DISTRIBUTION PATTERNS OF MESOPELAGIC FISH LARVAE IN RELATION TO HYDROGRAPHY OF THE NORTH EASTERN AEGEAN SEA

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Abstract
Distribution of mesopelagic fish larvae was studied during June 2003 and June 2004 in the Northeastern Aegean sea (NEA). In 2003, certain taxa (*Ceratoscopelus maderensis*, *Hygophum benoiti*) showed unusual distribution patterns with increased presence over a continental shelf area.
Keywords : Aegean Sea, Ichthyoplankton.

Introduction
Fish larvae distribution patterns are defined not only by the living habitat of adults but also by the water circulation pattern that may occasionally drift the reproductive products away from the spawning environment. In the present study, distribution patterns of mesopelagic fish larvae are examined in the NEA, an area characterized by high hydrodynamic complexity due to the movement of Black Sea water [1].

Materials and Methods
A grid of 24 stations (Fig. 1a) were sampled in 1-12 June 2003 and 31 May-12 June 2004, with a 60 cm bongo-net (0.250 mm meshed net) towed obliquely from 200 m to the surface (bottom permitting). Hydrographic profiles were collected on a denser grid of 68 stations. Preflexion larvae were identified and their abundance was standardized to numbers per 10 m^2. More details are provided in [1].

Results and Discussion
A total of 15 mesopelagic taxa were identified in both cruises (Table 1).

Tab. 1. Mean abundance values (larvae per 10 m^2) of the larval mesopelagic taxa identified in the bongo-net collections. N% per cent of positive stations (frequency of occurrence).

	June 2003		June 2004	
Larval taxa	**ind. 10m^{-2}**	**N%**	**ind. 10m^{-2}**	**N%**
Lestidiops jayakari jayakari	2.1	21	3.6	29
Arctozenus risso	0.3	4	0.5	8
Benthocema glaciale	4.2	13	1.9	13
Ceratoscopelus maderensis	77.9	79	104.6	75
Diaphus holti	0.8	17	0.8	17
Diaphus rafinesquii	0.2	4	0.2	4
Hygophum benoiti	84.3	67	87.8	58
Lampanyctus crocodilus	0.5	13	7.0	25
Lobianchia dofleini	0.8	17	1.9	25
Myctophum punctatum	11.5	33	29.0	42
Argyropelecus hemigymnus	2.0	21	5.0	21
Cyclothone braueri	0.3	8	2.0	17
Maurolicus Muelleri	6.7	42	9.1	38
Stomias boa boa	0.7	8	0.6	8
Vinciguerria spp.	2.8	29	6.9	33
TOTAL ABUNDANCE	**195.1**	**92**	**259.7**	**79**

In 2003, mesopelagic larvae were collected in 22 stations. Abundance ranged from 8 to 1140 ind. 10 m^{-2}. In 2004, it ranged from 4 to 2069 ind. 10 m^{-2} in 19 positive stations. Although mean abundance was higher in 2004 (259 ind. 10m^{-2} vs 195 ind. 10m^{-2} in 2003), this difference was not statistically significant (t=0.1359; p>0.1). The myctophiids *Hygophum benoiti* and *Ceratoscopelus maderensis* were the most abundant taxa. Early summer is within the peak of the spawning period of these species [2]. *Myctophum punctatum* was also important in both years. Large concentrations and maximum number of mesopelagic taxa were recorded beyond the continental shelf (depth>200 m). Abundance and species richness was generally low at sites <200 m especially in 2004. However, in 2003 continental shelf stations in the western part of the surveyed area (St. B108, B106) had increased abundance of mesopelagic fish larvae (654 and 293 ind. 10 m^{-2}respectively) (Fig. 1b,c), mostly due to thespecies *C. maderensis* and *H. benoiti*. Mesopelagic fishes live offshore at depths >200 m, hence the presence of their larvae over the shelf cannot be explained in terms of local spawning. The unusual presence of the mesopelagic larvae over the continental shelf could be explained in terms of hydrology. Horizontal distribution pattern of temperature, salinity and density (eg. Fig. 1b,c) showed that in contrast to 2004, pelagic water intruded over the continental shelf in the western part of the region in 2003, as a result of a meandering cyclonic movement of the prevailing current (the Lemnos-Imvros jet, [1]). Consequently mesopelagic fish larvae were advected inshore, especially *C. maderensis* and *H. benoiti* which are known to have a more surface vertical distribution [3].

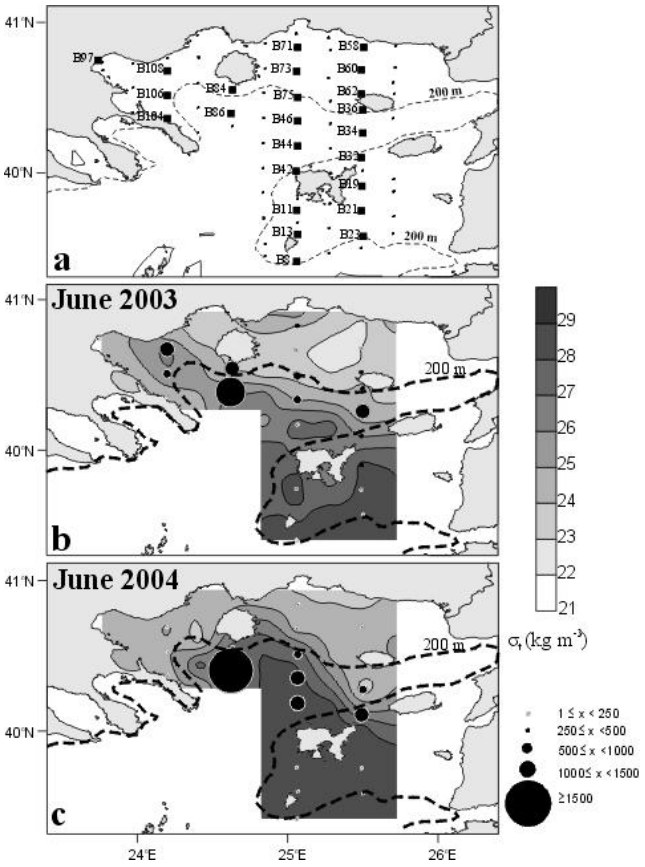

Fig. 1. (a) Station map [squares: ichtyoplankton and CTD; circles: CTD] (b,c) Horizontal distribution of water density (kg m^{-3}) at 10 m. Total abundance of mesopelagic taxa of the stations is also shown.

References

1 - Somarakis S., Drakopoulos P. G. and Filippou V., 2002. Distribution and abundance of larval fish in the Northern Aegean Sea - Eastern Mediterranean - in relation to early summer oceanographic conditions. *J. Plankton Res* ., 2: 339-357.
2 - Sabates A. and Maso M., 1990. Effect of a shelf-slope front on the spatial distribution of mesopelagic fish larvae in the western Mediterranean. *Deep-Sea Res.*, 37: 1085-1098.
3 - Olivar M.P. and Sabates A., 1997. Vertical distribution of fish larvae in the north-west Mediterranean Sea in spring. *Mar. Biol*., 129: 289-300.