POLYCHAETE, BACTERIA AND MICROPHYTOBENTHOS FLUCTUATIONS IN SUBTIDAL SEDIMENTS OF THE LIGURIAN SEA (NORTH WESTERN MEDITERRANEAN)

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Benthic bacteria and microphytobenthos represent important food source for macrofauna (NEWELL and FIELD, 1983) but their quantitative role in the diet of polychaetes has not been yet assessed (CAMMEN, 1980; MONTAGNA, 1984). The present study was designed to test the presence of a relationship between the fluctuations of the polichaete community and the fluctuations of the abundance and biomass of bacteria and microphytobenthos, representing a possible food source. From January 1991 to February 1993, a sandy bottom community at 10 m depth (Ligurian Sea) was investigated monthly by SCUBA divers. The following parameters were considered in the sediment : polychaete abundance (collected by using a suction device system, mesh sieve used 1 mm size), benthic bacterial density and biomass (estimated by epifluorescence microscopy), micro-phytobenthos biomass (measured as chlorophyll a) organic carbon (OC) and nitrogen (ON) (measured using a CHN analyser). Organic carbon showed the highest values both in winter (3.88 ± 1.89, 2.29 ± 0.57, and 2.02 ± 0.06 mg g^{-1} sediment d.w. in February and December 1991, January 1993) and spring (2.21 ± 0.14, 3.14 ± 1.11 mg g^{-1} sediment d.w. in April 1991 and May 1992, respectively), while the lowest at the beginning of summer (0.85 ± 0.00 mg g^{-1} sediment d.w. in June 1992). Nitrogen showed the highest value in October 1992 (0.46 ± 0.06 mg g^{-1} sediment d.w.) and the lowest in winter (0.14 ± 0.02, 0.19 ± 0.00 mg g^{-1} sediment d.w. in December 1991 and February 1993 respectively). Also chl-a showed wide seasonal fluctuations with minimum values in winter (0.18 ± 0.02 mg g^{-1} sediment d.w. in December 1992 and January 1993, respectively) and maximum in summer (3.96 ± 0.89 mg g^{-1} sediment d.w. in July 1991). Bacterial density and biomass varied seasonally being characterized during both years by spring (density: 2.68 x 108 g^{-1} of sediment d.w. in April 1991, 5.07 x 108 g^{-1} of sediment d.w. in April 1992; biomass: 11.94 and 21.06 mgC g^{-1} of sediment d.w., in April 1991 and 1992) and autumn peaks (density: 26.7 x 108 g^{-1} sed.d.w. in October 1991, 5.8 x 108 g^{-1} sed.d.w. in December 1992; biomass: 88.0 and 20.37 mgC g^{-1} sediment d.w., in October 1991 and December 1992, respectively). Polychaetes showed high seasonal fluctuations with spring peaks, and were significantly correlated with the chl-a trend (Spearman Rank Correlation, r = 0.94, p = 0.016, Fig. 1). On the contrary, no correlation was found with other sediment parameters. Deposit feeders were the most important group (52 %). They were significantly related to bacterial abundance (Spearman Rank Correlation, r = 0.985 p = 0.0004, Fig. 2).

It is well known that the standing stock of organic carbon does not always represent a measure of the amount of food readily available for benthic organisms. Food supply may have a major role in determining seasonal fluctuations of macrobenthos. Winter OC peaks, coupled with high C:N ratios (up to 17 in February 1991), suggest that the composition of the organic matter is mainly of refractory material (allochthonous origin). For this reason, the lack of significant correlations between polychaetes and organic carbon is not surprising. On the contrary, the significant correlation between the whole polychaetes community and microphytobenthos and between deposit feeders and bacteria, is consistent with those previously reported by MONTAGNA (1984), and it suggests the importance of these two components in the diet of polychaetes even though the presence of significant correlation between polychaetes and microbial parameters does not guarantee a cause-effect relationship and must be considered with caution. Nonetheless, since bacteria and microphytobenthos account for the majority of the labile organic matter and considering the oligotrophy of the Ligurian Sea, it is not unreasonable to assume that they may have a major role in structuring the polychaete community, especially as far as seasonal changes in trophic structure are concerned.

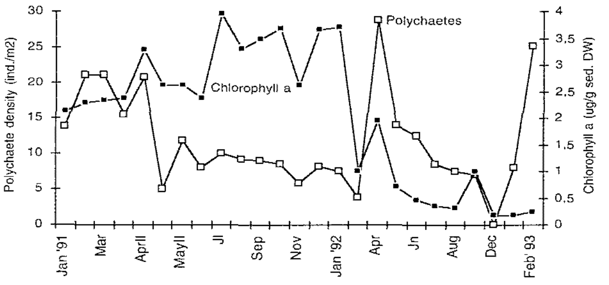

Fig. 1 Seasonal changes of polychetes abundance and chl-a content in the study area.

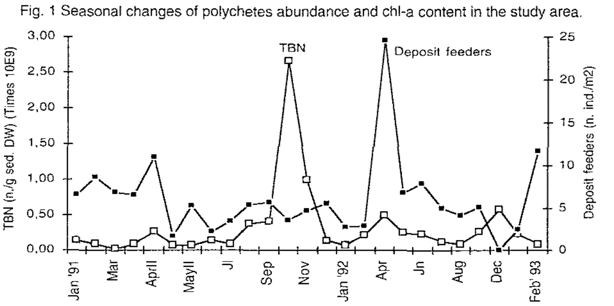

Fig. 2 Seasonal changes of deposit-feeders polychaete density and total bacterial number (TBN).

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AGE AND GROWTH OF *CHAMELEA GALLINA* (BIVALVIA : VENERIDAE) IN THE CENTRAL ADRIATIC SEA OBTAINED BY THIN SECTIONS

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Chamelea gallina is a very common bivalve in Mediterranean inshore waters where it inhabits well sorted fine sand biocoenosis (PICARD, 1965) : along the Western Adriatic shore it is found in shallow sandy bottoms down to a depth of about 13 metres and it sustains an important fishery worth an estimated total catch of about 100000 tons per year in the 80's (FROGLIA, 1989).

Fishery for *Chamelea gallina* along the Western Adriatic coast is performed by means of hydraulic dredges : in order to assess the available biomass of *Chamelea gallina* experimental surveys are carried out every year by IRPEM in an area covering about 200 km of coastline around Ancona. Material for this study was collected in June 1991, October 1991, November 1991, February 1992, June 1992 and December 1992. 917 specimens ranging from 7 to 49 mm in shell length were retained for the growth study.

Shell sectioning as method for investigating growth rates in bivalves is a long term established technique (RHOADS and LUTZ, 1980), it has been applied recently to the stock of *Chamelea gallina* of the Western Mediterranean (RAMON and RICHARDSON, 1992).

The right valve was sectioned from the umbo to the ventral margin along the axis of maximum growth in order to obtain a thin section of about 20-30μ mounted on a glass slide. The section was ground, polished and examined using a dissecting microscope under reflected light : 719 sections could be interpreted showing distinct annual increments. Annual periodicity was validated observing the period of formation of the increment on the ventral margin of the shell : slow growth increments are formed once per year approximately between October and February. The analysis of length frequency distributions of the experimental samples is in agreement with these findings .

A complete record of size at age for each *Chamelea gallina* was obtained by measuring incremental growth as the distance from the ventral margin of each translucent band to the umbo using an Image Analysis System linked to a dissecting microscope.

Chamelea gallina spawns in Central Adriatic mainly in late spring (POGGIANI *et al.*, 1973) therefore conventional birthday was assumed to be the 1st of July. The maximum age found in the sample is 8 years.

Parameters of the von Bertalanffy growth function together with their asymptotic standard errors were computed by means of non-linear regression analysis using the program FISHPARM (SAILA *et al.*, 1988):

L_∞= 41.6 (0.54) K= 0.48 (0.016) t_0= - 0.01 (0.17)

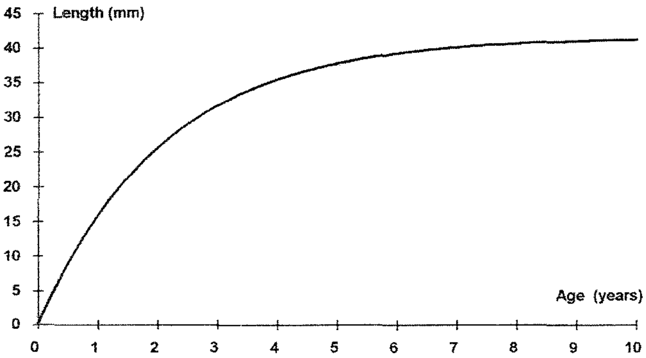

Fig. 1 - Von Bertalanffy growth curve of *Chamelea gallina*.

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