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The Development Rates of European Pilchard (*Sardina pilchardus* Walb. 1792) Eggs

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Using a Bongo-Net, pilchards eggs were collected at the peak of the spawning in Izmir Bay in February 1990. The eggs were roughly separated from plankton on board and transported to land laboratory as soon as possible in 6°C. The eggs were sorted according to their stages under dissecting microscope in the laboratory. The earliest stages were Ib 2 taken to three different temperature regimes (13 - 16 - 19 °C). It was estimated that the spawning time of pilchard is between 1900 and 2100 hours (PEREZ and RODRIGUEZ, 1988 ; CIHANGIR (in prep.)). Eggs have been sampled during twilight (1600 - 1900 h.), the sea water temperature was 14 °C at 20 meter depth. It was assumed that youngest captured eggs were 15-18 hours old. In laboratory experiments, hatching occurred in 75 h at 13°C, in 60 h at 16°C and in 55 h at 19°C (Fig.1) (the incubators were fluctuated to 0.5 - 1.0°C during the experiment). These results are proximate to RUSSEL (1976).

Stages description were adapted from MOSER and AHLSTROM (1985) and ALHEIT et al. (1987).

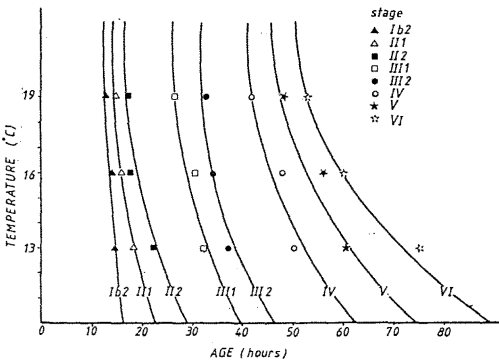
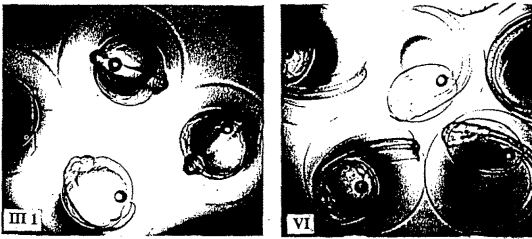


Figure 1. Development rates of pilchard eggs under different temperature regimes.



Various stages of pilchard eggs.

Description of Stages

- Ia 1 From fertilization to 64-cell stages.
- Ia 2 Formation of the blastodisc.
- Ia 3 Formation of the blastodisc as a lense.
- Ib 1 Progression of blastoderm until yolk is covered up by 1/2.
- Ib 2 Progression of blastoderm until yolk is covered up by 3/4.
- II 1 Progression of blastoderm until yolk is covered up by 3/4, blastopore open.
- II 2 Blastopore closed. The head region of the embryo apparent.
- III 1 Tail starts to separate from the yolk. The length of the free tail is smaller or equal than 1/2 the head length.
- III 2 The length of the free tail is greater than 1/2 the head length.
- IV The tail extended 1/4 the length of the yolk sac.
- V The tail extended 1/2 the length of the yolk sac.
- VI The tail length greater than 3/4 of the length of the yolk sac and hatching.

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