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Zooplankton and zoobenthos role in the diet of juvenile stages of different fish species in an embayment of the Po River Delta

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Zooplankton and zoobenthos distribution and feeding habits of juvenile stages of five fish species (*Sparus auratus* L., *Dicentrarchus labrax* L., *Liza ramada* Risso, *Liza aurata* Risso and *Liza saliens* Risso) in the Sacca di Scardovari have been studied, as integrated parts of a research on trophic structure and biological productivity of this embayment.

Sacca di Scardovari is a large embayment of about 32 km² area, located between the Tolle and Gnocca branches of the Po River Delta; its mean depth is about 1.5 m. It is connected to the sea through a wide mouth barred by partly submerged sand banks. Ecological investigation carried out by COLOMBO et al. (1979) showed a division of the bay into two areas with different characteristics. The more sheltered inner area shows more sluggish water renewal, more constant salinity, higher phytoplankton chlorophyll a contents and higher organic matter concentration in the sediment than the southern area, which is directly influenced by the tidal currents and by the water flow from the terminal branches of the river. The sediment is prevalingly clayey-silty in the northern area, prevalingly sandy in the southern one.

Zooplankton samples were collected nearly fortnightly from March 1978 to April 1979 at four stations by means of a pump equipped with an 80- μ m mesh net.

Macrobenthos and meiobenthos samples were gathered in a forty station grid (three samples per station) during June 1976, using respectively a 0.1 m² Van Veen grab and a hand-lowered 28 cm² corer.

Fry samples were collected during 1978 with a large trawled net, almost exclusively in the northern zone of the bay which is that mainly exploited by fry-fishermen. The stomach contents of 628 individuals were examined.

Total zooplankton has higher annual mean density in the northern area (about 190 ind./l on the average) than in the southern one (about 77 ind./l on the average). Besides, zooplankton of the inner area is mainly characterized by higher annual mean densities of the meroplanktonic groups, particularly larvae of Cirripeds (about 49 ind./l), Polychaetes (about 21 ind./l), Bivalves (about 19 ind./l) and Gastropods (about 28 ind./l); neritic Copepods (copepodites and adults) and Cladocerans are more abundant in the southern area, where their annual mean densities are respectively 8 and 4 ind./l.

Macrobenthos shows in the inner zone a higher mean density (17, 203 ind./m²) than in the southern one (3,705 ind./m²) (MANTOVANI et al. 1979); in the stations of the former area macrobenthos has a fairly low species diversity but a high variety of major taxa represented among the dominant species. These are the Polychaetes *Capitella capitata* (41 % of the mean density), *Polydora ciliata* (19 %) and *Ficopomatus*

enigmaticus (2 %); the Amphipods *Corophium insidiosum* (20 %) and *Gammarus insensibilis* (4 %); the Bivalves *Mytilaster minimus* (9 %) and *Cerastoderma glaucum* (2 %); the Gastropods *Hydrobia sp.* (1 %). In the southern area, on the contrary, the first 5 dominant species belong to the Polychaete phylum: *P. ciliata* (36 %), *Heteromastus filiformis* (29 %), *Streblospio shrubsolii* (15 %), *C. capitata* (6 %) and *Nereis succinea* (5 %).

Among the meiobenthic taxa, Harpacticoids were investigated in detail; their mean density in the northern area (251 ind./10 cm²) is about half of that in the southern one, while species diversity in the former zone is clearly higher than in the latter (CECCHERELLI and CEVIDALLI 1978). In the stations of the northern area, in fact, in addition to two typical benthic species, *Canuella perplexa* and *Microarthridion fallax*, phytal species are also well represented, such as *Ameira parvula*, *Tisbe histriana* and *Tisbe battagliai*. In the stations of the southern area, on the contrary, only *C. perplexa* represents 84 % of the total Harpacticoid density.

In the stomach contents of the examined fry, food items were generally identified at the level of the major taxonomic groups; food items belonging to some planktonic taxa (Cladocerans and Copepods) were identified at the species level; a rough, preliminary identification was also made for items belonging to some benthic taxa (Harpacticoids and Amphipods).

The degree of stomach fullness was on the average rather high, probably owing to the great food supply in the bay. The feeding habits of the fish fry of the five species show no great difference in the smaller-sized stages (standard length less than 30 mm): they have a carnivorous diet, based mainly on zooplankton and to a lesser extent on benthic or phytal organisms such as Harpacticoids and Amphipods. Moreover, they show a selective feeding behaviour towards different meroplankton groups: larvae of Copepods, Cirripeds and Polychaetes are abundant in their diet according to the corresponding abundance in the environment, while Bivalve and Gastropod larvae, which make up an important component of the embayment zooplankton, are fairly scarce.

As size increases (standard length more than 30 mm), food preferences are clearly differentiated: *S. auratus* feeds on macrophyte detritus and macrobenthos, almost exclusively Polychaetes and Amphipods (mainly *Corophium sp.*); *D. labrax* turns decidedly to macroplankton, i.e. Decapod larvae and Mysidaceans; the three species of grey mullets turn to a mixed diet which still includes zooplankton (larvae of Cirripeds and Bivalves) but tends to be mainly based on benthic organisms (microalgae, Polychaetes, Harpacticoids and, to a lesser extent, Nematods and Amphipods).

The composition of the stomach contents reflects basically the complexity and variability of the structure of the plankton and benthos biocoenoses in the northern area of the bay. The species of planktonic Cladocerans and Copepods and of Harpacticoids and Amphipods most frequently found in the stomach contents are the dominant ones in the embayment taxocoenoses.

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