International Council for the Exploration of the Sea

C.M. 1975/J:15
Pelagic Fish (Southern) Committee

Ichthyoplankton in the fishery area off Cap Blanc 1971 - 1974

by

E. BIESTER and N. JÖNSSON

University of Rostock, Section Biology

WG. Fisherybiology

The present ichthyoplankton investigations form part of a large-scale, long-term investigation of the upwelling phenomena off the north-west African coast by GDR research Vessels during the period 1970 - 1974. The occurence of larvae and eggs received special attention as a contribution towards research into the biology of the commercial fish of this region. Fisheries in the area are restricted to the shelf region with a point of concentration off Cap Blanco. Calculations of the primary production showed that the continental shelf between Cap Blanco and Nouakchott is characterised by the greatest productivity.

The ichthyoplankton material investigated was taken during six voyages of the research vessel "Alexander v. Humboldt" during the period 1970 - 1974. All samples were taken by means of the UNESCO standard net II. The diameter of the opening was 57 cm (0.25 m^2), the mesh size was 200 µm (No. 34) and the net was hauled at a speed of about 0.67 m/sec. Vertical hauls were taken from the depth ranges 25 - 0;75 - 25 and 200 - 75 m. During the continuous stations lasting about 14 days, samples were taken from two depth ranges (25 - 0 and 55 - 25 m) at a fixed position at intervals of six hours.

The samples obtained in this way were fixed on board with buffered 4 % formalin in sea water.

In order to permit comparisons between the values obtained, all values relating to larvae and spawn were converted to a water column of 25 m.

Only quantitative data was obtained for the fish spawn because their

precise classification is associated with major difficulties; only the spawn of the Engraulidae could be determined unambiguously. The fish larvae were determined according to the usual criteria, identification extending only to the family. The taxonomic categorisation used was that of DECKERT (1967). Only the commercially important families Clupeidae, Engraulidae, Carangidae, Scombridae and Sparidae together with the order Pleuronectiformes will be considered in this paper.

Values from eight different months (table 1) during the period 1970 - 1974 were available for determining the seasonal course of ichthyoplankton occurrence along the standard zonal section C off Cap Blanco ($20^{\circ}55'N$, $17^{\circ}22'W$ - $20^{\circ}55'N$, $19^{\circ}49'W$).

Investigation of the number of larvae and eggs per haul throughout the year revealed distinct maxima in May and October, high spawn values also being found for January (figure 1).

The spring maximum in May is caused by the increased numbers of larvae of Clupeidae, Engraulidae, Pleuronectiformes and Sparidae. All commercially exploited families except the Clupeidae were represented in the October maximum.

The ichthyoplankton material from six continuous stations ($20^{\circ}55'N$, $17^{\circ}27{,}5'W$) was evaluated during the period 1970 - 1974 (table 2).

Particularly high numbers of larvae were observed in March, 1974 and July, 1972 (figure 2). The maximum in March was caused primarily by Clupeidae, whereas the Engraulidae dominated in July. DIETRICH (1975) ascribes the high egg values in July 1972 to intensive spawning activities on the part of the Engraulidae. Large amounts of eggs from this family were also caught in March and June.

The material obtained at the continuous station provided the opportunity of also investigating the diurnal rhythm of the ichthyoplankton occurrence because this effect was not subject to overlapping due to the position of the station. In table 3, all values for larvae and eggs for the different times of the haul have been collated and compared. This reveals a maximum for the larvae during the night and dusk periods (a dusk value lower than the noon value was observed only in June, 1971). No pronounced rhythm could be observed in the distribution of the eggs.

The main fishing ground off Cap Blanco is characterized by upwelling processes throughout the year. The hydrographic conditions are relatively more stable and uniform than in the sea areas to the north and south, this permitting, if a certain degree of care is taken, the collation and comparison of values obtained in different years. In the off-shore region, large quantities of micronutrients lead to intensive plant production in the upper water layers and this provides favourable opportunities for the growth of larvae and young fish. Concentrations of larvae could always be found in areas containing a high plant biomass. The largest numbers of larvae per haul were observed in the off-shore region after the upwelling of cool, oxygen-deficient and nutrient-rich deep water had ceased and a stable density stratification had taken place so that phytoplankton as a nutrient basis for larvae and fish could rapidly develope (VOLLERT/HAUNSCHILD, 1973; DIETRICH, 1975). Due to the maximal primary production in the upper water layers, the majority of larvae were caught at depths of 0 - 25 m in the off-shore region. The numbers of larvae and spawn decreased distinctly with increasing distance from the coast. This correlation between decreasing upwelling intensity (ageing of the water body) and increasing ichthyoplankton occurrence could be confirmed by the results obtained at the continuous stations (MENZEL/WEBER, 1972; DIETRICH, 1975; BRANDT, 1975).

When considering the occurrence of ichthyoplankton in the region off Cap Blanco it is conspicuous that the number of spawn and larvae as a whole is very low (see also WIKTOR, 1969). The minimum lies in winter and early spring; an increase can be observed from early summer to late autumn and maxima occur in May and October.

We were unable to observe the main spawning period of the Clupeidae which is stated by CHUNG (1973). In agreement with WIKTOR (1971), our results indicate that the main spawning period for the Engraulidae off Cap Blanco lies in the months June to August. The spawning periods of the Carangidae extend over the whole year with a maximum from the end of May to the middle of July (AGAMY, 1974). Larvae of the Carangidae were also found in our samples throughout the whole year, although only in small numbers, with a slight increase in September/October. Larvae of the Scombridae family, which spawns in this area from December to February according to DOMANEVSKY (1966), were only caught as isolated examples during January, February and October.

Literatur

AGAMY, A. (1974): Fruchtbarkeitsbestimmung bei Decapterus rhonchus Geoffr. und die Dynamik dieser Bestände in Gewässern vor Nordwest-Afrika. Dissertation, Univ. Rostock, unpubl.

BRANDT, R. (1975): Untersuchungen am Ichthyoplankton vor NW-Afrika 1973/74 unter besonderer Berücksichtigung kommerziell wichtiger Familien. Diplomarbeit, Univ. Rostock, unpubl.

CHUNG, B.D. (1973): Untersuchungen zur Biometrie, Biologie und Bestandsdynamik von Sardinella aurita Val. (Clupeidae, Teleostei) in Gewässern vor Nordwest-Afrika. Dissertation, Univ. Rostock, unpubl.

DECKERT, K. (1967): Urania Tierreich Fische. Urania Verlag, Jena-Berlin

DIETRICH, B. (1975): Untersuchungen am Ichthyoplankton vor NW-Afrika 1972/73 unter besonderer Berücksichtigung kommerziell wichtiger Familien. Diplomarbeit, Univ. Rostock, unpubl.

DOMANEVSKY, L. (1969): Biology and Distribution of the Main Commercial Fishes and Peculiarities of their Fishing by Trawl on the Shelf from Cape Spartel to Cape Verde. ICES Paper Nr. 62, Section: Fishes

MENZEL, Ch. und Th. WEBER (1972): Ichthyoplanktonuntersuchungen an Materialien ausgewählter Gebiete Nordwestafrikas unter besonderer Berücksichtigung der kommerziell genutzten Arten. Diplomarbeit, Univ. Rostock, unpubl.

VOLLERT, B. und G. HAUNSCHILD (1973): Untersuchungen am Ichthyoplankton vor NW-Afrika 1970/71 unter besonderer Berücksichtigung kommerziell wichtiger Familien. Diplomarbeit, Univ. Rostock, unpubl.

WIKTOR, K. (1969): Distribution of Fish Eggs and Larvae in the Shelf Waters off North-West Afrika in the Period June to August. ICES C.M. 1969 J:3

WIKTOR, K. (1971): Biomass of Zooplankton and Distribution of Fish Larvae in the Shelf Waters off North-West Afrika in February. ICES C.M. 1971 L 5

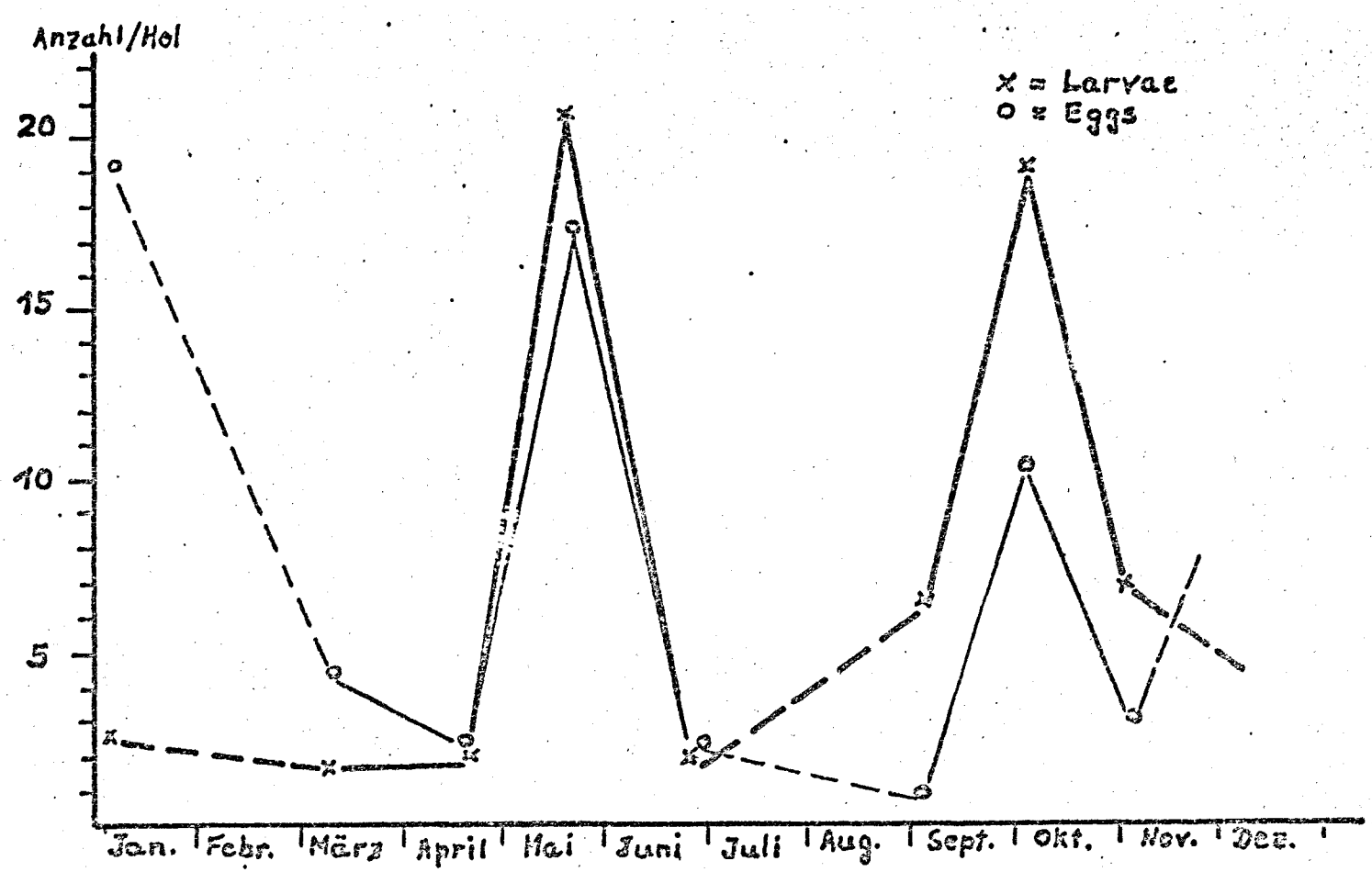

Fig. 1: Number of larvae and eggs per haul throughout the year along the section Cape Blanco (1970–74). No values were available for the periods represented by dotted lines.

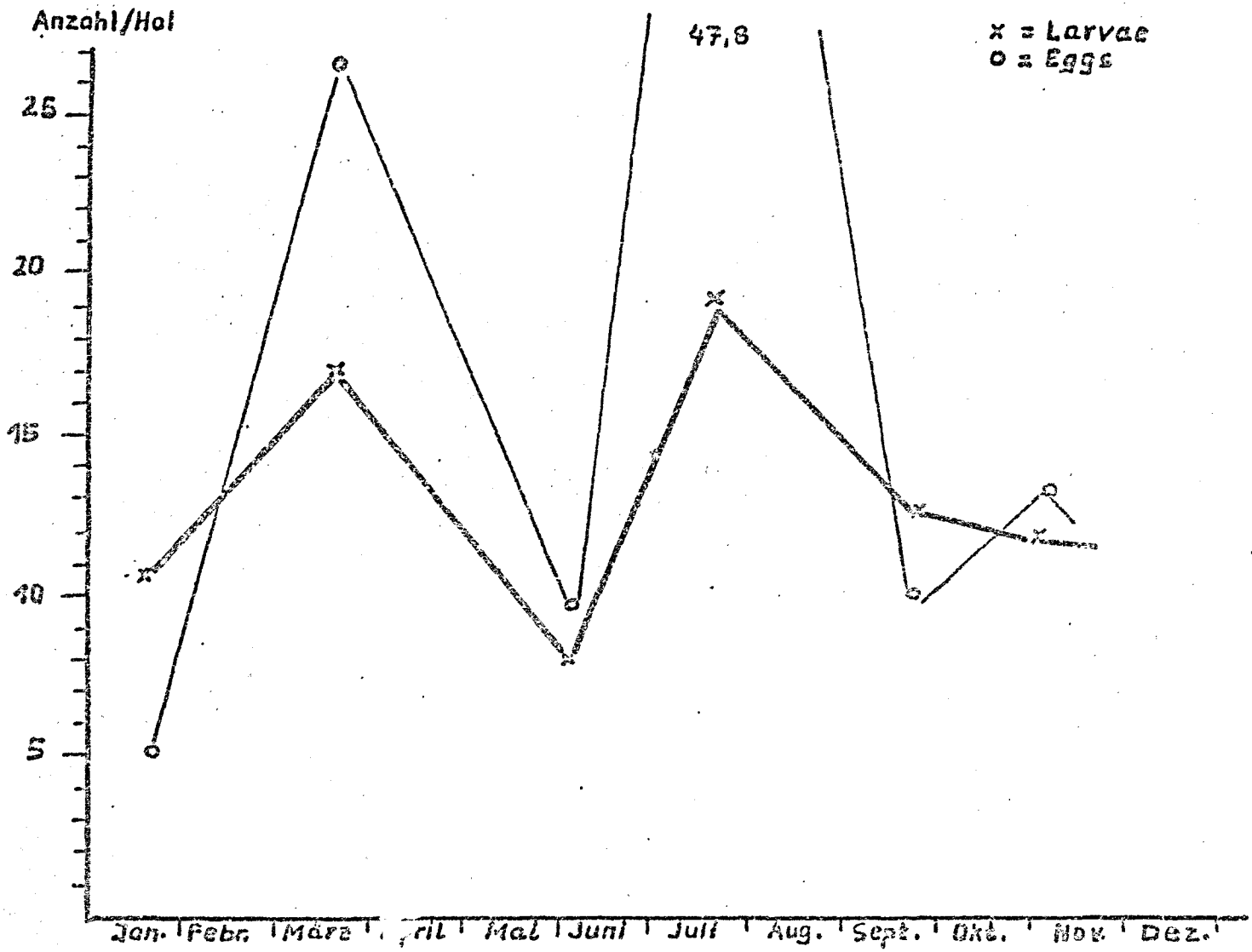

Fig. 2: Number of larvae and eggs per haul throughout the year at the continuous stations (1970-74).

Date	3.-4.1.73		8.-9.3.73		18.-19.4.71		19.-20.5.74		25.-26.6.72		2.-4.9.70		3.-4.10.71		2.-3.11.70	
Number/Hauls	26		26		20		19		15		18		25		23	
	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
Larvae	60,8	2,3	44,4	1,7	35,5	1,8	399,7	21,0	21,8	1,4	114,8	6,4	478,3	19,1	155,9	6,8
Eggs	496,5	19,1	112,7	4,3	45,4	2,3	335,6	17,6	32,9	2,2	12,5	0,7	263,8	10,6	67,7	2,9
Clupeidae	7,0	0,3	4,0	0,2			189,4	10,0	14,3	0,9	21,0	1,2	25,0	1,0	2,0	0,1
Engraulidae					2,5	0,1	82,3	4,3	0,8	0,1			183,1	7,3	2,0	0,1
Carangidae	2,0	0,1	6,0	0,2	0,8	0,1	4,0	0,2			7,8	0,4	32,7	1,3	3,0	0,1
Scombridae	3,0	0,1					2,0	0,1					6,0	0,2		
Sparidae							13,0	0,7	1,8	0,1			14,0	0,6		
Pleuronectif.					1,6	0,1	32,7	1,7	0,7	0,1	7,0	0,4	49,9	2,0	2,8	0,1

Tab.1 Distribution of larvae and eggs 1970 - 74 along Section Cap Blanco

a= Number of larvae and eggs

b= Values of a, converted pro haul

Date	15.-29.1.73		19.-31.3.73		31.5.-9.6.71		17.-26.7.72		18.-26.9.70		30.10.-8.11.71	
Number/Hauls	112		94		46		73		88		72	
	a	b	a	b	a	b	a	b	a	b	a	b
Larvae	1174,1	10,5	1597,9	17,0	362,0	7,9	1406,9	19,3	1107,6	12,6	853,4	11,9
Eggs	500,3	4,8	2517,0	26,8	424,1	9,2	3492,9	47,8	846,6	9,6	974,4	13,5
Clupeidae	198,8	1,8	632,7	6,7	27,9	0,6	4,8	0,1	10,0	0,1		
Engraulidae	50,5	0,5	59,3	0,6	85,0	1,8	673,2	9,2	55,6	0,6	46,0	0,6
Carangidae	52,9	0,5	70,2	0,8	1,7	>0,1			21,8	0,2	6,0	0,1
Scombridae			4,8	0,1								
Sparidae	24,5	0,2	61,1	0,7			138,9	1,9				
Pleuronectif.	439,3	3,9	188,6	2,0	127,1	2,8	159,5	2,2	253,0	2,9	106,8	1,5

Tab.2 Distribution of larvae and eggs on the continuous stations 1970-73

Date		15.-29.1.73		19.-31.3.73		31.5.-9.6.71		17.-26.7.72		18.-26.9.70		30.10.-8.11.71	
Number/Hauls		112		94		46		73		88		72	
Time		a	b	a	b	a	b	a	b	a	b	a	b
00.00/	Larvae	336,7	12,0	473,3	19,7	107,0	6,0	366,1	21,5	163,0	8,0	122,0	13,0
01.00	Eggs	132,9	4,7	641,0	26,7	106,0	6,0	1265,7	74,5	75,0	4,0	191,0	21,0
07.00	Larvae	254,5	9,1	362,4	15,1	7,0	2,0	402,3	21,2	112,0	5,0	122,0	13,0
	Eggs	156,4	5,6	657,7	27,4	23,0	6,0	1053,4	55,4	69,0	3,0	125,0	14,0
12.00/	Larvae	236,3	8,4	326,5	13,6	72,0	3,0	304,6	16,0	62,0	3,0	84,0	10,0
13.00	Eggs	110,4	3,9	810,0	33,8	84,0	4,0	652,2	34,3	112,0	5,0	167,0	21,0
18.00/	Larvae	346,6	12,4	465,9	19,4	34,0	8,0	334,3	18,6	131,0	6,0	156,0	17,0
19.00	Eggs	100,6	3,6	463,1	19,3	23,0	6,0	521,6	29,0	99,0	5,0	109,0	12,0

Tab. 3 Diurnal Distribution of larvae and eggs on the continuous stations 1970-73