ANNUAL CYCLE OF DECAPOD LARVAE ASSOCIATED WITH A SANDY BEACH IN SOUTHEASTERN OF SPAIN

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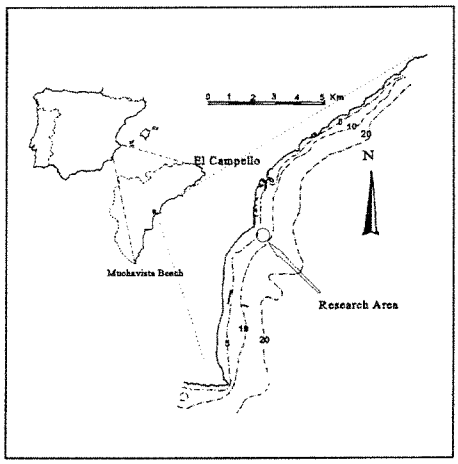
The research area is placed in Muchavista Beach (El Campello), located on the Southeastern coast of Spain (fig.1). The bionomic composition of this beach mainly consists of sandy bottom biocoenosis and small *Cymodocea nodosa* meadows. The research period was from July 1990 to July 1991. Samples were taken in the neritic zone, between eight and one meter depth, with a planktonic net (250 µm mesh size), and were quantified with a digital flow-meter. During the sampling period, the dominant species in decapod meroplankton were zoeas and megalopas from the following groups: (a) *Polybiinae* group (26.04%), (b) *Hippolytidae* family (15.73 %), (c) *Portumnus latipes* (13.00 %), (d) *Philocheras* sp. (11.78 %), (e) *Processa* sp. (9.42 %), and (f) *Diogenes pugilator* (8.05 %).



If we compare the composition of neritic larvae population with that of adult populations during the same period, we can see that the dominant taxa are the same in both cases. Dominant adults in the study area are: *D. pugilator* (40.85%), *Philocheras monacanthus* (25.12%), *Macropodia rostrata* (14,6%), *Hippolyte inermis* (12.07%) and *Liocarcinus vernalis* (2.8%) (GUILLÉN & PÉREZ, 1993).

Due to the fact that it is very difficult to determine larvae, mainly to get species level, there is very little specific literature on the subject. This fact makes it almost impossible to make any relationship between larvae and adults. This problem even gets worse with larvae of Polybiinae and Hippolytidae, because several species are included in these groups.

The research carried out revealed that the larvae and adult populations found in the area are closely related to each other, such is the case of the larvae that could be determined to species level, viz., *D. pugilator*. In this way, we can consider that many *Philocheras* sp. and *Processa* sp. larvae are the same than the benthic adults found, viz., *P. monacanthus* and *P. modica carolii* respectively. And therefore, larvae considered as *Polybiinae* and *Hippolytidae* may contain a considerable percentage of the main species found in this research, that is, *L. vernalis* and *H. inermis* respectively.

However, the abundance of *P. latipes* larvae contrasts with the lack of adults. This fact could be clarified by means of the bathymetric range of *P. latipes* (0-2 meters). This area was not sampled during the research period. This absence of relationship between larvae and adult populations is also seen in *M. rostrata* of which no larvae were found, and in Majidae of which just two specimens were identified as such. When comparing the seasonal composition of decapod larvae, some differences can be pointed out :

Summer : Larvae composition is equally distributed. However, some species can be considered as dominant, such as Hippolytidae group (26%), and the Polybiinae group, probably *Liocarcinus* sp. (25%), and *P. latipes* (11%). The latter mainly reproduces during the summer period. In this season, we have also found *D. pugilator* (10%), and at percentages lower than 10%: *Calcinus tubularis, Porcellana platycheles, Pirimela denticulata, Processa* sp., *Callianassa* sp, *Ebalia* sp., *Eurynome* sp. and species included as Caridea, Alpheidae, Majidae, and non identified Brachyura.

Autumn : Polybiinae group still dominates in the samples obtained (37%). But, the variety is lesser than the one observed during the summer. This fact can be due to a *Philocheras* sp. larvae bloom (39%). We have also detected Hippolytidae larvae, *P. latipes, D. pugilator*, and a group of unidentified Brachyura (8%). The remaining taxa are *Dromia personata* and Alpheidae, and stand for the 2%.

Winter : Although the number of larvae was low, the samples taken at the end of this period (March) dominated the number of samples taken during the winter. Thus, *Processa* sp. (40%) is the main species, due to the start of its reproductive period. *Processa* sp. is immediately followed by *Philocheras* sp. (17%), by *Polybiinae* group (14%) and by *Galathea intermedia* (8%) that also start their reproductive period. There are seven other taxa with percentages lower than 2%: *Processa* sp., unidentified Caridea, *P. platycheles, P. denticulata, P. latipes, Gennadas elegans* and Majidae.

Spring : The species with high fecundity gives rise to high larvae percentages, like Polybiinae group (31%) and *P. latipes* (43%). At this time of the year, *D. pugilator* starts its reproduction season (10%). We also point out the decrease of larvae of *Processa* sp. and *Philocheras* sp., contrasting with the high percentage observed during the winter period.

Finally, we must underline the high number of larvae from neritic zone species, and the low percentage (0,3%) of oceanic species (only *G. elegans*). Thus, we can say that the dominant taxa found are the same than those of the dominant species from local benthic communities (GUILLÉN & PÉREZ-RUZAFA, 1993).

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WINTER DISTRIBUTION OF COPEPODS IN THE SOUTH ADRIATIC SEA

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Data about the epipelagic copepods of the Southern Adriatic Sea, collected in the coastal and offshore waters, are reported in this paper. The zooplankton has been collected in 20 stations situated along 5 transects on the bathymetrics of the 50, 100, 200 and 500 meters in the Apulian Adriatic waters during a research aiming at evaluating the Clupeiforms ichthyoplankton (fig.1). Samples were obtained by double oblique hauls using a "Bongo 60" net with 235 µm mesh size. The data have been elaborated through multivariate analysis using Bray-Curtis index of similarity. In the whole area 74 species of copepods have been determined, however 17 are the ones which represent 95% of population (tab.1).

Clausocalanus pergens	20,7	*Clausocalanus jobei*	2,6
Acartia clausi	19,3	*Calanus helgolandicus*	2,5
Ctenocalanus vanus	9,7	*Calanus tenuicornis*	2
Paracalanus parvus	9,2	*Oithona plumifera*	1,3
Oithona atlantica	6	*Calocalanus styliremis*	1,3
Centropages typicus	5,5	*Pseudocalanus elongatus*	1,1
Temora longicornis	3,5	*Clausocalanus arcuicornis*	1,1
Clausocalanus paululus	3,4	*Clausocalanus furcatus*	1
Oithona similis	2,8		

tab.1 : Percentage (%) of the most important species.

From the cluster analysis (fig.2) two groups of stations (G1 and G2) are distinguished at 30% level of similarity. The first group (G1), which includes the stations of the first transect (st.1-4) and the stations nearest to the coast situated on the bathymetrics of 50 and 100 m (st.5, 9, 13, 17, 6, 10), is characterized by the presence of typical coastal species as *Acartia clausi* (28,3%), *Paracalanus parvus* (14,5%) and *Centropages typicus* (13,1%). The separation of the stations 1 ,2, 3 and 4 at 35% level of similarity is due to the major presence in these waters of *Ctenocalanus vanus* (28%), *Oithona atlantica* (22,3%) and *A. clausi* (19%). The second group (G2) is composed of the two most southern stations of the 100 m bathymetrics (st.14, 18) and all the other stations situated on the 200 m and 500 m bathymetrics (st. 7, 8, 11, 12, 15, 16, 19, 20). The stations belonging to this group are distinguished by the dominance of open waters species like *Clausocalanus pergens* (48,6%), *Clausocalanus paululus* (6%), *Oithona atlantica* (3,7%), *Clausocalanus arcuicornis (3,7%)* and the presence of other neritic species as *P. parvus* (7,9%), *C. vanus* (5,3%), *Oithona similis* (4,9%). The separation of stations 16, 18 and 19 at 40% level of similarity is due to the higher frequency of *C. paululus* (16,6%; 130 ind./m^3) while the station 20 is distinguished for the maximum presence of *C. pergens* (57,7%; 403 ind./m^3). It can be highlighted that *C. pergens* and *C. paululus*, considered by HURE *et al.*, 1980 as two typical species of the superficial waters of the Adriatic "oceanic community", within the most southern area of the basin extend their areal of distribution even in the neritic-coastal waters, favoured by the low winterly temperatures of the same. They continue to characterize the epipelagic open waters copepods population in the Southern Adriatic Sea. *O. atlantica* FARRAN 1908, an open waters species (NISHIDA, 1985) already found in the Otranto Channel as well (HAJDERI *et al.*, 1993), which has been never signaled before by other authors for the Adriatic Sea (HURE *et al.*, 1969, 1980; REGNER, 1985), is reported for the first time in the Southern Adriatic Sea with density values between 0,8-183,3 ind/m^3. Furthermore other four new species for the Adriatic Sea have been found : *Calocalanus tenuis* FARRAN 1926, *Centropages bradyi* WHEELER 1899, *Scolecithrix auropecten* GIESBRECHT,1892 and *Candacia giesbrechti* GRICE & LAWSON 1977. They are rare species, mostly found in the Western Mediterranean (particularly the first three ones), which probably enter the Adriatic Sea through the current of the atlantic superficial waters that in winter moves from the Central Mediterranean towards the Adriatic (ZORE-ARMANDA, 1969).

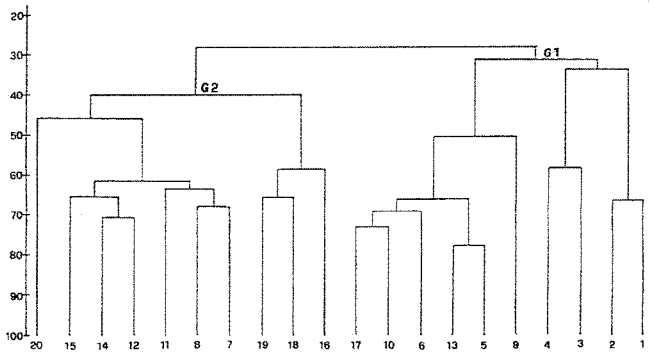

Fig.2 : Stations affinity

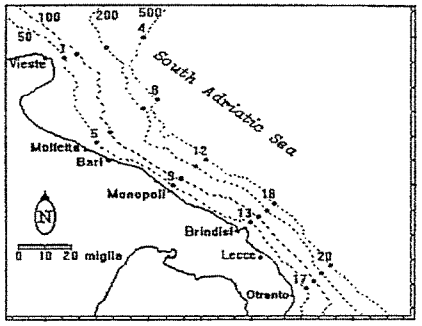

Fig.1 : Map of sampling stations

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