THE DISTRIBUTION, ABUNDANCE AND SOME ECOLOGICAL ASPECTS OF THE ICHTHYOPLANKTON IN THE S.E. MEDITERRANEAN WATERS.

By

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CONTENTS

ABSTRACT

Regional variations were observed in the abundance and distribution of the total catch of the fish eggs and larvae in the S.E. Mediterranean coast during February and August (1971) Some association could be observed between six identified species of fish eggs and certain regions of distribution. The ichthyoplankton appeared in 10 - 70 % of the samples and indicated a range of abundance from 0.02 to 11.3 2 Egg/m3. The superficial 0 — 5 cm layer of water air interface was characterised by greater abundance of pelagic fish eggs than the deeper layers.

INTRODUCTION

The study of the distribution of fish eggs and larvae is important for the management of the fishery grounds. The first attempt to collect them from the Egyptian Mediterranean coastal waters was made during 1933 and 1931 (Whitehouse, 1933). A large stramine young fish net and an ordinary bolting silk net used for this purpose. The eggs and larvae were found in significant abundance in two stations at 3 to 5 mils north to Agami point (few miles north west to Alexandria coast). They belonged to the species *Umbrina cirrosa* (L.,) *Serranus caprilla* (L.); *Serranus hepatus* (L.); *Sardinella aurita* (C. & V.) ; *Sardinella granigera* (C. & V.) ; *Engraulis enerasicholus* (L.); *Brama raji* (Bl.) and *Plouronectidae.*

The before mentioned work concerned mainly the identfication of the species whil the edetermination of their abundance was lacking. The following work may add some knowledge about the species composition, ecology and regional distribution of the fish eggs and larvae in the south east Mediterranean waters.

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MATERIAL & METHODS

This recent attempt to determine the distribution and abundance of the fish eggs and larvae in the S.E. Mediterranean waters was made by the Russian research vessel ,,Ichthyolog'' during its cruise in 1970—1971.

Ichthyoplankton collections were taken from 42 stations distributed along 6 sections perpendicularly constructed upon the shoreline at ES-Sallum, Mersa Matrouh, Arabs Gulf, Abu-Kir Bay, El-Brullus and Damietta regions. Vertical zooplankton hauls of the depths 25, 50, 100, 125 m. were taken (Fig. 1). In addition, the samples from horizontal ichthyoplankton hauls in the 0—5 cm surface microlayer of water-air interface were collected.

Two Russian types of nets were used. The first net, of the type U.K.C. 80 which was designed for the vertical hauls, had the mouth ring diameter of approximaterly 80 cm. The net attained a cone like form of Nylon gause No. 1 having about 48 meshes per inch and an aperture size of about 0.41 mm. The length of the cone was about 300 cm. The second net of the Russian type P.H.C. was designed to filter the upper 0-5 cm. layer of the surface water. This net helped to catch the pelagic fish eggs and lavrvae especially those floating in the water-air interface or slowly swimming in it . Its mouth was desigend to take a rectangular form by means of 60 x 20 cm. brass frame. The total length of the net was about 500 cm. Its cone was made of nylon gause No. 3, having about 58 meshes per inch. The aperture size was about 0.33 mm. The code end was attached to solid polyethylene container which attained a cylindrical form. Its end could be closed by a piece of nylon gause of very fine mesh size. The mouth was kept floating by means of 2 cork floats on both sides of it. Their places were fixed to hold tthe net mouth in a vertical position with a submerged heigth of 5 cm. under the water-air interface.

A nylon cord of about 50 m length was attached to its mouth. The net should be left freely floating away from the anchored ship untill the 50 m cord was completely paid out The oprator ougth to collect the ropes directly after its complete stretching and with his moderate power and speed of his hands. As a result, the filtered water column length was approximately 50 m. The influence of the sea water current during the time of hauling was taken into consideration.

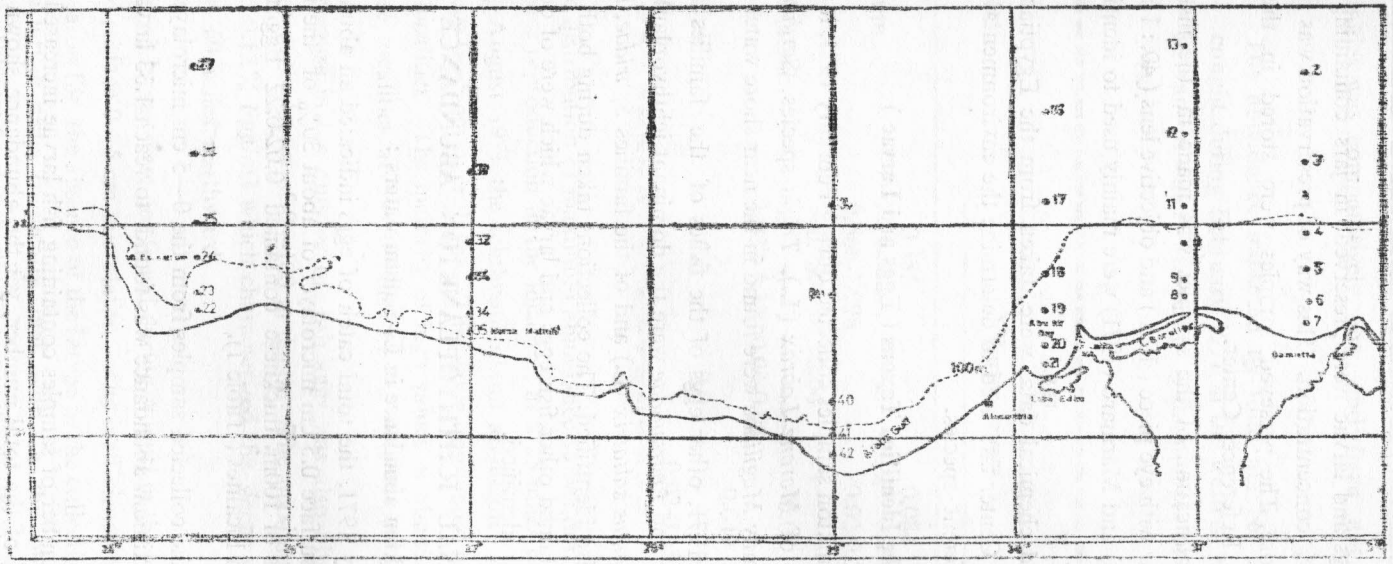

Fig. 1. The plankton sampling and hydrographic stations taken in the S. E. Mediterrancan Waters during «ICHTHYOLOG» Cruise 1970—1971.

The collected eggs and larvae were preserved in jars containing formaline solution of about 2 % concentration. This way of preservation was found convenient for our purpose. The preseved samples were stored in the Egyptian Biological Colletion Reference Center.

Sorting and identification of the samples was made in the institute using « Reichert » binocular with eye piece (10 x) and objective lens (40.: 1). The work of Whitehouse (1933) and Marinaro (1971) were mainly used to identify the eggs and larvae of fishes.

The physical and chemical data were taken from the Egyptian National Oceanographic Data Center and used to determine the environmental conditions surrounding the different species.

The Identified Taxons (Eggs and Larvae)

In the ichthyoplankton samples collected during February 1971, it was possible to identity the eggs of *Morone Labrax* (L.), *Trigla* species, *Sardinella aurita.* The larvae of the family *Mugilidae* were found in the near shore water collectins.

During August 1971, other eggs of the fishes of the families *Serranidae, Mullidae, Carangidae* and *Engraulidae* were the dominant ichthyoplankton forms. The larvae of *Pomatomus saltatrix* (L.) and of the families *Sparidae, Engraulidae* and *Mullidae* were also identtified. The collections taken during both winter and summer seasons contained other fish eggs and larvae which were of doubted species or not easy to be identified.

REGIONAL ICHTHYOPLANKTON ABUNDANCE

The total ichthyoplankton abundance in Es-Sallum waters :

During February 1971, the total catch of eggs indicated an abundance 0.66-1.99 Egg/m3 in the surface 0.5 cm microlayer of about 30% of the investigated localities. The waters of 100m. thicknese contained 0.02-0.22 Egg/m3 in about 20 % of the norhtern localites (Table 1).

About 15% of the collected samples from the 0—5 cm microlayer contained fish larvae. The maximum abundance was found to reach 1.33 larva/m3 in this layer.

Although the number of samples containing fish larvae increased with depth reaching about 50% of the total number, yet the abundance shown by each of

these samples was comparatively low, and have not exceeded 0.02 larva/m3 (Table 1).

Table 1. The abundance indicated by total number of fish eggs and larvae cought during February 1971 in the western regions of the S.E. Mediterranean waters . (Average is the numerator, range is the denominator).

Region	Eggs		Larvae		
	Water layers		Water layers		
ES-Sallum	0.385 / 0.666-1.998	— / —	0.084 / 0.02-0.22	0.190 / 0.0-1.332	0.008 / 0.0-0.02
Mersa Matruh	0.780 / 1.332-3.330	0.06 / 0.04-0.08	0.0	0.0	0.008 / 0.0-0.04
Arabs Gulf	0.0	0.0	0.049 / 0.02-0.139	0.0	0.025 / 0.0-0.099

The distribution of maximum abundance values during Febrary 1971 suggested intense reproduction in the localities at 2-25 miles north from the shoreline. During August 1971 the ichthyoplankton abundance reached 7.99 Egg/m³ in the surface 0—5 cm microlayer. This value dominated about 17 % of the investigated localities. The majority of high values of abundance were found in the nearshore localities at 5—10 miles northwards (Fig. 2).

A decrease in the number of fish aggs was also observed during August in the lower water layers of 0—100 m depth. The maximum abundance have not exceeded 0.12% Egg/m3 which characterized the deep waters of the localities at about 60 miles northward.

The fish larvae were not found during August in the ichthyoplankton samples from the surface 0—5 cm microlayer. The inefficiency of the towing speed may be the reason for the absence of the larvae in the collections from this microlayer. The fish larvae were frequently met with in the offshore water layers of 0—50 m thickness. Their abundance ranged from : 0.03to 0.35 larva /m³

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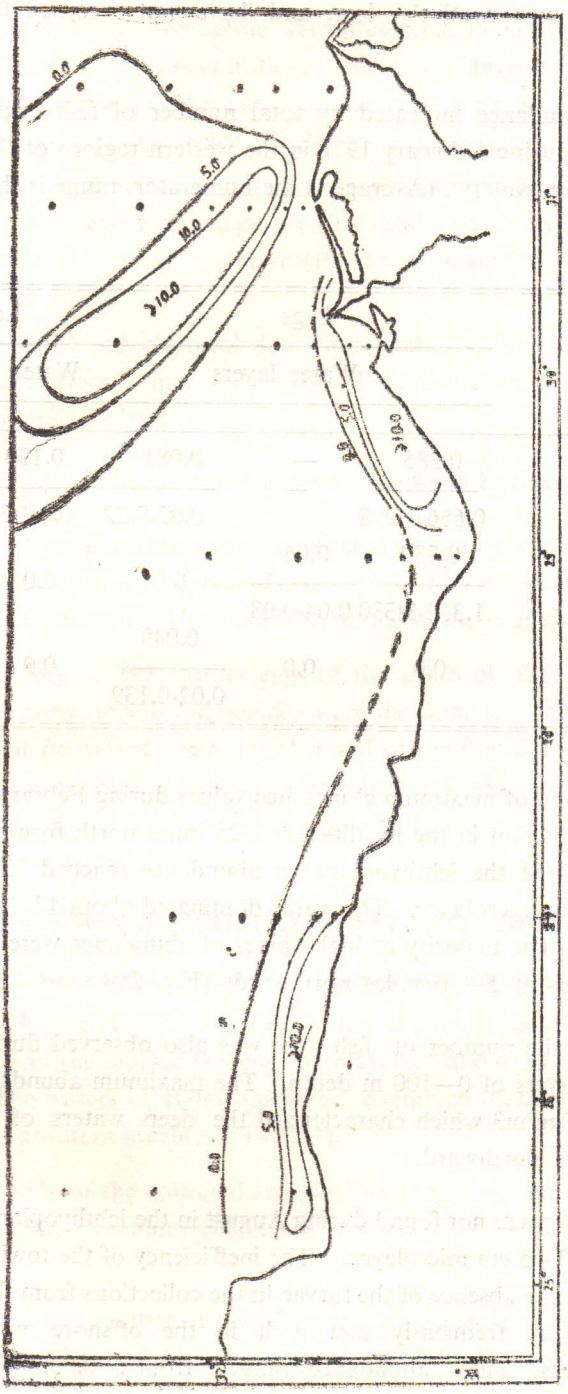

Fig. 2. The distribution of maximum abundance of fish eggs (total number/m3) in the surface 0—5 cm microlayer of water- air interface during August 1971.

(Fig. 4) But these values decreased to 0.02—0.05 larva/m3 as shown by the samples from the vertical hauls of 0—100 m depth. Inspite of this low values, yet the deep water samples which contained larvae were 70% of the total number.

The total ichthyoplankton abundance north to Mersa-Matruh :

During the winter season the fish eggs in the surface 0—5 cm. microlayer fluctuated between 1.33 and 3.33 Egg/m3 in about 30 % of the investigated localities while in the deep 50 m water layer, the eggs were found in about 50% of them. The abundance of the eggs in lower 50 m water layers decreased to 0.04—0.08 Egg/m3.

The larvae were found in about 10 % of the ichthyoplankton collections from the deep 50 m water layer. Their abundance have not exceeded 0.04 larva/m3. Some difference in this abundance was shown by the samples from 0—100 m water hauls. The maximum values reached 0.03 larva/m3 in the loellities at about 50 miles northward from the shoreline.

During August of the same year, about 15% of the collected samples from the surface 0—5 cm. microlayer indicated the distribution of 0.67 Egg/m3 (Fig. 2). The egg abundance was 0.20—0.24 Egg/m3 in the lower water layers of 0—100 m thickness at about 10 miles north from the shoreline. It decreased to 0.03—0.06 Egg /m3 in the localities beyond 60 miles northward. The maximum abundance of the larvae was about 0.07 larva/m3 in the upper layers of 50 m thickness (Fig. 4).

The Arabs-Gulf ichthyoplankton :

In February 1971, the water layers of 0—100 m depth contained 0.04—0.14 Egg/m3 The eggs were met with in about 40% of the investigated localities. The larvae in this layer ranged from 0.02 to 0.20 larva/m3 in about 60 % of the localities. The majority were distributed at a distance about 15—30 miles northward.

During August, the ichthyoplankton from the surface 0—5 cm. microlayer contained no eggs. The lower water layers of 0—100 m depth contained 0.04—0.48 Egg/m3 in about 30 % of the northern localities. The maxmum abundance was observed at a distance about 20 miles northward.

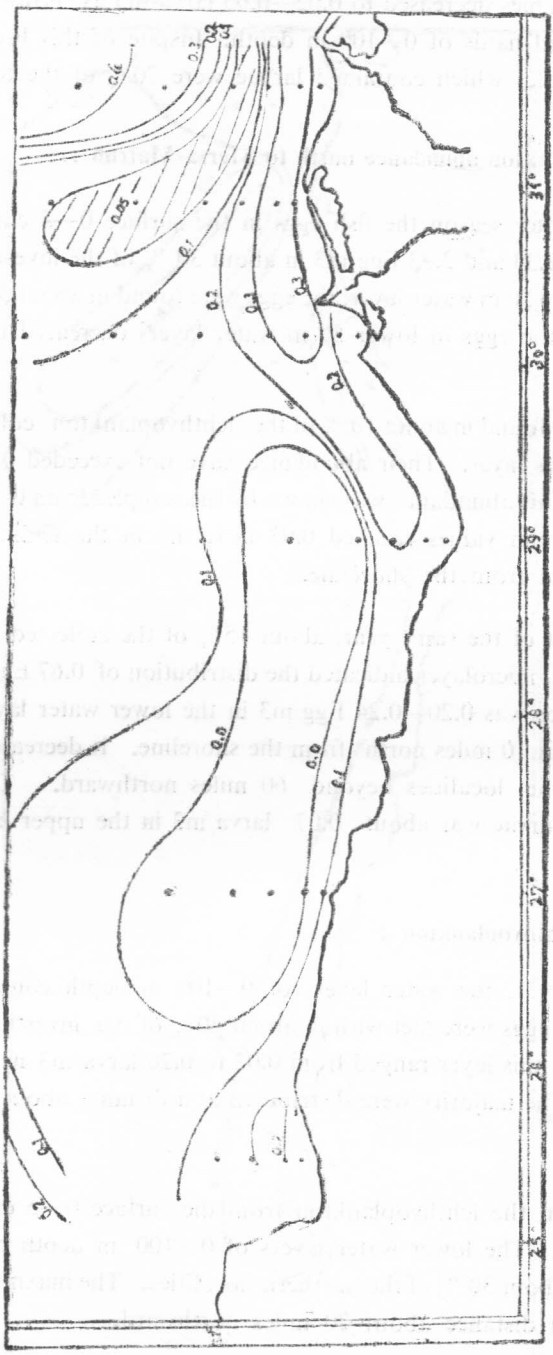

Fig. 3. The distribution of maximum abundance of fish eggs (total number/m3) shown by the vertical 50—0 m hauls taken during August 1971.

The larvae were found in the surface 0—5 cm. microlayer and ranged from 0.67 to 1.33 larva/m3. The lower layers of 0—100 m depth contained 0.04—0.24 larva/m3 in about 35% of the localities. The maximum abundance of the larvae was noticed at a distance 10—20 miles northward. Generally, about 40% of the ichthyoplankton collections from these regions contained different fish eggs and larvae. The increase in the shallow water area with its bottom dwelling fishes which have pelagic eggs and larvae may be the reason for the significant abundance of ichthyoplankton in the shallow Arabs Gulf regions.

The total ichthyoplankton abundance in Abu-Qir Bay :

The eggs of the winter reproducing fishes were found in about 25% of the northern localities. They have not exceeded 1.34 Egg/m3 in the 0—5 cm microlayer . The maximum abundance in Abu-Kir Bay regions was estimated during the summer cruise 1971. It reached 4.66 -11.32 Egg/m3 in the surface microlayer of water-air interface (Fig. 2). These values covered about 44% of the northern localities. The majority of the maximum values of abundance were distributed in the nearshore regions. On the other hand the deep water layers of 0—100 m depth contained 0.08—0.28 Egg/m3 in about 85% of the open sea investigated localities. The larvae were met with in the upper 0—5 cm microlayers of the waters in 20% of the total number of investigated localities and reached about 0.67 larva/m3 . In the lower 0—100 m depth layers, their abundance decreased to about 0.16 larva/m3 in 58 % of the localities and reached 0.20 —0.03 larva/m3 in the other 42% of them .

The eggs and larvae in El-Brullus rgions :

The majority of the different ichthyoplankton forms were distributed at a distance about 20—50 miles north to the shoreline (Fig.2—3). During August, the surface0—5 cm microlayer contained 1.34—4.00 Egg/m3 in about 45% of the investigated area. The lower layers of 0—100 m depth in about 40 % of the area, contained 0.04—0.23 Egg/m3.

The larvae were absent in all the collections from the microlayer of water-air interface in these regions. But their abundance was about 0.02 larva/m3 in 15% of the collections from the deep 0—100 m water layers.

The total ichthyoplankton abundence north to Damietta shores :

During the summer cruise, the abundance 1.32—0.66 Egg/m3 were found in the surface 0—5 cm. microlayer of the offshore regions. The collections from the nearshore regions contained no eggs. But 50% of the vertical 0—100 m water hauls in the offshore regions suggested the distribution of 0.04—0.83 Egg /m3 in the corresponding layers.

The larvae were met with in about 30 % of the collections. The majority were distributed in the shallow water regions of about 0 — 20 m thickness and suggested about 0.50 larva/m3 (Fig. 4). The deeper water layers of 0—100 m depth attained 0.12 larva/m3.

The diurnal changes in the number of eggs and larvae :

During the day time of February 1971, about 95 % of the collected samples at 0400—1300 a.m. were deprived of the eggs and larvae. Also about 50% of the collected samples during August early day time were empty. But nearly 100% of the maximum numbers of eggs and larvae (Table 2) were found in the after-noon collected samples. The ichthyoplankton collections suggested the decrease of the number of eggs and larvae during the early day time. However, this suggestion needs further confirmation.

Table 2. The maximum abundance of fish eggs and larvae caught during variable day time of August 1971 from the different regions of the South East Mediterranean.

		Eggs			Larvae	
Regions	Time	0—5cm	0—50m	0—100m	0—50m	0—100m
ES-Sallum	0400—1300	0.0	0.04	0.06	0.0	0.05
	1300—2200	7.99	0.12	0.03	0.03	0.05
Mersa Matruh	0400—1300	0.0	0.24	0.0	0.08	0.02
	1300—2200	0.67	0·03	0.06	0.02	0.02
Arabs Gulf	0400—1300	0.0	0.04	0.0	0.22	0.0
	1300—2200	—	—	0.04	0.20	0.09

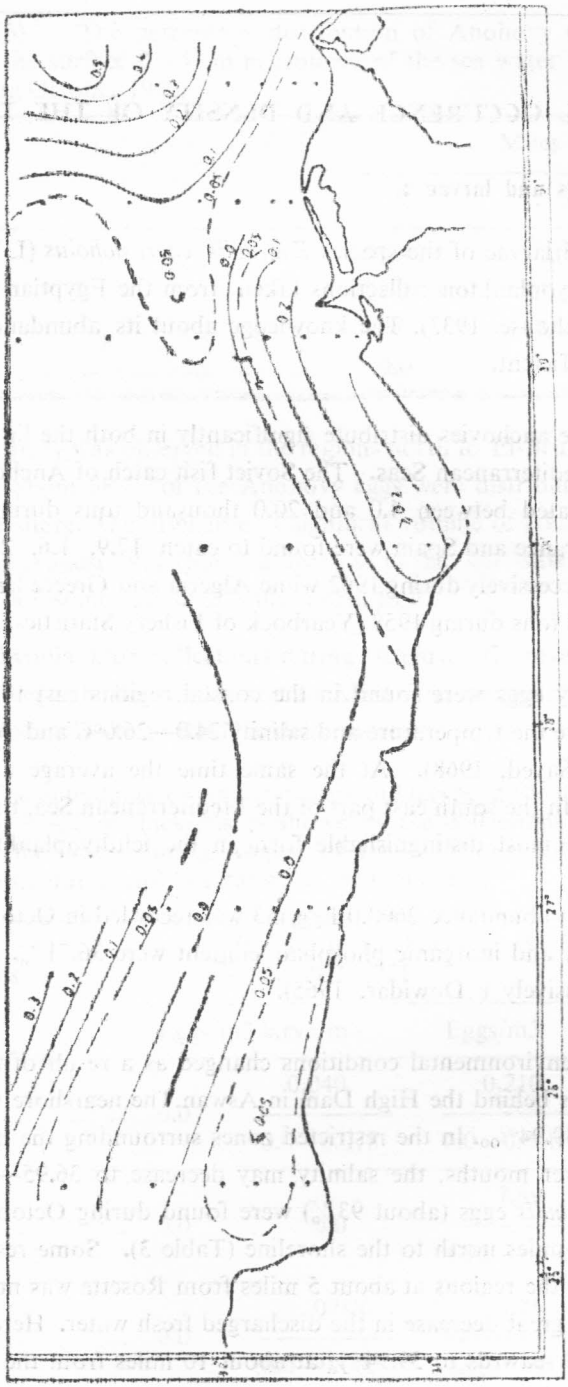

Fig. 4. The distribution of maximum abundance of fish larvae (total number/m3) shown by the vertical 50—0 m hauls taken during August 1971.

SEASONAL OCCURENCE AND DENSITY OF THE TAXONS

The Anchovy eggs and larvae :

The eggs and larvae of the species *Engraulis encrasioholus* (L.), were identified in the ichthyoplankton collections taken from the Egyptian waters during June 1933 (Whitehouse, 1933). The knowledge about its abundance and distribution was insufficient.

Generally the anchovies distribute significantly in both the linked basines of the black and Mediterranean Seas. The Soviet fish catch of Anchovios from the Black Sea fluctuated between 4.0 and 20.0 thousand tons during 1949—1950. Turkey, Itally, France and Spain were found to catch 17.9, 1.6, 28.4 and 109.4 thousand tons successively during 1962 while Algeria and Greece landed about 5.3 and 9.4 thousand tons during 1958 (Yearbock of Fishery Statistics, F.A.O., 1962).

The Anchovy eggs were found in the coastal regions east to the Danoube delta shores where the temperature and salinity 24.0—26.0°C and 16.73—17.32‰ successively (El-Sayed, 1968). At the same time the average abundance was 50.46 Egg/m3 . In the south east part of the Mediterranean Sea, the eggs of Anchovy formed the most distinguishable form in the ichthyoplankton collections.

Its maximum abundance 2600.0 Egg/m3 was recorded in October 1961 while the water salinity and inorganic phosphate content were 36.71 ‰ and 0.15 ug-at PO_4—P/L successively (Dowidar, 1965).

Since 1965, the environmental conditions changed as a result of the reservation of the Nile waters behind the High Dam in Aswan.The nearshore waters attained salinity 39.13—39.94‰. In the restricted zones surrounding the lake-sea connec tions and the river mouths, the salinity may decrease to 36.95—31.34‰. The majority of *Engraulis* eggs (about 93 %) were found during October 1972 in the regions at 5—10 miles north to the shoreline (Table 3). Some restriction of the Anohovy eggs to the regions at about 5 miles from Rosetta was noticed and may be related to the great decrease in the discharged fresh water. Here the sea water salinity increased seawrds to 39.94 ‰ at about 10 miles from the outlet.

Table (3) — The percentage distribution of Anohovy eggs with distance (miles) in the surface 0—5 cm microlayer of the sea water north to the delta shores during October 1972.

Regions	Miles		
	5	10	15
Rosetta	19.9	0.0	0.0
El-Brullus	26.2	35.5	2.8
Damietta	0.0	2.8	4.3
Port-Said	0.0	8.5	0.0

The contrary was observed in the regions north to El-Brullus lake-sea connection where about 38 % of the Anohovy eggs were distributed beyond 10 miles north to the shore. The discharge of significat volume of lake waters through the outles during August 1971 caused a decrease in the sea water salinity to about 38.38 ‰ at a distance about 20 miles north to it.

The ichthyoplankton collections during August 1971 revealed the scarcity of the Anchovy eggs in the waters west to Alexandria regions. The larvae were met with in the waters north to the Nile delta shores.

Table 4. The abundance of Anchovy eggs and larvae in the different water layers of 0—50 m thickness as shown by the collections taken north to the delta shores during August 1971 and October 1972 (The average as numerator and the range as denominator).

Regions	0—50 m thickness at VIII 1971		0—5 cm microleyer at X 1972	
	Eggs/m3	larva/m3	Eggs/m3	larva/m3
Damietta	0.0	0.040 0.0—0.078	0.210 0.0—0.860	0.043 0.0—0.215
El-Brullus	0.0	0.0	7.89 4.95—10.75	0.071 0.0—0.215
Rosetta	0.0	0.020 0.0—0.080	5.25 0.0—6.02	0.0

Their abundance reached a maximum 0.078 larva/m3 and an average 0.040 larva/m3 in the continental shelf water layers of 0—50 m thickness north to Damietta outlet. They also reached a maximum 0.080 larva/m3 and an average 0.029 larva/m3 in about 16 % of the coastal waters of the same thickness north to Rosetta outlet. Great difference was observed during October 1972. The eggs and larvae appeared much more abundant than in August. The eggs were distributed in the surface 0—5 cm microlayer of 85 % of the invesigated localities. El-Brullus regions appeared to acquire the highest abundance 10.75 Egg/m3. The lowest abundance appeared in the regions north to Damietta and have not exceeded 0.860 Egg/m3 (Table 4).

The larvae were met with in about 28 % of El-Brullos coastal area. Their abundance varied between an average 0.043 and 0.071 larva/m3 in these regions.

The eggs of the family Carangidae ;

The fishes from the family Carangidae formed important part of the Egyptian fisheries. The eggs of *Trachurus* species were found in significant abundance along the south east Mediterranean shores (Table 5). About 45 % of the eggs were distributed at a distance 10 miles from the shores. There may be some tendency of the fish to reproduce in the regions beyond 15 miles north to the delta shores while this distance decrease in the regions west to Alexandria waters to about 5 miles north Mersa Matrouh.

Table 5. The percentage distribution of eggs of *Trachurus* species with distance (miles) n the 0—5 cm microlayer in the S.E. Mediterranean during August 1971 and October 1972.

Regions	Miles		
	5	10	15
ES-Sallum	0.0	0.0	4.2
Mersa Matruh	29.2	0.0	4.0
Arabs Gulf	0.0	41.7	0.0
Abu-Qir Bay	0.0	4.2	4.2
El-Brullus	0.0	0.0—	12.5

the surface microlayer contained maximum 4.5 Egg /m3 in Mersa Matruh region. About 60% of the investigated localities attained average 0.636 Egg/m3. The deep layers of 0—50m thickness in the Arabs Gulf waters were shown to contain maximum 0.48 Egg/m3 The calculated average abundance in it was 0.096 Egg/m3 (Table 6) . Generally the average abundance of this species eggs have nearly been similar in the water layers of 0—50 m thickness in both the eastern and western regions and reached 0.08—0.09 Egg/m3. The eggs of *Trachurus* species were not observed in the waters north to Rosetta and Damietta outlets.

The temperatur and salinity of the waters in which the eggs were found ranged from 24.00°C to 26.48°C and from 38.65 to 39.34 ‰ successively.

Table 6. The abundance (Egg/m3) of *Trachurus* species eggs in the water layers of different thickness in the S.E. Mediterranean during August 1971 (average as numerator and range as denominator)

Regions	Water layer thickness		
	0—5 cm.	0—50 m.	0—100 m
ES-Sallum	0.0	0.0	0.012 0.0—0.06
Mersa Matruh	0.6336 0.0—4.452	0.081 0.0—0.325	0.0
Arabs Gulf	0.0	0.096 0.0 0.480	0.0
El-Brullus	0.533 0.0—2.664	0.0	0.0

The eggs of the family *Mullidae* :

Mullus baratus and *Mullus surmulatus* are the common species of this family in the S.E Mediterranean waters. The fish catch from *Mullus barbatus* constituted the major part of the fish landings from this famly (M.T. Hashem 1973).

During August 1971 the maximum abundance of its eggs in Abu-Qir Bay nearshore regions exceeded about 6 times its value in Mersa Matruh (Table 7). The open sea water north to Abu-Qir Bay was empty of any eggs of this species. This may be attributed to the scarcity of the reproducing fishes in the offshore deep waters. The fish eggs could be found in about 20% of the investigated localities north to Abu-Qir Bay but in Mersa Matruh regions they were found in about 14% of the the investigated area. The nearshore regions were suggested as the main spawning grounds of this species. The surface 0—4 cm microlayer of water -air interface contained the highest abundance of eggs. In Abu-Qir Bay it reached 3.780 Egg/m3 while in Damietta coastal rgions it have not exceeded 0.670 Egg/m3.

Table 7. The abundance of eggs of *Mullus barbatus* and *Serranus* species in the coastal waters of the S.E. Mediterranean during August 1971 (Average as numerator and range as denominator)

Regions	Species	Water layers		
		0—5 cm	0—50 m	0—100 m
Mersa Matruh	*Mullus barbatus*	0.068 / 0.0—0.476	0.017 / 0.0—0.120	0.003 / 0.0—0.224
Abu Qir Bay	« «	0.472 / 0.0—2.780	0.0	0.0
Damietta	« «	0.094 / 0.0—0.670	0.0	0.006 / 0.0—0.024
Mersa Matruh	*Serranus spp.*	0.237 / 0.0—1.658	0.0	0.0
Abu-Qir Bay	« «	0.22 / 0.0—1.554	0.013 / 0.0—0.0040	0.0
Damietta	« «	0.111 / —	0.0	0.0

The abundance of the eggs decreased with the increase in the depth of the investigated sea water layers (Table 7.) They were found in about 15% of the investigated loclities north to Damietta outlet. No larvae of this family could be detected in the collected samples.

The eggs of the family Serranidae :

The fish catch of the family *Serranidae* constituted important part of the landings from he coastal regions west to Alexandria. *Serranus scriba* (L.), and and *Serranus cabrilla* (L.), mainly dominate the western regions while the *Epiniphelus alexandrinus* (C. & V.) may be found north to the delta shores. The eggs of these fishes were identified in the ichthyoplankton collections during August 1971 in Mersa Matruh , Abu-Qir Bay and Damietta regions. The maximum abundance 1.658 Egg/m3 were met with in the surface 0—5 cm. microlayer of Mersa Matruh nearshore regions.

About 16% of the investigated localities contained these eggs. They were mostly distributed at about 5 miles from the shore. The temperature and salinity at the time of collection were 25.9°C and 38.99‰ successively.

In Abu-Qir Bay the average number of eggs was 0.013 Egg/m3 and distributed mainly in about 30% of its localities. The lowest abundance 0.666 Egg/m3 in the layer of water-air interface was found north to Damietta outlet. The scarcity of eggs in the deep layers suggest the fish reproduction mainly to take place in the nearshore regions (Table 7).

The eggs of the family Clupeidae :

The distribution of *Sardinella auriat* (C. & V.) eggs could be identified during February 1971. Its maximum 1.332 Egg/m3 was found in the surface 0—5 cm. microlayer of ES-Sallum waters where the salinity and temperature were about 38.54‰. and 16.60°C. The distributed eggs in these regions reached exceptionally high numbers in about 20% of the investigated localities. These observations agree with the results of the recent fishing experiments which suggested this region to serve as good grounds for fishing *Sardinella aurita* The localities at about 5—10 miles north to the shore line were covered with significant number of eggs. In Abu-Qir Bay, the maximum abundance 0.667Egg/m3 was found at a distance about 20 miles north to the shoreline. But the average values covered about 35% of the total area of these regions (Table 8).

The fish larvae were found in about 50% of the investigated localities. The average abundance was approximately 0.113 larva/m3 . The surface water temperture and salinity were 17.00°C and 38.96 ‰ in the locality of distribution of the post larvae.

CONCLUSION

The fishes Morone labrax, Trigla species, Sardinella aurita, were noted to reproduce in the S.E. Mediterranean waters during February 1971 while the fishes of the families *Serranidae*, *Mullidae*, *Carangidae*, *Sparidae*, *Engraulidae* reproduced during August. The eggs and larvae of the previous species as well as the larvae of *Pomatomous saltatrix* and Grey Mullets were identified to distribute in the coastal surface waters. Regional variation in the abundance of the identified fish eggs and larvae could be detected. ES-Sallum reions were distinguished with frequent occurence of pelagic eggs and larvae during February. The majority of the sample containing them were located at about 2—25 miles from the shore. The average abundance varied from 0.384 Egg/m3 in the surface 0—5 cm microlayer of water-air interface to about 0.048 Egg/m3 in the deep layers of 0—100 m dopth. The number of larvae varied beetwen 1.33 larva/m3 in the superficial layer to about 0.02 larva/m3 in the deeper water layer. The ichthyoplankton forms existed in 30—70% of the investigated localities of these regions.

In August the fish eggs reached a maximum 7.99 Egg/m3 in the surface 0—5cm microlayer and 0.12 Egg/m3 in the lower 0—100 m water layers. Slight difference in the abundance of the larvae could be observed in the deep layers during August.

In Mersa Matruh regions the eggs reached maximum about 3.33 Egg/m3 in the surface layer during February and 0.67 Egg/m3 during August. In the deeper layers it varied during both monthes from 0.04 Egg/m3 to 0.04—0.24 Egg/m3 successively. The larvae existed in the deeper layers reacheing about 0.04 0.07 larva/m3 during February and distributed with nearly the same numbers during August.

In the Arabs Gulf regions the number of eggs was found less than in the previous regions and fluctuated between 0.04 and 0.48 Egg/m3 in the different water layers during February and August. The abundance of the larvae 0.02—0.20 larva/m3 found during February was significantly less than 0.04 —1.33 larva/m3

which was found during August. Here the increase in the shallow water area with its pelagic eggs and larvae of the bottom dwelling summmer spawners may be important factor in the ichthyoplankton abundance determination.

In Abu-Qir Bay waters the ichthyoplankton abundance varied from 1.34 Egg/m3 during February to 4.66—11.32 Egg/m3 during August 1971. The deep water layers contained much less number of eggs than the before mentioned numbers. The abundance of the larvae varied from 0.67 larva/m3 in the surface layer of the shallow waters to 0.20—0.07 larva/m3 in the deep layers.

The waters north to El-Brullus shores were covered during Agust 1971 by 1.34—4.00 Egg/m3 in the surface microlayer of water -air interface and contained 0.04—0.23 Egg/m3 in the deeper layers. The larvae were much more scarce reaching about 0.02 larva/m3 in the deep layers.

The abundance of eggs in the waters north to Damictta outlet during both months was of the range 0.66—1.32 Egg/m3 in the layer of water-air interface and 0.04—0.83 Egg/m3 in the deep layers. The number of larvae were about 0.50 larva/m3 in the shallow waters of 20 m depth.

The eggs of *Engraulis encrasicholus* were distributed during October 1972 in the regions along 5—10 miles north of the Nile delta shores where the salinity decreased to 36.13—38.34 ‰. The maximum abundance 10.57 Egg/m3 was met with in the surface 0—5 cm microlayer of waters. Significant variation was observed in the egg numbers according to the season and regions of distribution. The number of larvae varied betwween 0.94 and 0.07 larva/m3 in the shallow coastal waters.

Some tendency of the *Trachurus* species to reproduce in the regions beyond 15 miles north to the delta shores and less than 10 miles in the regions west to Alexandria Mersa Matruh coastal regions. The reproduction occured in the waters attaining temperature and salinity 24.48—26.48°C and 38.66-39.34‰. successively.

The maximum number of eggs of *Mullus barbatus* was distributed in Abu-Qir Bay during August and reached 3.78 Egg/m3 in the surface 0—5 cm. microlayer of the shallow waters. The abundance of the eggs decreased seawardly in the deeper layers.

During August the coastal nearshore waters located between the Arabs-Gulf and Alexandria were the field of distribution of significant numbers of *Serranidae*

eggs. The maximum abundance was 1.658 Egg/m3 in the surface 0—5 cm microlayer attaining temperature and salinity 25.9°C and 38.99°/₀₀. About 0.04 Egg/m3 was found in the deeper layers.

The eggs of *Sardinella aurita* covered ES-Sallum regions in exceptionally high numbers, reaching maximum 2.332 Egg/m3 during February. They were found in the layer of water-air interface attaining temperature and salinity about 16.6°C and 38.54°/₀₀ The eggs of *Trigla* species were distributed in Abu-Qir nearshore waters especially in the layer of water-air interface in numbers reaching 4.662 Egg/m3 during February 1971. Less numbers were found in Mersa Matrunh inshore waters.

The fish eggs of the family *Mugilidae* were not found in the coastal waters of the S.E. Mediterranean during February cruise 1971. The distributed number of post larvae reached 0.67 larva/m3 in the layer of water -air inteface at about 10 miles north to El-Brullus shores.

SUMMARY

1 — The eggs and larvae of ten species of fish were distributed during February and August 1971 in the coastal S.E. Mediterranean waters.

2 — Important regional variations could be observed in the pattern of distribution and abundance of the total number of fish eggs and larvae as well as of the different species.

3 — The surface microlayer of watar-air interface contained the Maximum abundance of the pelagic fish eggs which reached 11.32 Egg/m3 while the abundance decreased in the deeper layers and have not exceeded 0.48 Egg/m3.

4 — The larvae were significantly distributed in the deeper layers below the water-air interface and reached about 0.67 larva/m3 in the shallow waters.

5 — ES—Sallum and Mersa Matruh regions were covered by the highest numbers of *Sardinella aurita* eggs reaching average 0.224 Egg/m3 in the surface waters during February. This suggested significant reproducing fish stock.

6 — Abu-Qir Bay surface nearshore waters were characterised by the distribution of *Mullus barbatus* eggs reaching 3.780 Egg/m3 . The abundance suggested the reproduction of significant stock during August in this region.

7 — The waters located between the Arabs Gulf and Alexandria regions were the field of reproducing *Serranus cabrilla* and *Serranus scriba*. The average abundance of their eggs was 0.237 Egg/m3.

8 — Factors as the depth of waters and its temperature and salinity may have significant influence, upon the survival, distribution and abundance of the fish eggs of the different species.

9 — Diurnal changes in the abundance of the fish eggs could be observed and need further study.

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COMPARATIVE ELECTROPHORETIC STUDIES ON THE SERA OF FIVE SPECIES OF MARINE MOLLUSCS

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