

FISH EGG MORTALITY AND ABNORMAL EMBRYOGENESIS

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Des études dans le Golfe Saronique, Mer Egée, menées dans le cadre du programme des Systèmes du Saronique (SSP) ont permis de relever: Dans le cas des oeufs de la Sardine, une mortalité plus élevée et la parution de malformations embryonnaires juste avant le début de la saison froide. Dans le cas des oeufs de l'anchois, une mortalité plus élevée et des malformations embryonnaires avant la saison chaude. Par contre, dans le cas de la Sardinelle (*Sardinella aurita*), tous les oeufs observés paraissaient normaux et vivants.

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Field studies on mortality and abnormal embryogenesis of the species *Sardina pilchardus* Walb., *Sardinella aurita* Val., and *Engraulis encrasicolus* L., have been carried out in the Saronikos Gulf, Aegean Sea, as a part of the Saronikos Systems Project (SSP).

Sardina pilchardus eggs were found to have higher mortalities and malformed embryos just prior the onset of the cold season. *Engraulis encrasicolus* eggs had higher mortalities and malformed embryos prior to the warm season. *Sardina pilchardus* and *Engraulis encrasicolus* occasionally showed high embryonic mortalities of 50 to 65 % of the fertilized eggs, per cruise. No mortality or malformed embryos have ever been observed for *Sardinella aurita*. No adequate explanation for this phenomenon has been given.

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The present paper should be considered as a preliminary report on the observed egg mortalities and embryonic malformations of the fish species *S. pilchardus*, *S. aurita* and *E. encrasicolus*. All eggs have been obtained from net samples.

Fish egg mortalities, up to 40 or 60 per cent are quite common, therefore they are considered to be "natural" (Table I). Even if there are several data in existence on fish egg mortalities there appear to be a complete lack of information on fish embryonic

AUTHOR	AREA	% DEAD EGGS	
		S. pilchardus	E. encrasicolus
Arbault & Lacroix 1971	Golfe de Gascogne	1.5 - 15.0	
Arbault & Lacroix 1977	Golfe de Gascogne	7.2 - 25.0	12.0 - 64.0
Aldebert & Tournier 1971	Golfe du Lion	33.0 - 49.0 93% Marseille 12% Sete	
Ciechowski de	Argentina		87.0 - 93.0
Demir 1974	Turkish waters		58.0 - 77.0
Gamulin & Hure 1955	Adriatic Sea	3.0 - 50.0	
Hure 1961	Adriatic Sea	24.0 - 40.0	
Lee 1961	Golfe du Lion	46.0 - 52.0	
Lee 1966	Golfe du Lion	35.5	
Lee et al., 1967	Golfe du Lion	10.0 - 46.0 mean 29 %	
Southward & Demir 1973	English channel	38.0 - 92.0 mean 50 %	
Yannopoulos & Yannopoulos (present paper)	Aegean Sea	8.4 - 52.0	10.7 - 66.2

TABLE I. Egg mortalities of *Sardina pilchardus* and *Engraulis encrasicolus* from Mediterranean Sea and Atlantic ocean.

malformations occurring within their natural environment. On the other hand there exist good data on the abnormal embryonic development under laboratory conditions. Longwell (1977) reported fish embryonic malformations from their natural environment but the area was heavily polluted by an oil spill.

cruise		fish eggs N	Sardina pilchardus eggs				stations with		
No	month		total N	dead N	%	malformed N	%	eggs sard.eggs	
1	December 72	608	535	232	43.3	62	11.6	17	16
2	January 73	1784	734	380	52.0	11	1.5	24	20
3	March 73	1016	115	13	11.3	1	1.0	28	21
4	May 73	3015	27	9	33.3	-	-	25	3
5	June 73	-	-	-	-	-	-	23	-
6	August 73	-	-	-	-	-	-	34	-
7	October 73	-	-	-	-	-	-	31	-
8	December 73	804	497	137	27.6	27	5.4	31	16
9	February 74	1844	1640	137	8.4	17	1.0	36	31
10	April 74	1236	349	132	37.8	1	0.3	31	24
11	June 74	-	-	-	-	-	-	36	-
12	November 74	324	207	50	24.2	-	-	28	19
13	December 74	392	280	48	17.2	-	-	35	31

TABLE II. Percentages of dead and malformed embryos of *Sardina pilchardus* during the different sampling periods.

Table II gives the total number of the fish eggs obtained during the sampling periods, the total number and the numbers as well as the percentages of the Sardine eggs found dead and with malformed embryos.

Tables III and IV show the corresponding data for *S. aurita* and *E. encrasicholus*; neither dead eggs nor malformed embryos have been recorded for *S. aurita*. It has been impossible to figure out what are the physiological adaptations of this species.

cruise		fish eggs N	<i>Sardinella aurita</i> eggs				stations with		
No	month		total N	dead N	%	malformed N	%	eggs sard.eggs	
1	December 72	-	-	-	-	-	-	17	-
2	January 73	-	-	-	-	-	-	24	-
3	March 73	-	-	-	-	-	-	28	-
4	May 73	3015	175	-	-	-	-	25	7
5	June 73	2338	176	-	-	-	-	23	15
6	August 73	863	12	-	-	-	-	34	14
7	October 73	-	-	-	-	-	-	31	-
8	December 73	-	-	-	-	-	-	31	-
9	February 74	-	-	-	-	-	-	36	-
10	April 74	1236	40	-	-	-	-	31	4
11	June 74	4401	207	-	-	-	-	36	9
12	November 74	-	-	-	-	-	-	28	-
13	December 74	-	-	-	-	-	-	35	-

TABLE III. Percentages of dead and malformed embryos of *Sardinella aurita* during the different sampling periods.

cruise		fish eggs N	Engraulis encrasicolus eggs					stations with	
No	month		total N	dead N	%	malformed N	%	eggs	anch.eggs
1	December 72	-	-	-	-	-	-	17	-
2	January 73	-	-	-	-	-	-	24	-
3	March 73	-	-	-	-	-	-	28	-
4	May 73	3015	2115	461	21.8	4	0.2	25	23
5	June 73	2338	1315	647	49.2	121	9.2	23	21
6	August 73	863	551	247	44.8	29	5.3	34	24
7	October 73	480	346	37	10.7	13	3.8	31	24
8	December 73	-	-	-	-	-	-	31	-
9	February 74	-	-	-	-	-	-	36	-
10	April 74	1236	695	174	25.0	46	6.6	31	21
11	June 74	4401	2659	1761	66.2	34	1.3	36	31
12	November 74	324	25	4	16.0	1	4.0	28	19
13	December 74	392	2	-	-	-	-	35	1

TABLE IV. Percentages of dead and malformed embryos of *Engraulis encrasicolus* during the different sampling periods.

From tables II and IV it may be noticed that the higher percentages of the malformed embryos of *Sardina pilchardus* have been calculated during December 1972 and 1973 that is prior the onset of the cold season. For *Engraulis encrasicolus* the higher percentages of the malformed embryos have been obtained during June 1973 and April 1974, that is, prior the beginning of the warm season.

Literature cited.

Longwell A., 1977. A genetic look at fish eggs and oil. *Oceanus*, 20, 4, 46-58.