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DECAPOD CRUSTACEANS COLLECTED BY DEEP-WATER TRAWLS (BETWEEN 1000 AND 2200 m) IN THE CATALAN AREA (NORTH-WESTERN MEDITERRANEAN)

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Summary

A total of 56 trawls were performed between 1000 and 2200 m depth in the Catalan Sea (NE Spain). A total of 32 species were present in the samples. The mean number of individuals per trawling hour was calculated grouping the trawls by 100 m depth intervals. The species collected could be classified into two groups: (a) species which also inhabit the upper slope, and (b) the extreme depth species. The 1400 and 1900 m isobaths coincide with changes in the faunistic composition.

Introduction

The decapod crustacean fauna in the North-West Mediterranean is relatively well known in the upper slope and continental shelf (Zariquiey Alvarez, 1968; Sardá and Palomera, 1981; Abelló et al., 1988). However, the descriptive study of deep-water decapod crustaceans at depths of more than 1000 m was only recently initiated in this area (Abelló and Valladares, 1988). The main objective of the present paper is to present the results of average abundance by depth of the species collected is 56 deep-water trawls (between 1000 to 2200 m) performed in the Catalan Sea.

The present results constitute the first contribution to study the deep-water communities of decapod crustaceans in the North-West Mediterranean Sea.

Material and Methods

Figure 1 shows the study area: bottoms between 1000 and 2200 m in the Catalan Sea, between the coast of Catalonia (North-East Spain) and the Balearic Islands. A total of 56 trawls were performed in several cruises on board R/V "García del Cid" which took place between 1985 and 1988.

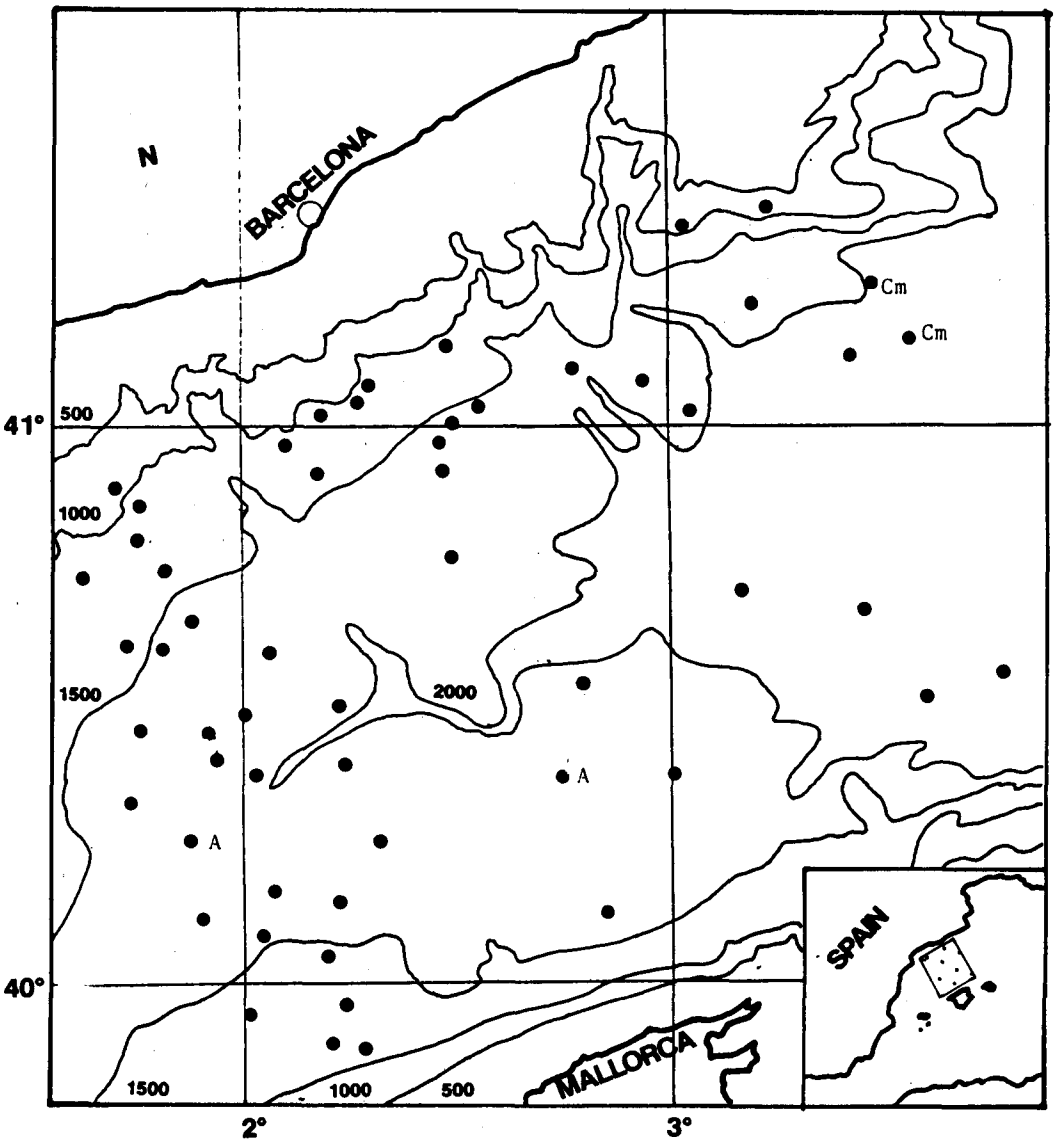

Fig. 1 Depth contour map of the study area in the Western Mediterranean: symbols indicate positions of trawls:
Cm Presence of *Chaceon mediterraneus*.
A Presence of indeterminate Axiidae.

All the samples were collected using a Marinovich type bottom trawl with doors equipped with a 6 mm codend mesh size.

Trawls were grouped by 100 m depth intervals. The mean number of individuals per trawling hour was then calculated.

We identified the decapod crustaceans captured to the species level, except with some specimens of the family Axiidae, whose taxonomic status is still indeterminate (Table 1).

Results and Discussion

A total of 32 species were present in the samples (Table 1, Figure 2). Only 15 of them attained density levels greater than or equal to one individual per hour. Five of these were bathypelagic species (*Gennadas elegans, Sergestes arcticus, Sergia robusta, Pasiphaea multidentata,* and *Acanthephyra pelagica)*; the remaining ten ware benthic or nektobenthic species. Results for the benthic and nektobenthic species are considered to be the most reliable, given the type of net employed in the sampling.

Some of the nektobenthic shrimps exhibited considerable depth-dependent variability in abundance. The shrimps *Aristeus antennatus* and *Acanthephyra eximia* occurred all along the sampled depth range, though their abundances by depth fluctuated.

Other species were distributed over only part of the depth range sampled. The lower limit to the distribution of *Plesionika acanthonotus* was situated at around 1400 m. *Nematocarcinus exilis* became progressively more abundant after the 1400 m isobath, reaching maximum density levels in the deepest area sampled (2200 m).

Among the benthic species, the distribution of *Polycheles typhlops* and *Geryon longipes* followed the same pattern as *Plesionika acanthonotus.* Conversely, *Stereomastis sculpta* exhibited a distribution pattern similar to that of *Nematocarcinus exilis.*

The crangonid *Pontophilus norvegicus* and the anomuran *Munida tenuimana* were regularly distributed between 1000 and 1900 m. At greater depths, their abundance became negligible or nil.

Among the rest of species with a low density we want to remark the occurrence of two individuals of *Chaceon mediterraneus*, brachyuran crabs belonging to the family Geryonidae. This constitutes the first record of this deep-water species in the Iberian Mediterranean waters and the third in the Mediterranean Sea (Manning and Holthuis, 1989). We also want to remark the occurrence of one individual of the galatheid crab *Munidopsis tridentata* captured in a trawl performed between 960 and 1002 m. This constitutes the second record of this

Table 1. Average abundance (number of individuals captured per hour of trawling) during the sampling program. *: less than one individual per hour.

Depth:	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200
number of trawls:	8	5	3	6	3	4	3	8	7	2	2	1	4
SPECIES													
Gennadas elegans (S.I. Smith, 1882)	1	1	*	2	*	4	2	2	*	2	0	0	*
Aristeus antennatus (Risso, 1816)	12	5	13	15	10	13	6	5	6	2	0	0	*
Sergestes arcticus (Kröyer, 1855)	4	4	*	2	*	0	*	*	0	0	0	*	0
Sergestes henseni (Ortmann, 1893)	0	0	*	0	0	0	0	0	0	0	0	0	0
Sergestes sargassi (Ortmann, 1893)	*	0	0	0	0	0	0	0	0	0	0	0	0
Sergia robusta (S.I. Smith, 1882)	2	2	*	3	*	2	*	1	*	*	2	1	*
Richardina fredericii (Lo Bianco, 1903)	0	0	*	0	0	0	0	0	0	0	0	0	0
Pasiphaea multidentata (Esmark, 1866)	*	*	*	*	*	*	*	*	*	*	*	*	*
Acanthephyra eximia (S.I. Smith, 1886)	4	4	6	19	19	36	14	36	32	65	18	34	93
Acanthephyra pelagica (Risso, 1816)	*	*	*	2	*	2	*	*	*	*	4	*	*
Plesionika acanthonotus (S.I. Smith, 1882)	11	9	17	2	2	*	*	0	0	0	0	0	0
Nematocarcinus exilis (Bate, 1888)	0	0	0	3	*	2	2	5	6	9	7	21	32
Pontocaris lacazei (Gourret, 1887)	*	*	0	0	0	0	0	0	0	0	0	0	0
Pontophilus norvegicus (M. Sars, 1861)	14	10	20	15	7	15	14	11	4	6	*	0	*
Nephrops norvegicus (Linnaeus, 1758)	*	0	0	0	0	0	0	0	0	0	0	0	0
Polycheles typhlops (Heller, 1862)	5	6	2	*	*	2	*	0	*	0	0	0	0
Stesreomastis sculpta (S.I. Smith, 1880)	*	*	*	1	3	7	5	21	25	60	12	65	59
Calocaris macandreae (Bell, 1846)	8	2	1	*	0	*	*	*	0	0	*	0	0
Fam. Axiidae	0	0	0	0	0	0	0	*	0	*	0	0	0
Pagurus alatus (Fabricius, 1775)	*	*	0	0	0	0	0	0	0	0	0	0	0
Munida intermedia (A. Milne Edwards & Bouvier, 1899)	*	0	0	0	0	0	0	0	0	0	0	0	0
Munida tenuimana (G.O. Sars, 1872)	17	21	43	26	26	28	20	18	19	22	0	0	*
Munidopsis tridantata (Esmark, 1857)	*	0	0	0	0	0	0	0	0	0	0	0	0
Paromola cuvieri (Risso, 1816)	*	*	0	0	0	0	0	0	0	0	0	0	0
Medorippe lanata (Linnaeus, 1767)	0	0	0	0	0	0	0	0	0	0	0	0	0
Liocarcinus depurator (Linnaeus, 1758)	0	0	0	0	0	0	0	0	0	0	0	0	0
Macropipus tuberculatus (Roux, 1830)	*	0	0	0	0	0	0	0	0	0	0	*	0
Geryon longipes (A. Milne Edwards, 1881)	1	7	*	2	*	*	*	*	*	0	0	0	0
Chaceon mediterraneus (Manning & Holthuis, 1989)	0	0	0	0	0	0	0	0	0	0	0	0	*
Monodaeus couchii (Couch, 1851)	*	*	0	0	0	0	0	0	0	0	0	0	0
Macropodia longipes (A. Milne Edwards & Bouvier, 1899)	*	0	*	0	0	0	0	0	0	0	0	0	0
Dorhynchus thomsoni (Thomson, 1873)	*	*	*	*	0	0	0	0	0	0	0	0	*
Total number of individuals	81	74	106	94	73	112	69	101	94	167	46	127	193

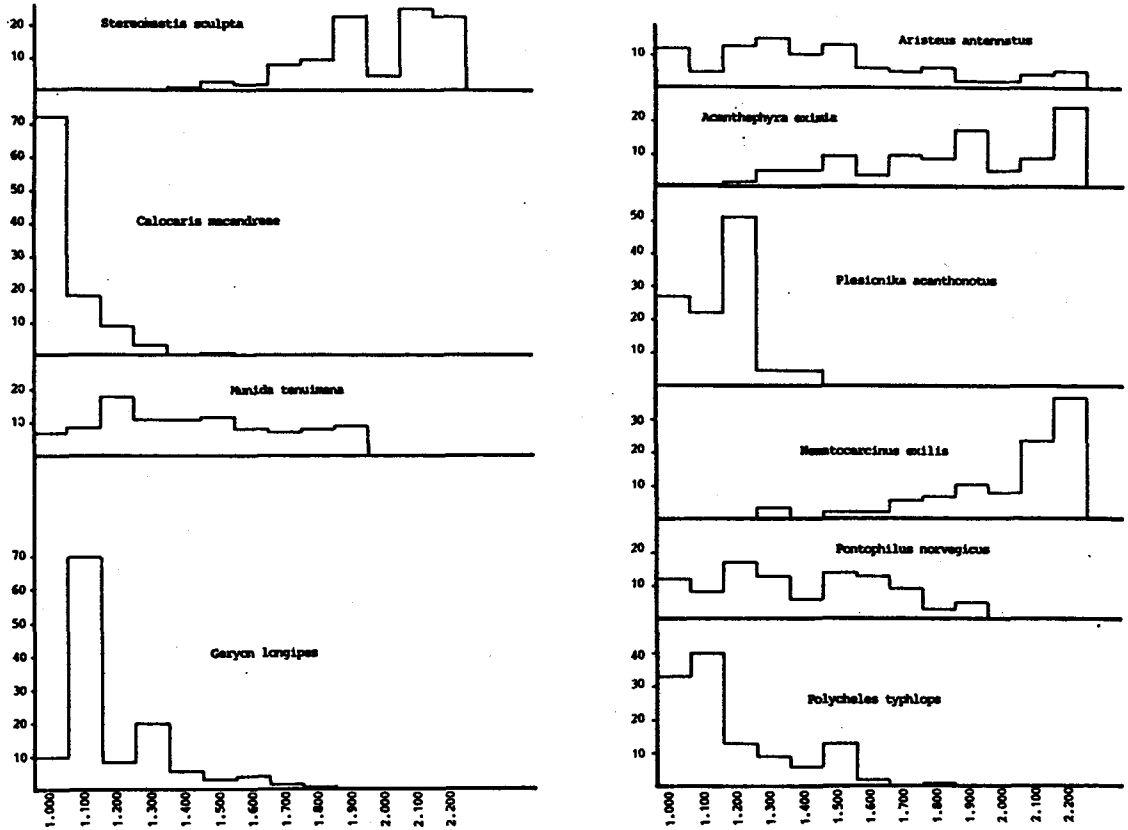

Fig. 2 Percentage abundance by 100 m depth intervals of the ten more abundant species.

species in the Mediterranean Sea (Abelló and Valladares, 1988), providing thus further evidence of the occurrence of this species in the Mediterranean. In the same way we want to note the occurrence of one idividual of *Richardina fredericii* collected in a trawl at 1050 m.

One species whose taxonomic status is still indeterminate was also collected. It is a macruran belonging to the family Axiidae (3 individuals captured in two trawls between 1750 and 1900 m) (Figure 1).

In summary the species collected can be classified in two great groups:

1. The species which also occur on the lower-slope (500-800 m depth) (Abelló et al., 1988). Generally, these species do not extend their distribution range to depths lower than 1400 m.
2. A second group of species exclusive of extreme depths (distributed only below 1400 m).

The first group includes almost all the species with densities lower than one individual per trawling hour over the entire study area and can be regarded as the fringes of their population, living on or over bottoms shallower than 1000 m, hence the very low densities in the depth range sampled in this study. These species are the caridean shrimp *Pontocaris lacazei,* the macruran *Nephrops norvegicus,* the anomuran crabs *Munida intermedia* and *Pagurus alatus,* and the brachyuran crabs *Paromola cuvieri, Medorippe lanata, Liocarcinus depurator, Macropipus tuberculatus, Monodaeus couchii, Macropodia longipes,* and *Dorhynchus thomsoni.*

Other species showed higher densities on the same depth range: *Plesionika acanthonotus, Calocaris macandreae, Polycheles typhlops* and *Geryon longipes* (Figure 2).

Aristeus antennatus and *Acanthephyra eximia* were distributed troughout the sampled depth range. *A. antennatus* was abundant in trawls performed between 1000 and 1500 m, but the density of this species fell to about half around the 1600 m isobath. The converse held true for *Acanthephyra eximia.* Its abundance was low between 1000 and 1300 m, afterwhich it climbed, particularly from 1700 m.

Only two species showed an exclusive extreme depth distribution pattern: *Nematocarcinus exilis* and *Stereomastis sculpta.* The caridean shrimp *A. eximia* is another species whose abundance was important in the extreme depth interval (1400-2200 m), but is not an extreme depth exclusive species.

Chaceon mediterraneus and the indeterminate Axiidae species appear also to be extreme depths species, as their distribution pattern in the hauls suggests.

In summary, there appear to be two isobath limits which coincide with changes in the faunistic composition. The most important faunistic change is

found around 1400 m. This boundary is also indicated by different authors in other areas (Headrich et al., 1980; Lampitt et al., 1986). The 1400 m isobath constitutes the lower distribution limit of certain species and the upper distribution limit of the extreme depth species. In the same way this limit is also related to the changes in abundance of certain species (*Aristeus antennatus* and *Acanthephyra eximia*).

Finally the 1900 m isobath apparently constitutes a second boundary, limiting the distribution of *Munida tenuimana* and *Pontophilus norvegicus*.

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