

THE REPRODUCTION AND THE EGG SIZE VARIATIONS OF SARDINA PILCHARDUS  
Walb. IN THE THERMAIKOS GULF, AEGEAN SEA.

by  
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SUMMARY. Preliminary information on the reproduction of *Sardina pilchardus* Walb., in the Thermaikos Gulf, Aegean Sea, is given. The investigated area presented special combined natural and artificial environmental conditions; there are no such data in existence. A possible explanation for the significant difference of the mean size dimensions of the eggs is proposed.

RESUME. Etude préliminaire de la reproduction de la Sardine (*Sardina pilchardus* Walb.) dans le golfe de Salonique et recherches biometriques sur les variations des dimensions des oeufs. On propose une hypothèse sur les differences significatives des valeurs moyennes du diametre des oeufs est également présentée.

The ichthyoplankton standing stock of *Sardina pilchardus* Walb. in the Thermaikos Gulf has been studied from zooplankton samples collected with a WP-2 nylon net, mesh size 0.24 mm, towed vertically from the bottom to the surface. A station grid of 43 positions was established and the eggs and larvae of *Sardina pilchardus* were obtained during two of the cruises, that is, in November 1975 and February 1976 at 33 and 26 stations respectively.

The area investigated is a shallow basin, ranging from 15 to 75 meters in depth, where three major rivers and two sewage outfalls release their affluents. From the zooplanktonic studies it is obvious that this area is over-eutrophicated, especially the inner isolated regions where the sewage outfalls have their strongest effect, which cause, during Summer, anoxic conditions and fish killing occasionally, (Yannopoulos, in preparation).

The eggs of *Sardina pilchardus* were numerous during November and represented the 75.4 % of the fish eggs while in February the Sardine eggs were 54.3 %. The total production of Sardine eggs were 4.4 times higher in November than in February. The larvae of *Sardina pilchardus* although less numerous than the eggs represented the 84.3 % of the total fish larvae population in

November while in February the 45.0 % only; the remaining 55.0 % were mainly consisted by Gobiidae and few Gadidae. The population of Sardine larvae were 5.4 times denser in November than in February. In general, the ratio of the total egg production in November versus February was 3.2 while of the larvae was 2.9.

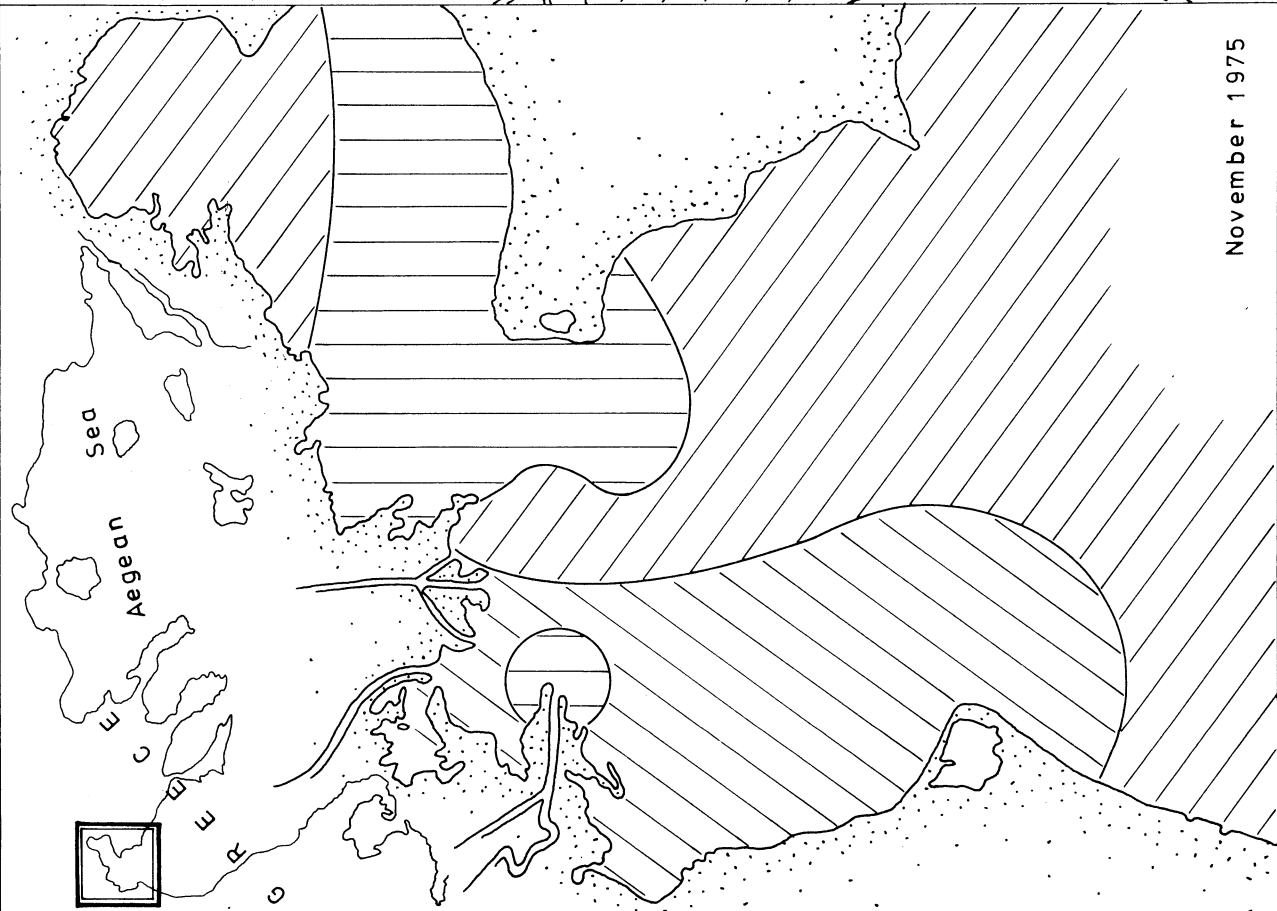
Figure 1, presents the distribution and abundance of the eggs of *Sardina pilchardus* during the two forementioned periods. The maximum egg density was 204 eggs/m<sup>2</sup> of the surface and the minimum 8 eggs/m<sup>2</sup> during November, while in February the corresponding values were 72 and 4 eggs/m<sup>2</sup> respectively. The distribution pattern of the larvae of Sardine was almost the same with a maximum density 44 larvae/m<sup>2</sup> and a minimum of 4 larvae/m<sup>2</sup> during November, and 24 larvae/m<sup>2</sup> and 4 larvae/m<sup>2</sup> maximum and minimum respectively, in February.

The mean size of *Sardina pilchardus* eggs in November, was  $1.589 \pm 0.080$  mm and in February  $1.635 \pm 0.091$  mm. The difference between the two means is significant at the 95 % confidence interval. From these data it is noticeable that due to unknown factors, there is a relation which may be expressed as: larger number of smaller eggs are associated with warmer waters and reduced number of larger eggs with colder waters. A similar relationship has been previously reported for the Sardine off Plymouth (Southward et al., 1973). A possible explanation would be that independently from temperature and other environmental conditions, smaller eggs are produced earlier by younger specimens, which are more numerous, therefore smaller eggs are more abundant; while late spawners, in colder waters - for species reproduces itself in Winter - will deposit fewer eggs, because aged specimens are considerably less numerous and of larger dimensions.

#### LITERATURE.

SOUTHWARD A. J., DEMIR N., 1973. Seasonal changes in dimensions and viability of the developing eggs of the Cornish pilchard (*Sardina pilchardus* Walb.) off Plymouth. In: The Early life History of Fish, J. H. S. Blaxter (ed.), 52-68.

N° per m<sup>2</sup> of surface



November 1975

February 1976

