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Observations on the French cod fishery in the Gulf of St. Lawrence  
(ICNAF Div. 4R) during the winter of 1973

by

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1.- Introduction.

In 1973, metropolitan French trawlers began cod fishing in the Newfoundland and Nova Scotia areas at the end of January. The first fishing sector was the Gulf of Saint Lawrence where several boats started fishing around January 20 th. The majority of the French fleet stayed in this sector until about February 19 th. During this period, the side-trawlers had to come and go from the Gulf depending on the movements of the pack, while the stern-trawlers stayed there permanently. From the February 19 th on, most of the trawlers were obliged to leave the Gulf because of difficult ice conditions. Until February 25 th or thereabouts, the French boats fished near St. Paul Island and on the Scatarie and St. Ann banks (ICNAF Subdiv. 4 Vn). After this date, the French fishery moved further south to the Misaine and Artimon banks (ICNAF Subdiv. 4 Vs), then to the Canso bank and around the Banquereau bank Gully (4 Vs and 4 W).

During the period when the French fleet was in the Gulf of St. Lawrence, the R/V Cryos made a cruise in the same sector from January 22nd to February 2nd 1973.

One of the aims of this cruise was to gather information about the cod stock which underwent the French fishing effort. For this purpose, the research vessel undertook a series of trawl-hauls throughout the French fishing zone. This

commercial fishing zone (fig. 1) was limited to the north by the ice condition (MINNET and POULARD, 1973) and to the east by the 12 mile fishing limits. The fishing took place at depths from 90 to 300 m but the best yields were obtained between 120 and 250 m.

On board the R/V Cryos, after each haul of 30 minutes duration (fig. 1), the total catch of cod and other commercial fish was weighed in order to determine the yield. All the cod - or a random sample when the catch was too large - were sexed and measured (total length to the centimetre below). So 6499 cod (3379 male and 3120 female) were sexed and measured for this study; during the measuring, the sexual stage of each of these cod was noted using the definitions given by POWLES (1958). In addition, 803 pairs of otoliths (404 male and 399 female) were sampled at two trawling stations whose positions are shown in fig. 1. In the laboratory, the otoliths were broken across the sulcus without polishing, embedded in modelling clay and kept wet with ethyl alcohol. Readings were made through a binocular microscope (X 16) under reflected light by counting the hyaline rings. Taking into consideration the date of our sampling (late January), the validity of the hyaline zones as year-zones has been established following the otolith calendar proposed by KOHLER (1958) and recommended by JENSEN (1961).

The fishing gear used by the R/V Cryos was a standard bottom trawl whose specifications are given in Table 1. The French trawlers used different types of trawls: bottom trawl for the side-trawlers and bottom or semi-pelagic trawls for the stern-trawlers; the specifications are shown in Table 1. Slight modifications could however be made on board the individual trawlers. We must note, when examining this table, that the body and codend mesh in the different types of trawls is always 144 mm. On the other hand, the trawl used by the R/V Cryos had a codend mesh of 50 mm. The great difference in the size of the codend mesh means that the research vessel caught

more small fish than the commercial trawlers. Thus, we must take into account this bias in the length-frequency curves as well as in the age and sexual stage frequencies.

## 1.- Results.

### 1.- Catches.

In the French fishing zone, the catches of the R/V Cryos consisted mainly of cod. The best yields were obtained off St. George's Bay (3951 kg/half-hour) between 140 and 165 m (bottom temperatures from 1 to 2°C) and off the Port au Port Peninsula (6700 kg/half-hour and 3521 kg/half-hour) at depths of 220 and 240 m (bottom temperatures between 4 and 6°C).

Redfish were also caught during some tows. The largest yield (780 kg/half-hour) was obtained off the Port au Port Peninsula, between 245 and 260 m (bottom temperature of 6°C).

The largest catch of haddock (220 kg/half-hour) was also made at the above-mentioned trawling station. Elsewhere, the yields did not go over 73 kg/half-hour.

Few witch were also taken twice: 75 and 85 kg/half-hour between 335 and 355 m (temperatures from 5 to 6°C).

The catches of American plaice were mediocre (5 to 25 kg/half-hour) and only one yield of 220 kg/half-hour must be noted off the Port au Port Peninsula, between 175 and 190 m (bottom temperature of 2.0°C).

### 2.- Size and age of cod.

The average size distribution of the male and female cod is shown in fig. 2. We note that, for both sexes, the modal length is identical (43 cm Lt). The distributions are also somewhat similar with females nevertheless reaching larger sizes. Small cod (15 - 32 cm) caught by the R/V Cryos probably did not bear any of the French fishing effort.

Before regrouping the measurements taken at each station, the modal sizes of males and females varied between 40 and 52 cm Lt. We do not give this data separately since the size composition of the cod in this zone depends not on the latitudinal position of the sampling but on the depth at which it was made. In fact, in St. George's Bay and off Port au Port Peninsula, the modal size of the cod increases slightly with depth (MINET and POULARD, 1973).

The otoliths readings show the relative importance of the age-classes IV and VI for male as for female cod. In this region, the young age-classes (II and III) sampled by the Cryos are very weak. No cod older than 11 were found (fig.2).

### 3.- Sexual stages and maturity.

The examination of the gonads shows (fig.3) the importance of the immature cod (stage I): 46.0 % for the males and 64.6 % for the females. At this time of year, most of the mature cod are ripening (stage II): 51.9 % for the males and 29.1 % for the females. Some ripe cod (stage III) were observed: 1.5 % for the males and 3.8 % for the females. On the other hand, spawning and spent cod (stages IV and V) are absent. Only a few cod which spawned the previous year are recovering (stage VI): 0.5 % for the males and 2.5 % for the females.

The size distribution in each sexual stage is shown in fig.4. The male and female immatures (stage I) are distributed identically, the modal size of females being however greater (43 cm instead of 40 cm for the males).

This difference is seen again for the modal sizes of ripening individuals (stage II). In addition, the males begin ripening at smaller sizes: 37 cm instead of 40 cm for the females.

The ripe (stage III) and recovering (stage VI) cod have similar distribution for both sexes, although the females are more abundant.

This data reveals the difference in size-at-maturity for males and females. Frequency ratios between the size distribution of the mature fish and that of total cod show (Table 2) that 90% of the males reach the first sexual maturity at about 45 cm Lt., while 50% of the females are only mature at about 50 cm Lt.

References.

- JENSEN (A.C.), 1961.- A standard terminology and notation for otolith age readers.- Int. Comm. Northw. Atlant. Fish., Annual Meeting, 1961, Document No. 39.
- MOHLER (A.C.), 1968.- The validity of otolith age determinations for haddock (Melanogrammus aeglefinus) from the Lockeport, N.S., area.- J. Fish. Res. Bd. Canada, 15 (6) : 1229-1238.
- MIN T (J.P.) and SULLARD (J.C.), 1973.- Winter distribution of cod (Gadus morhua L.) off the southwestern coast of Newfoundland (ICNAF Division 4 R) in relation to water temperature.- Int. Comm. Northw. Atlant. Fish., this meeting.
- POWLES (P.M.), 1956.- Studies of reproduction and feeding of Atlantic cod (Gadus callarias L.) in the southwestern Gulf of St. Lawrence.- J. Fish. Res. Bd. Canada, 15 (6) : 1383-1402.

Table 1. Specifications of the trawl used by the R/V *Cryos* and of the main types of trawls used by the French trawlers.

	R/V CRYOS	FRENCH TRAWLERS			
	bottom trawl	bottom trawls		semi-pelagic trawls	
Headrope	31.20 m	33.00 m	33.00 m	35.00 m	38.50 m
Footrope	17.70 m *	10.80 m *	12.00 m *	42.00 m	45.50 m
Wings mesh	140 mm	144 mm	144 mm	200 mm	200 mm
Body mesh	140 mm	144 mm	144 mm	144 mm	144 mm
Codend mesh	50 mm	144 mm	144 mm	144 mm	144 mm

\* with steel-bobbins

Table 2. Percentages of mature male and female cod by length in the French fishing area.

Length Group cm	MALE MATURE		FEMALE MATURE	
	No.	%	No.	%
28	0	0	0	0
31	0	0	0	0
34	1	1.3	0	0
37	7	2.9	0	0
40	53	11.4	2	0.5
43	152	27.2	26	5.7
46	283	57.6	70	17.3
49	365	80.4	135	35.3
52	336	91.6	218	65.5
55	269	93.7	196	77.5
58	161	98.2	181	81.5
61	99	96.1	111	90.2
64	47	100	70	95.9
67+	51	100	96	100

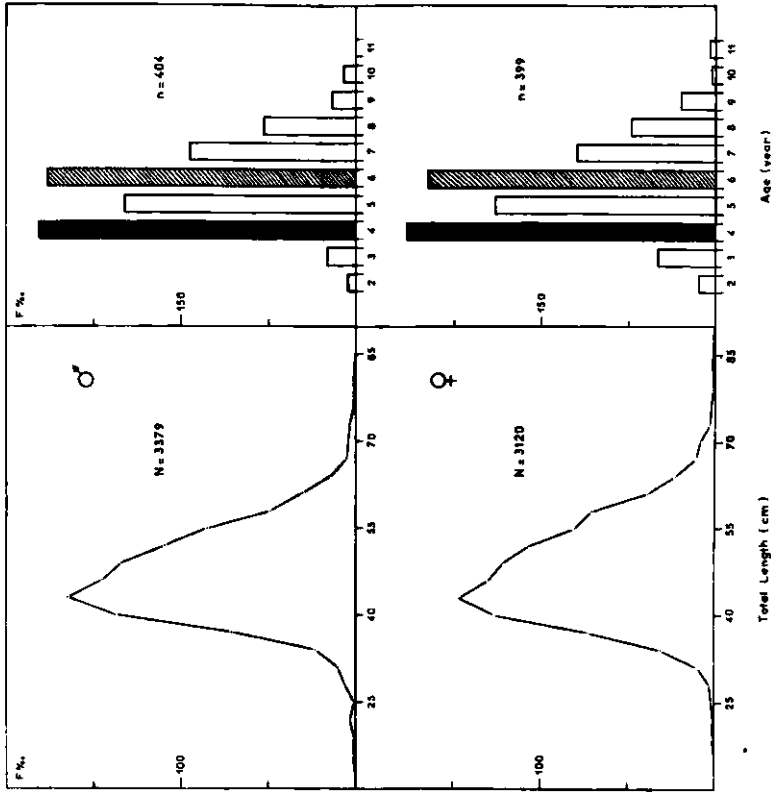


Fig. 2. Length and age frequency of the male and female cod caught in the French fishing area by the R/V *Cryos* in the winter of 1973.

N = number of cod measured,  
n = number of otoliths read.

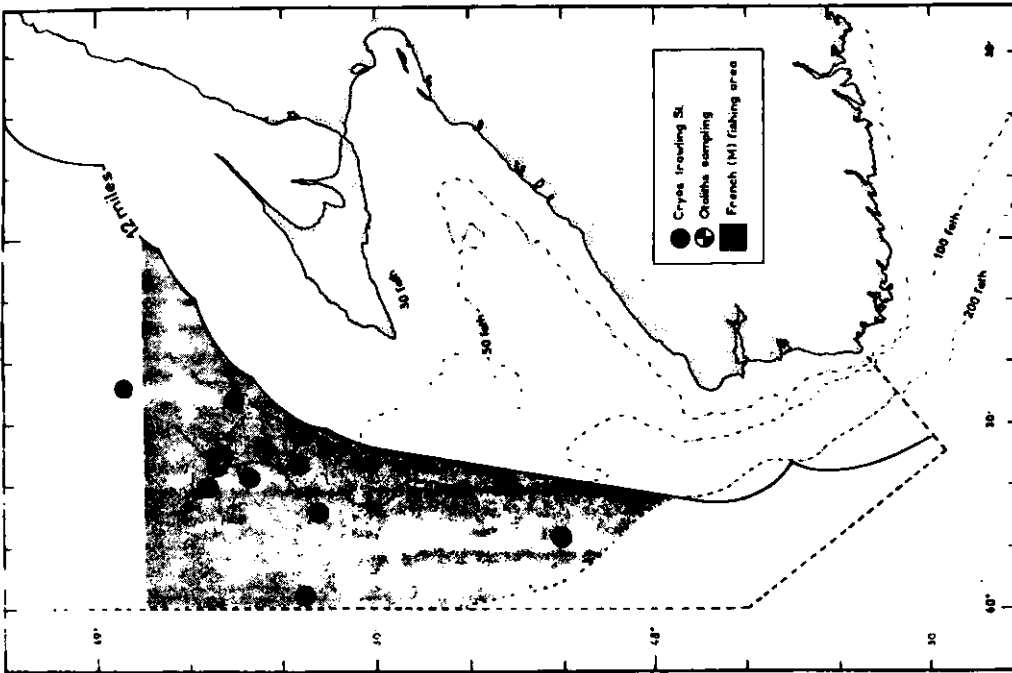


Fig. 1. French fishing area in the Gulf of St. Lawrence during the winter of 1973 and position of trawling and sampling stations occupied by the R/V *Cryos* from 24-31 January 1973.

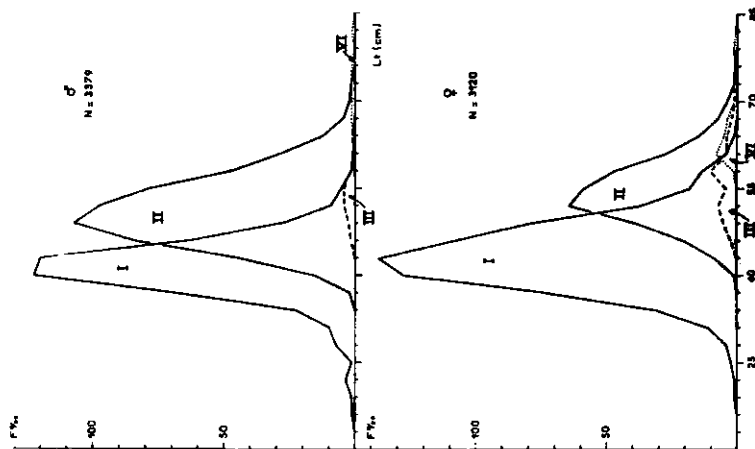


Fig. 4. Length frequency of the male and female cod in relation to the sexual stages.

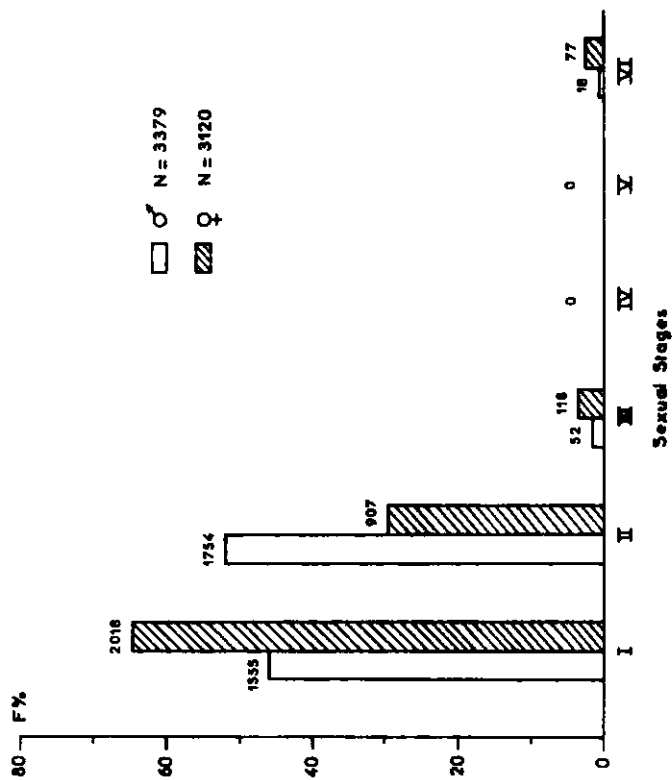


Fig. 3. Sexual stage frequency of the male and female cod caught in the French fishing area.