Preliminary study on the seasonal distribution of teleosteans larvae in the Aegean Sea. I. Fam. Serranidae

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At least eight species of serranids are known to occur as adults in the Aegean Sea (PAPACONSTANTINOU, 1988), of which the following six have been recorded as larvae during routine ichthyoplankton surveys carried out in the central Aegean Sea : Anthias *anthias, Callanthias ruber, Epinephelus alexandrinus, Serranus hepatus, S. cabrilla and S. scriba*. Results are presented in this study on the distribution, abundance and depth distribution of serranid larvae collected between June 1990 and February 1991 in a total of 21 stations off the Eubia coasts and the Pelion peninsula, visited at approximately bimonthly intervals.

Sampling at each station was conducted with a BONGO net, towed horizontally at a ship's speed of 2.5 knots at desired depths, and a MARK III high speed sampler, towed obliquely from near the bottom to the surface, at a ship's speed of 5 knots. The BONGO net was fitted with gauzes of 500 µ mesh aperture and the MARK III with gauzes of 250 µ. Additional sampling was carried out in a number of stations using a METHOT mid-water trawl with a cod-end mesh aperture of 2.0 mm for catching late larvae and post-metamorphosed fish. In the laboratory the eggs and larvae of all fish species were extracted from the samples, identified to the lowest possible taxon, counted and measured. Numbers per haul were converted to numbers per 1000 m^3 of sea water using the flowmeter readings. Table I shows the seasonal and vertical distribution of the serranid larvae, respectively, using the BONGO net data series. It appears that with the exception of *C. ruber*, all other species seem to be summer or late summer spawners. The data suggest that *S. hepatus, S. cabrilla* and *S. scriba* inhabit the upper water layer, while *A. anthias* and *C. ruber* were also found in deeper layers.

Table 1 - Seasonal and vertical distribution of serranid larvae (larvae por 1000 m^3 sea water), using the Bongo net data series.

Species	Month					Depth		
	June	July	September	December	February	0-50	51-100	101-205
A. anthias	-	-	2.3	-	-	1.1	0.6	4.2
C. ruber	4.6	1.9	1.7	6.4	3.3	1.7	3.3	5.1
E. alexandrinus	-	-	1.1	-	-	1.1	0.6	-
S. cabrilla	13.9	1.9	12.0	-	-	18.4	10.0	-
S. hepatus	60.3	145.8	620.3	-	-	388.4	463.0	92.1
S. scriba	-	-	8.0	-	-	11.5	2.2	-

The MARK III net caught significantly fewer larvae (in total, 1111 larvae over the surveyed period, of which 59 belonged to serranids) in comparison to the BONGO net (17720 larvae of which 1283 belonged to serranids), due to the much lower volumes of water filtered and shorter hauling times of the first instrument. However, the MARK III sampled more efficiently the water column, due to its finer meshes, and gave a higher average concentration of eggs and larvae than the BONGO net (Table 2). The METHOT trawl caught relatively fewer larvae and an insignificant number of eggs, as expected, due to its coarse meshes. The most complete coverage of the sampling area with this instrument occurred in September 1990, and yielded 813 larvae (out of which 170 belonged to serranids, almost exclusively *S. hepatus*). *S. hepatus* was the most abundant species, followed by *S. cabrilla*. About 95% of the total collected larvae belonged to *S. hepatus*, of which 89.3% were fished in September. Fig. 1 shows the horizontal distribution of *S. hepatus*, using the MARK III data series. The apparent length distribution of *S. hepatus* larvae caught with the three sampling instruments used is shown in Fig. 2.

The length distribution of *S. hepatus* larvae caught in different sampling periods were compared, and no significant differences were found. These results indicate that breeding is continuous, beginning probably in May, and is completed in late September, with a peak spawning in late August, which is in accordance with the results of a study of the gonadal maturation cycle of this species in the Aegean Sea (PAPACONSTANTINOU, unpublished data). However, differences in the length distribution of *S. hepatus* larvae caught in inshore and offshore stations were found, suggesting a gradual dispersal from spawning sites occurring in shallower waters to deeper ones.

Two spawning subareas in of *S. hepatus* were found in the sampling area : one at the north of the Skiathos channel, which is influenced by the N. Aegean Sea hydrographic system, and the other at the Trikeri channel. The highest densities were found in the second area, which is influenced by the Evoikos gulf hydrographic system and is characterised by a broad continental shelf.

Table 2.- Absolute and average number per 100 m^3 filtered water over the surveyed areas sampling period with BONGO net and MARK III.

		BONGO net		MARK III	
		Number	Number/100 m^3	Number	Number/100 m^3
June	Eggs	5779	1633	373	2552
	Larvae	1509	375	211	1045
	Serranid larvae	68	18	9	50
July	Eggs	2361	896	232	2677
	Larvae	605	202	185	1883
	Serranid larvae	80	32	10	102
September	Eggs	2345	530	132	1921
	Larvae	11615	2522	595	5719
	Serranid larvae	1129	236	40	401

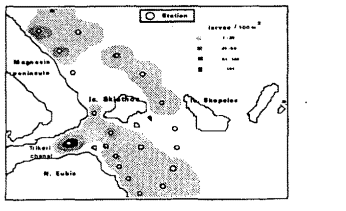

Fig. 1

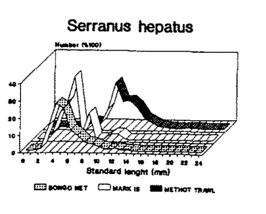

Fig. 2

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The Stripped dolphin disease in Greece, 1990-1992

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The Stripped dolphin (*Stenella coeruleoalba*) is a cosmopolitan cetacean with a wide distribution range from tropical to temperate areas. It was considered until now as the most abundant dolphin in the Mediterranean (BOMPAR *et al.*, 1991). From the summer 1990 its situation has drastically changed. The species has been affected by an epizootic which has depleted its population in the Western basin and is actually striking it in the Eastern basin. The epizootic is caused by a morbillivirus named dolphin morbillivirus (DMV) (OSTERHAUS *et al.*, 1992).

Evolution of the mortality in Greece

First data available on stripped dolphins stranded in Greek waters are from Zakynthos and correspond to July 1991. Twelve dead dolphins had been found in this island up to February 1992. Several samples were sent in August to the Bilthoven laboratories (Holland) by the W.W.F. team working in Zakynthos on Monk seals (*Monachus monachus*). Some of the dolphins had been affected by dolphin morbillivirus with certainty, confirming the presence of the epizootic in Greece (VLACHOUTSIKOU, pers com).

No figure is known about the natural stranding of cetaceans before the epizootic, but a geographical progression of the strandings towards the East and North East of the country have been observed. The number of dead animals was still increasing in February and it was not known if a maximum had been already reached (fig. 1). A total of 83 cetaceans had been recorder up to 6 February 1992, from the beginning of the disease; 54 of them are Stripped dolphins and 16 are unknown dolphin species.

Special consideration must be given to the species found dead during this period. Although most of the individuals are Stripped dolphins, it is also significant that 5 Cuvier's beaked whales *Ziphius cavirostris* were present (see fig. 2), four of them stranded in a period and location with many records of *Stenella coeruleoalba* deaths. This toothed whale inhabits very deep waters, and their strandings are usually scarce because they live far away from the coasts. It is not known if the morbilliviruses have also affected this species or any other of the ones shown in fig. 2, but it can not be considered impossible. KENNEDY *et al.*, (1988) recorded morbillivirus infection in common porpoises (*Phocoena phocoena*) from Northern Ireland. Also OSTERHAUS *et al.*, (1992) found morbillivirus in two common porpoises stranded in Holland and named it porpoise morbillivirus (PMV). The epizootic which affect the Stripped dolphins is produced by DMV (OSTERHAUS *et al.*, 1992). The character teuthophage of both Stripped dolphins and Couvier's beaked whales could have facilitated the physical proximity between individuals of these species and a consequent infection.

In addition, OSTERHAUS *et al.*, (1992) proved that Bottlenose dolphins (*Tursiops truncatus*) blood cells can be infected by dolphin morbillivirus in laboratory. Three individuals of this species have been stranded in the research period, all of them in areas known to be infected, but their vulnerability in the wild has not been demonstrated.

Origin of the epizootic

It has been hypothesized (BOMPAR *et al.*, 1991) that Phocine distemper virus (PDV) could have been transported by the Atlantic population of stripped dolphins to the Mediterranean, without been affected by the virus because of natural inmunization. The stranding of Stripped dolphins also in the Spanish Atlantic could be against this argument. The same authors consider remote the possibility of infection by seals.

Nevertheless, two ill Hooded seals (*Cystophora cristata*) arrived at the coasts of southern Spain in June 1990, one at Huelva and the other at Tarifa (personal data). Both animals died within a few hours, the latter at least with symptoms of canine distemper virus (CDV), a disease very similar to PDV. The presence of three dead seals in the north of Morocco was also reported at this date. No data exists to confirm that these individuals were Monk seals (*Monachus monachus*) and not Hooded seals. An incursion of infected Hooded seals in the Mediterranean could explain the origin of the epizootic in Valencian waters about one month later. A similar incursion by Harp seals (*Pagophilus groenlandicus*) to the North Sea caused the mass mortality of Harbour seals (*Phoca vitulina*) and Grey seals (*Halichoerus grypus*) in 1988 (BOMPAR *et al.*, 1991).

Very recent data (OSTERHAUS *et al.*, 1992) confirmed the presence of morbillivirus antigen and nucleic acids in the Hooded seals from Spain.

On the other hand, the same authors demonstrated that the DMV is closely related to PMV and different from PDV-1 and PDV-2 and concluded that different clusters of morbilliviruses were responsible for the cetaceans.

Fig. 1.- Stranded cetaceans in Greece 1990-1992.

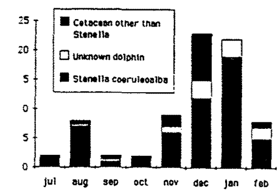
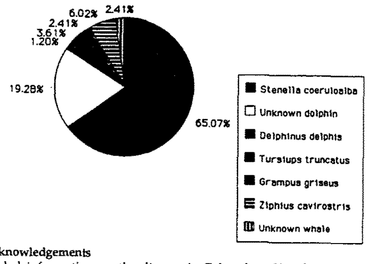


Fig. 2.- Cetacean species stranded in Greece from July 1991 to February 192 (N=83).



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