a 9km radius

of 52°08'N, 02°48'E, covering the local area of maximum plaice egg abundance.

5. Other activities

i) Tests of new plankton samplers. Two 50cm X 2.75cm HSPS's with hinged nose cone fittings and hinged half bodies were tested before use on the 1983 mackerel egg surveys. The hinged nose cone and body fittings facilitated the task of washing down the net after use.

One body was fitted with two side fins at the rear and the other had an additional 'tail plane' fin. Both samplers appeared to be stable in the water, fished well, and were easily shot and recovered. No major modifications will be necessary before their use later in the year.

ii) Environmental monitoring. The Guildline environmental monitoring system was operated successfully and continuous records of temperature, depth, salinity and conductivity were obtained for all plankton stations.

Water temperatures within the area of the main grid of stations ranged from 6.9 to 8.2°C, up to two degrees higher than those recorded in January 1982.

The temperature at the stations of the close surveys was within the range 7.8 to 8.0°C. There was no stratification within the water column.

iii) Histological and biochemical studies. One hundred and forty-four samples for sex steroid analysis and ovaries fixed in Gilson's fluid were collected from mature female plaice to study batch fecundity and ovulation rhythm. The remaining parts of these fish were frozen whole to measure the change in body composition during the final stages of ovarian maturation and spawning.

Seventy plasma samples were collected from male plaice to look for any rhythm in spermiation as indicated by levels of 17α 20β dihydroxy progesterone.

Seven mature female plaice were drop frozen in refridgerant cooled to approximately -110°C for cryostat sectioning to study cellular morphology during spawning.

iv) Marine intelligence. No three spined sticklebacks (Gasterosteus aculeatus) were taken in the Granton trawl this year.

v) Material collected for outside bodies. One hundred ml of plasma was collected from cod, whiting, and plaice for Dr Ian Henderson, Sheffield University, for use in Vitamin D Studies.

F R Harden Jones
Naturalist in Charge
1 February 1983

SEEN IN DRAFT:

M J Willcock Master
W J Saxby Fishing Skipper

INITIALLED: DGJ

TABLE 1 Abundance (n/m^2) of Stage 1a and all plaice eggs taken by the 76cm High Speed Plankton Sampler on the nights of 22 to 29 January 1983 inclusive. Full Moon was on 28/29 January. Data based on provisional counts made on board RV CIROLANA.

Date	Stage 1a		All eggs	
January	Mean of all Stations	Centre Station	Mean of all Stations	Centre Station
22	-	23	-	39
23	14	14	29	30
24	20	20	39	40
25	28	33	56	60
26	27	30	59	70
27	31	40	68	84
28	26	24	59	64
29	28	40	63	83

TABLE 2 A comparison between the ratios of male to female plaice, the proportions of immature to mature females, and the gonad maturation stages of mature females in 1982 (5-18 Jan, Full Moon 9 Jan) and in 1983 (21 Jan-1 Feb, Full Moon 28 Jan).

Comparison	1982	1983
all male : all female	5 : 1	11 : 1
mat male : mat female	11 : 1	19 : 1
% all females mature	46	60
mature females		
% III to V	80	64
VI	14	25
VII	6	12