NOTES ON THE VERTICAL DISTRIBUTION OF PELAGIC SHRIMPS (DECAPODA, NATANTIA) IN THE AEGEAN SEA

BY

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ABSTRACT

Sampling in the northern Aegean Sea, in depths of 250-1000 m revealed the presence of eight species of pelagic shrimps and gave information on the vertical distribution patterns for some of them.

Two species of Pasiphaeoidea (*Pasiphaea multidentata*, *P. sivado*), 1 species of Oplophoroidea (*Acanthephyra pelagica*), 1 Penaeoidea (*Gennadas elegans*), and 4 Sergestoidea (*Sergestes arcticus*, *S. atlanticus*, *S. sargassi*, and *Sergia robusta*) were found. The most abundant of these were *S. arcticus* and *G. elegans*, with similar abundances, followed by *S. robusta* and *A. pelagica*. The other four species had a very low abundance. During daytime, *S. arcticus* had the widest range of vertical distribution and the bulk of its population occurred at 500 m, while *A. pelagica*, *G. elegans*, and *S. robusta* had less extensive ranges of vertical distribution and the bulk of their populations lay in the zone of 750 m.

The vertical distribution of the species found in the Aegean Sea is compared with those of other areas.

RÉSUMÉ

Des échantillonnages au nord de la mer Egée, à des profondeurs de 250-1000 m, ont révélé la présence de huit espèces de crevettes pélagiques et ont apporté des informations sur des modèles de répartition verticale pour certains d'entre eux.

Deux espèces de Pasiphaeoidea (*Pasiphaea multidentata*, *P. sivado*), une espèce d'Oplophoroidea (*Acanthephyra pelagica*), un Penaeoidea (*Gennadas elegans*), et quatre Sergestoidea (*Sergestes arcticus*, *S. atlanticus*, *S. sargassi* et *Sergia robusta*) ont été trouvées. Les plus abondants étaient *S. arcticus* et *G. elegans*, avec des abondances analogues, suivies par *S. robusta* et *A. pelagica*. Les quatre autres espèces avaient une abondance très faible. Durant la journée, *S. arcticus* avait la plus large répartition verticale et le maximum de sa population à 500 m tandis que *A. pelagica*, *G. elegans* et *S. robusta* avaient une répartition verticale moins étendue et le maximum de leurs populations dans la zone de 750 m. La répartition verticale des espèces trouvées dans la mer Egée est comparée à celle des autres zones.

INTRODUCTION

Eighteen species of pelagic shrimps are known from the Mediterranean, 13 of which have also been reported from the Aegean Sea (Koukouras, in press).

Review of the relevant literature showed that the information on the vertical distribution of the Mediterranean pelagic shrimps is limited, scattered, and based mainly on collections made with bottom trawls (e.g., Sardá & Palomera, 1981; Cartes et al., 1993). Only Froglia & Giannini (1984) collected pelagic shrimps using a mid-water trawl.

On the contrary, Foxton (1970a, b), as an example, gave detailed information on the vertical distribution of the pelagic shrimps in the Canary Islands area, based on collections made with mid-water trawls, while Flock & Hopkins (1992) did so on the vertical distribution of the sergestid shrimps in the eastern gulf of Mexico. Recently, Vereshchaka (1994) gave information on the night and day depth ranges of the North Atlantic and Caribbean *Sergia* species.

This paper is concerned with the depth distribution of the pelagic shrimps of a restricted area in the Mediterranean during daytime.

MATERIAL AND METHODS

In the framework of a broader study on the pelagic fauna in the northern Aegean Sea, a fishing cruise was undertaken in summer 1993, from the 17th till the 28th of July by the National Centre of Marine Research. A grid of 9 stations (fig. 1) was designed, all over the study area. At each station, samples were taken from depths of 250, 500, 750, and 1000 m.

A METHOT mid-water trawl with a mouth aperture of 2.2 m, fitted with a net of 3.0 mm mesh at the cod-end, was used for sampling during daytime. During 1 h horizontal tows, towing speed varied between 1.5 and 2.3 knots (= 2.7-4.1 km/h). Towing-speed, temperature, and depth of towing were controlled by a SCANMAR system. No measure of the water quantity filtered during a tow was carried out, but since a standard procedure was followed, samples are considered semiquantitative and, hence, comparable.

Decapods were sorted from the catches either immediately on recovery of the net or within a few hours after collection and preserved in 10% neutral sea water formalin. Carapace length (Cl) was measured from the hind of the orbit to the terminal margin of the carapace, and the number of ovigerous female individuals was recorded.

Catch totals for each tow are given individually in table I. The larvae of the various species collected were not taken into account and are not included in the table. According to their developmental stage, the collected individuals were

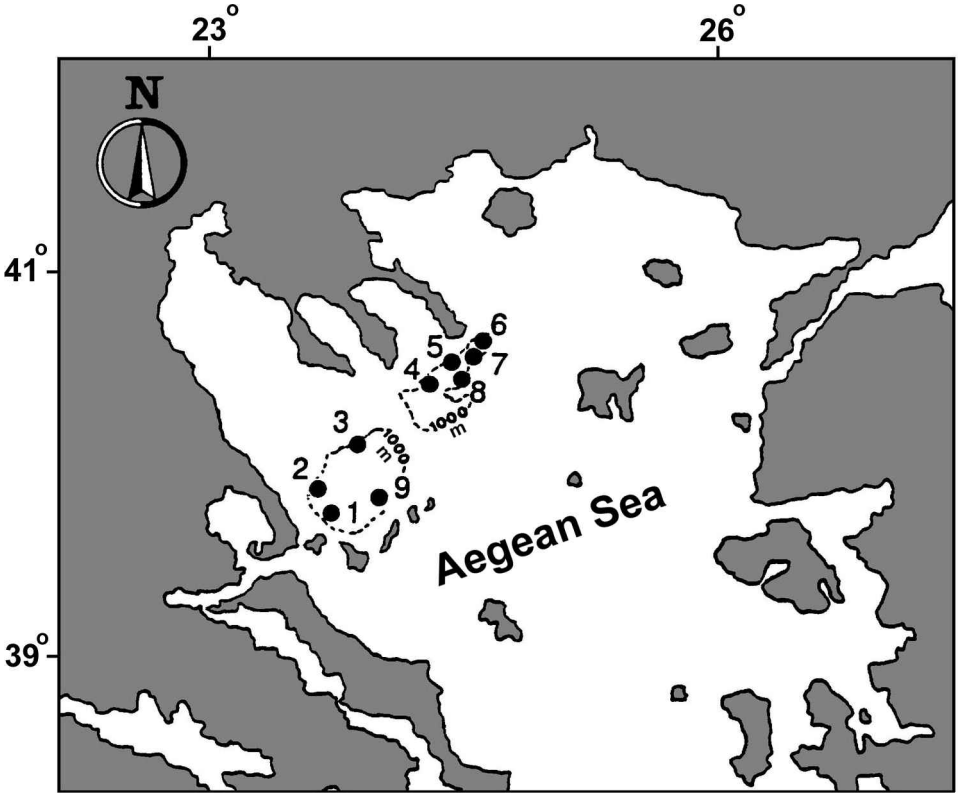

Fig. 1. Map of the northern Aegean Sea indicating the sampling stations.

divided into juveniles and adults and are presented in two different columns for each species.

The depth distribution of the most abundant species, as it results from the total catches of all 9 sampling stations, is presented graphically as a histogram. Percentage cumulative catch curves, both for the population as a total and separately for the juvenile and adult individuals, are also given in order to emphasize the differences of the species' depth distributions.

RESULTS AND DISCUSSION

Family Oplophoridae

Acanthephyra pelagica (Risso, 1816)

Material. — 59 adults and 233 juveniles from all stations (1-9), at depths of 500-1000 m (table I). At the depth of 500 m (station 5), only 7 adults and 11 juveniles were found, among which the unique ovigerous ♀, having Cl = 19.5 mm. Max. Cl = 22.0 mm (♂, station 7, depth 750 m).

A. pelagica is a bathypelagic species (fig. 2A), occurring by day principally below 500 m with a population maximum at 750 m. At this depth, the cumulative catch level is approximately 66% (fig. 2B) for the population as a whole. Furthermore, at 500 m only 6.2% of the population existed, while at 1000 m it was 33.9%. Juveniles (Cl < 7.5 mm) were more numerous than adults at all depths (fig. 2). Nevertheless, the ratio of adults : juveniles is reduced from 1 : 1.6 (38.9%) at 500 m, to 1 : 3.6 (21.7%) at 750 m and to 1 : 6.1 (14.1%) at 1000 m. This is also demonstrated by the cumulative percentages of the two size groups, which at the depth of 750 m (fig. 2B) is about 76% for adults, while for juveniles approximately 63%. From these data, it seems that the bulk of juvenile individuals is shifted to greater depths in comparison to the bulk of adults, at least during daytime.

Ovigerous females have been recorded to appear in February, April, July, and September (Zariquiey Alvarez, 1968). The only ovigerous female in the Aegean Sea was collected in July. The limited number of ovigerous females in the populations of this species was stressed by Stephensen (1923). Chace (1940) did not find any ovigerous individuals among 36 adult females collected between April and September near Bermuda.

This species has been found at depths between 350 and 4700 m (e.g., Senna, 1903; Chace, 1940; Crosnier & Forest, 1973; De Saint Laurent, 1985). As far as we know, the vertical distribution of *A. pelagica* (as *A. haeckelii* (Martens, 1868)) has been studied only by Chace (1940), who examined a population of 217 specimens (35 ♂ ♂, 36 ♀ ♀, 146 juveniles; numerically close to that from the Aegean) near Bermuda, at depths down to approximately 1700 m; his samples were also taken during daytime. Unfortunately, the different sampling depth range (1700 m instead of 1000 m) does not permit a reliable comparison of the Bermuda data with those from the Aegean Sea. However, we can note that in both cases juveniles were more numerous than adults at all depths.

Family Pasiphaeidae

Pasiphaea multidentata Esmark, 1866

Material. — 29 individuals (2 adults and 27 juveniles) from stations 1, 2, 4, 5, 6, 7, and 9 at depths of 500-1000 m (table I). Max. Cl = 30.6 mm, total length 105 mm (♂, station 2, depth 750 m).

The limited number of specimens captured (table I) does not permit any reliable estimate of the vertical distribution of this species in the Aegean. However, of a total of 29 specimens, 18 (62%) were found at a depth of 750 m. At 250 m no individuals were found, at 500 m only 4 (14%), while at 1000 m, 7 (24%). All individuals were juveniles (Cl < 14.5 mm) except for two adults with max. Cl = 30.6 mm, found at 750 m and 1000 m depth (station 2).

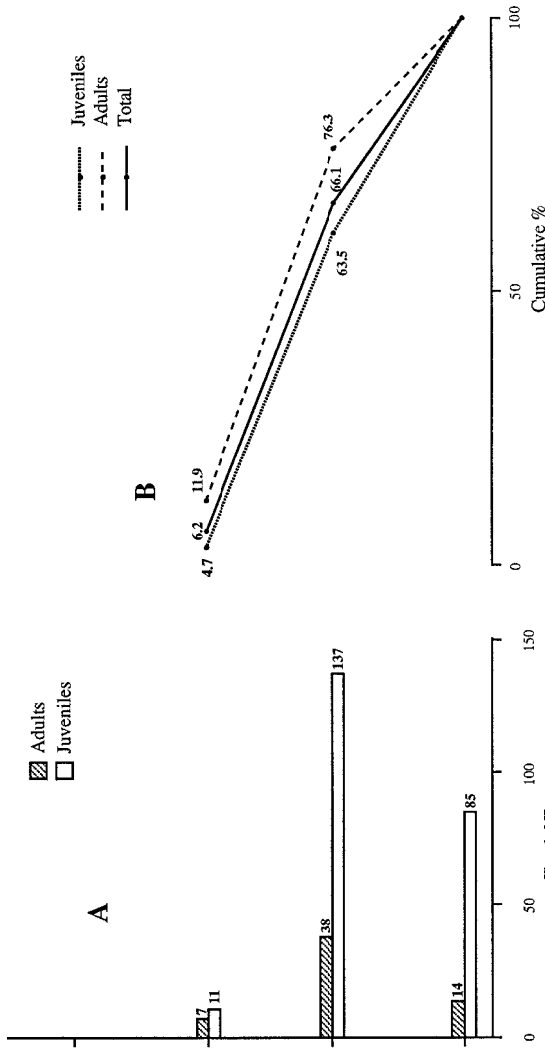

Fig. 2. The depth distribution of *Acanthephyra pelagica* (Risso, 1816) in the northern Aegean Sea. A, catch totals; B, cumulative percentages.

TABLE I

Species of pelagic shrimps collected in the present series of sampling hauls, in the northern Aegean Sea. A, adults; J, juveniles

	Fishing depth (m)	*Acanthephyra pelagica* (Risso, 1816)		*Pasiphaea multidentata* Esmark, 1866		*Pasiphaea sivado* (Risso, 1816)		*Gennadas elegans* (Smith, 1882)		*Sergestes arcticus* Krøyer, 1855		*Sergestes atlanticus* H. Milne Edwards, 1830		*Sergestes sargassi* Ortmann, 1893		*Sergia robusta* (Smith, 1882)		
Station		A	J	A	J	A	J	A	J	A	J	A	J	A	J	A	J	Total
1	250	–	–	–	–	–	–	–	2	–	5	–	–	–	–	–	–	7
1	500	–	–	–	–	4	–	–	–	165	7	–	–	–	–	–	2	178
1	750	12	6	–	4	–	–	13	42	30	–	–	–	–	–	5	29	141
1	1000	2	15	–	–	–	–	14	33	16	–	–	–	–	–	–	7	87
2	250	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	500	–	–	–	1	–	–	1	3	10	4	–	–	–	–	–	–	19
2	750	4	2	1	4	–	–	34	86	33	–	–	–	–	–	8	–	172
2	1000	8	40	1	4	–	–	39	112	43	1	–	–	–	–	7	23	278
3	250	–	–	–	–	–	–	–	–	–	7	–	–	–	–	–	–	7
3	500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
3	750	2	54	–	–	–	–	19	96	40	–	–	–	–	–	5	28	244
3	1000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
4	250	–	–	–	–	–	–	–	1	–	1	–	–	–	–	–	–	2
4	500	–	–	–	2	–	–	–	–	9	35	–	–	–	–	–	–	46
4	750	8	10	–	4	–	–	22	48	17	3	–	–	–	–	8	29	149
4	1000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5	250	–	–	–	–	–	–	–	–	–	5	–	–	–	–	–	–	5
5	500	7	11	–	1	–	–	6	34	119	–	1	–	–	–	8	33	220
5	750	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5	1000	–	–	–	1	–	–	3	–	12	1	–	–	–	–	1	2	20

TABLE I
(Continued)

Station	Fishing depth (m)	*Acanthephyra pelagica* (Risso, 1816) A	*Acanthephyra pelagica* (Risso, 1816) J	*Pasiphaea multidentata* Esmark, 1866 A	*Pasiphaea multidentata* Esmark, 1866 J	*Pasiphaea sivado* (Risso, 1816) A	*Pasiphaea sivado* (Risso, 1816) J	*Gennadas elegans* (Smith, 1882) A	*Gennadas elegans* (Smith, 1882) J	*Sergestes arcticus* Krøyer, 1855 A	*Sergestes arcticus* Krøyer, 1855 J	*Sergestes atlanticus* H. Milne Edwards, 1830 A	*Sergestes atlanticus* H. Milne Edwards, 1830 J	*Sergestes sargassi* Ortmann, 1893 A	*Sergestes sargassi* Ortmann, 1893 J	*Sergia robusta* (Smith, 1882) A	*Sergia robusta* (Smith, 1882) J	Total
6	250	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
6	500	–	–	–	–	–	–	2	1	4	3	–	–	–	–	–	–	10
6	750	1	32	–	2	–	–	12	78	88	2	–	–	–	–	1	23	239
6	1000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
7	250	–	–	–	–	–	–	–	–	1	17	–	–	–	–	–	–	18
7	500	–	–	–	–	–	1	–	–	38	35	–	–	1	–	–	–	75
7	750	6	33	–	2	–	–	16	61	57	6	–	–	–	–	2	23	206
7	1000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
8	250	–	–	–	–	–	–	–	–	–	14	–	–	–	–	–	–	14
8	500	–	–	–	–	–	–	–	–	18	8	–	–	–	–	–	–	26
8	750	2	–	–	–	–	–	3	1	2	–	–	–	–	–	2	1	11
8	1000	1	18	–	–	–	–	21	36	22	–	–	–	–	–	–	8	106
9	250	–	–	–	–	–	–	–	–	–	5	–	–	–	–	–	–	5
9	500	–	–	–	–	–	–	–	–	–	4	–	–	–	–	–	–	4
9	750	3	–	–	1	–	–	–	1	5	–	–	–	–	–	–	4	14
9	1000	3	12	–	1	–	–	20	46	34	–	–	–	–	–	2	22	140
Total	250	–	–	–	–	–	–	–	3	1	54	–	–	–	–	–	–	58
stations	500	7	11	–	4	4	1	9	38	363	96	1	–	1	–	8	35	578
	750	38	137	1	17	–	–	119	413	272	11	–	–	–	–	31	137	1176
	1000	14	85	1	6	–	–	97	227	127	2	–	–	–	–	10	62	631

Concerning the Mediterranean, *P. multidentata* has been considered an extremely rare species (Stephensen, 1923; Ševčić, 1990). However, the collection of 29 individuals at 9 stations distributed in a restricted area, shows that this species has a greater abundance than is generally assumed. The reason for this should be attributed mainly to the lack of intensive sampling efforts at greater depths.

The information existing on the vertical distribution of this species is very limited until now. In the Atlantic, it seems to extend below 10 m down to 2000 m (e.g., Stephensen, 1923; Burukovskii, 1976; Smaldon, 1979). In the Mediterranean, its depth range during daytime is reported as approximately 300-1500 m (e.g., Zariquiey Alvarez, 1968; Relini-Orsi & Relini, 1972; Arena & Li Greci, 1973; Pipitone & Tumbiolo, 1993).

Pasiphaea sivado (Risso, 1816)

Material. — 5 individuals (1 juvenile and 4 adults) from stations 1 and 7, at depths of 500 m (table I). Max. Cl = 25.2 mm (♂, station 1, 500 m, total length 85 mm). Juvenile Cl = 7.1 mm (station 7, 500 m). 1 ovigerous female, from station 1 (500 m, July 1993; Cl = 20.1 mm, bearing 63 eggs, diameter = 1.2 mm).

The limited number of specimens (table I) does not permit an estimate of the species vertical distribution in the Aegean. However, at stations 1-9 all 5 specimens were captured at a depth of 500 m, during daytime.

Kemp (1910) reported for *P. sivado* that the young individuals live in waters near the surface and descend into deeper waters as they grow up. Froglia & Giannini (1984) stress that this species can be found in subsurface layers by night, but at daytime it probably stays close to the sea bottom.

This Atlanto-Mediterranean species has a depth range in the Atlantic extending from the surface down to 2000 m (Sivertsen & Holthuis, 1956; Burukovskii, 1976), with its greatest abundance, by daytime, between 350 and 500 m (Maurin, 1961; Sardá et al., 1982). Particularly in the Mediterranean, it has a daytime depth range of 50-1527 m (e.g., Sardá & Palomera, 1981; Froglia & Giannini, 1984; Pipitone & Tumbiolo, 1993) with greatest abundance at depths of 400 to 600 m (Relini-Orsi & Relini, 1972; Arena & Li Greci, 1973; Sardá & Palomera, 1981), approximately the same depth range in which the Aegean specimens were collected.

Family Benthesicymidae

Gennadas elegans (Smith, 1882)

Material. — 225 adults and 681 juveniles from all stations (1-9) at depths of 250-1000 m (table I). Juveniles Cl = 3.0-5.5 mm. Adults Cl > 7.0 mm. Max. Cl = 10.5 mm (♀, station 2, depth 1000 m).

G. elegans is a bathypelagic species occurring principally below 500 m during daytime, with a population maximum at 750 m (fig. 3A). At this depth, the

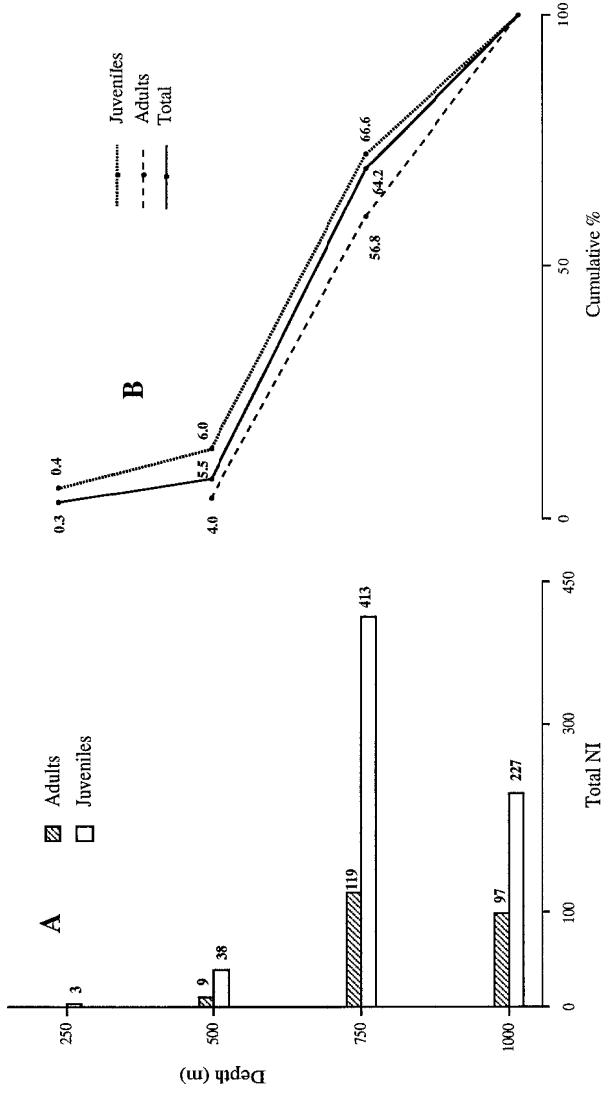

Fig. 3. The depth distribution of *Gennadas elegans* (Smith, 1882) in the northern Aegean Sea. A, catch totals; B, cumulative percentages.

cumulative catch level is about 64% (fig. 3B) for the population as a whole. Furthermore, down to 500 m only 5.5% of the population occurred while at 1000 m the percentage was 35.8. Juvenile individuals (Cl < 5.5 mm) were more numerous than adults at all depths (fig. 3A) while at 250 m only 3 juveniles were found. The adults : juveniles ratio increased from 1 : 4.2 (19.1%) at 500 m, to 1 : 3.5 (22.4%) at 750 m and to 1 : 2.4 (29.9%) at 1000 m. Cumulative catch percentages of the two size classes at the depth of 750 m (fig. 3B) were estimated to be approximately 57% for adults and 67% for juveniles. Therefore, it seems that the bulk of adults moves to greater depths than the bulk of juveniles, at least during daytime.

Foxton (1970b) observed that by day this species is restricted to depths below 750 m, with a population maximum between 800 and 900 m where he collected over 50% of the total catch. In the Aegean sampling area, the total catch percentages were 58.7% at 750 m and 35.8% at 1000 m. This Atlanto-Mediterranean species has been reported between 500 and 3000 m during daytime, but at night it can be found as shallow as 150 m (Smith, 1882; Foxton, 1970b). Sund (1920) and Foxton (1970b) reported that the smaller individuals tended to live at shallower depths than the larger ones, as was also demonstrated for the Aegean population.

In the Mediterranean, this species has been found in the Ligurian Sea between depths of 600 and 750 m (Relini-Orsi & Relini, 1972), in the Adriatic between 250 and 1000 m (Froglia & Giannini, 1984), and in the Catalan Sea between 1000 and 2200 m (Cartes et al., 1993).

Family Sergestidae

Sergestes arcticus Krøyer, 1855

Material. — 926 individuals (763 adults, 163 juveniles) from all stations (1-9) at depths of 250-1000 m (table I). Juveniles Cl < 6.5 mm; adults Cl > 8 mm. Max. Cl = 14.5 mm (♀, station 1, depth 750 m).

S. arcticus is a bathypelagic species (fig. 4A) occurring principally below 500 m by day, with a population maximum at 500 m (fig. 4A-B). At this depth, the cumulative catch level is approximately 57% (fig. 4B) for the population as a whole. Furthermore, shallower than 500 m only 6% of the population existed, while in deeper layers approximately 43% was found.

Juvenile individuals (Cl < 6.5 mm) significantly exceeded adults in numbers at 250 m only, while at all other depths adult individuals dominated significantly over the juveniles (fig. 4A). From 500 m down to 1000 m, both juveniles and adults gradually decreased in numbers. Excluding the depth of 250 m, where only one adult and 54 juveniles were found, at the remaining depth levels the adults : juveniles ratio was 1 : 0.3 at 500 m, 1 : 0.04 at 750 m, and 1 : 0.01 at 1000 m.

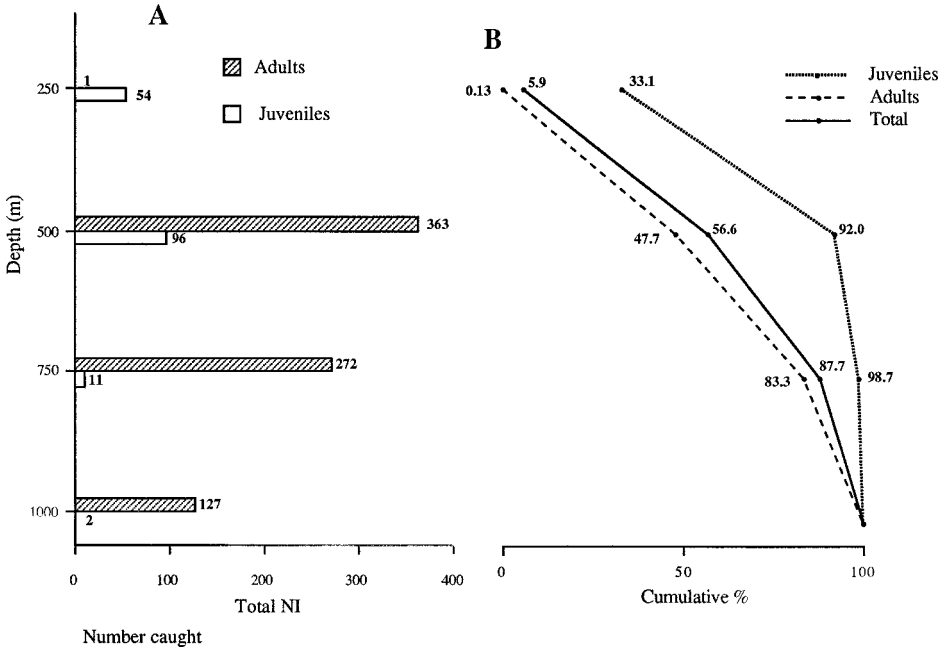

Fig. 4. The depth distribution of *Sergestes arcticus* Krøyer, 1855 in the northern Aegean Sea. A, catch totals; B, cumulative percentages.

In other words, with increasing depth, the adults : juveniles ratio also increases. Apart from that, the percentage cumulative catches of the two size classes at 500 m (fig. 4B) are approximately 48% for adults and 92% for juveniles. Thus, it seems that the bulk of juveniles moves to less deep waters than the adults, at least during daytime.

The information existing on the vertical distribution of *S. arcticus* is very limited and scattered. This cosmopolitan species (Pérez Farfante & Kensley, 1997) has been found at depths between 80 and 2100 m (e.g., Froglia & Giannini, 1984; Macpherson, 1991; Cartes et al., 1993). In the Mediterranean, its depth range is 80-2100 m (Zariquiey Alvarez, 1968; Relini-Orsi & Relini, 1972; Froglia & Giannini, 1984; Cartes et al., 1993). Furthermore, Froglia & Giannini (1982) found that during daytime the bulk of the population is located at depths of 700-850 m with a maximum abundance at 700 m. In the Aegean, the bulk of the population seems to be located at 500-700 m, with a maximum at 500 m.

Sergestes atlanticus H. Milne Edwards, 1830

Material. — A single female specimen (Cl = 9 mm), from station 5, at a depth of 500 m (table I).

This cosmopolitan species (Pérez Farfante & Kensley, 1997) should be considered very rare in the Mediterranean (Koukouras, in press). Foxton (1970b) in his

extensive samplings in the NE Atlantic only found 1 individual. It seems to be much more abundant in the Gulf of Mexico (Flock & Hopkins, 1992).

S. atlanticus should be considered a bathypelagic species with a depth range from the surface down to 3000 m (Hansen, 1922; Flock & Hopkins, 1992) having the bulk of its population located mainly between 400 and 800 m, both in the Atlantic and in the Pacific (Flock & Hopkins, 1992).

Sergestes sargassi Ortmann, 1893

Material. — A single female specimen (Cl = 10 mm), from station 7, at 500 m (table I).

This cosmopolitan species (Pérez Farfante & Kensley, 1997) could be considered as rare in the Mediterranean (Koukouras, in press). In the NE Atlantic (Foxton, 1970b) and in the Gulf of Mexico (Flock & Hopkins, 1992) it occurs in great abundance.

S. sargassi is also a bathypelagic species that can be found from 100 m (by night) down to approximately 2000 m (Foxton, 1970b; Flock & Hopkins, 1992). In the Gulf of Mexico it is more abundant, by day, at depths between 300-700 m. Adult individuals in the Mediterranean were collected in the western basin down to 1000-1500 m (Cartes et al., 1993), and in the Adriatic between 200 and 600 m (Froglia & Giannini, 1984).

Sergia robusta (Smith, 1882)

Material. — 283 individuals (49 adults, 234 juveniles) from all stations (1-9) at depths of 500-1000 m (table I). Juveniles Cl < 14.5 mm. Max. Cl = 20.5 mm (2 ♀♀, stations 2 and 5, depths 1000 and 500 m, respectively).

S. robusta is a bathypelagic species (fig. 5A) occurring in the Aegean Sea below 500 m by day, with a population maximum at 750 m (fig. 5). At this depth, the cumulative catch level is about 75% (fig. 5B) for the population as a whole; at 500 m only 15% of the population existed, and at 1000 m 25%. Juveniles (Cl < 6.5 mm) were remarkably more numerous than adults at all depths (fig. 5A). The ratio adults : juveniles was 1 : 4.4 at 500 m, 1 : 4.4 at 750 m, and 1 : 6.2 at 1000 m. Hence, this ratio decreases only slightly at 1000 m. At the depth of 750 m, the cumulative percentages of the two size classes were estimated to be about 80% for adults and 73% for juveniles. Thus, we can accept that the bulk of juveniles, during daytime, is moving to slightly deeper waters than the adults do.

The existing information on the vertical distribution of this Atlanto-Mediterranean species (Pérez Farfante & Kensley, 1997) gives a depth range from 100 m down to 4700 m (e.g., Hansen, 1922; Crosnier & Forest, 1973). In the Atlantic, Foxton (1970b) found that it was distributed from 700 to more than 1000 m during

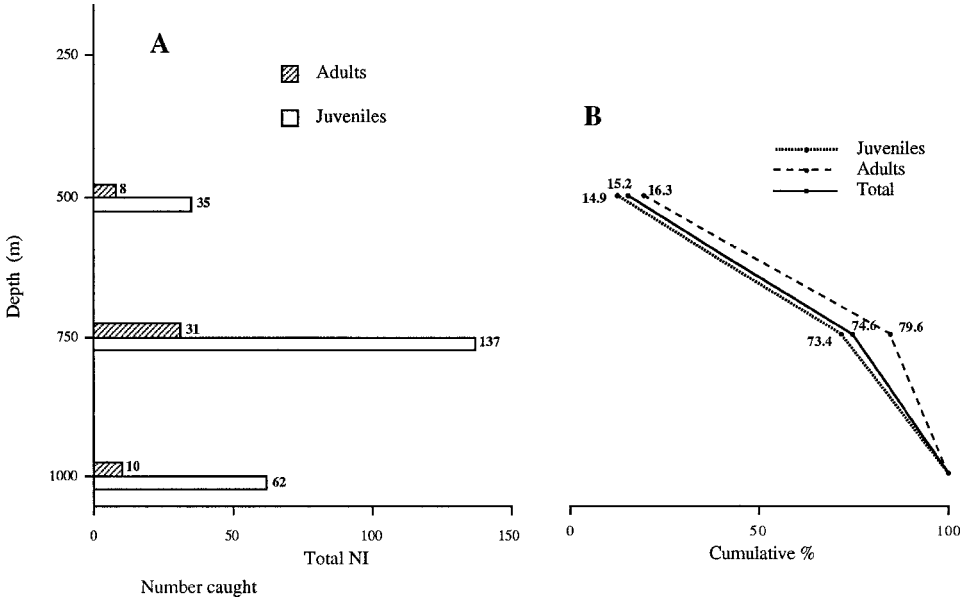

Fig. 5. The depth distribution of *Sergia robusta* (Smith, 1882) in the northern Aegean Sea. A, catch totals; B, cumulative percentages.

daytime, having its maximum abundance at 800 m, while Vereshchaka (1994) found it from 1000 to 2000 m with maximal density in the layer of 1500-2000 m, and at night below 200 m with a maximal density at 200-500 m. The latter author attributed the difference of his daytime data with those given by Foxton (1970b) to the fact that he had samples from depths of 0-950 m only. Flock & Hopkins (1992) found a daytime depth range at 200-900 m for the corresponding population in the Gulf of Mexico, with the bulk of juveniles located at 400 m and that of the adults at 800 m. The bulk of the Aegean population, as a total, was also located approximately at the same depth level (750 m). The fact that in the Aegean the bulk of the juvenile individuals seems to be located a little deeper than the adults, unlike the observations made in the Gulf of Mexico, could be attributed to the fact that in the Aegean the maximum bottom depth does not exceed 1000 m, and hence the adults are not able to migrate deeper, even if they might prefer so. As a result, there is a mixing of the two size classes. An additional reason is, that sampling in the Aegean was performed only at 4 depth levels. Froglia & Giannini (1982) found that the bulk of the population of this species in the western Mediterranean is located from 700 m to deeper than 1000 m during daytime. These bathymetric data also agree with those for the Atlantic (Foxton, 1970b; Flock & Hopkins, 1992) and for the Aegean Sea.

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