X-II1

TROPHIC STRUCTURE CHANGES OF A POLYCHAETE COMMUNITY ALONG A VERTICAL CLIFF

Adriana GIANGRANDE

Dipartimento di Scienza dell'Ambiente e del Territorio,
Università di Pisa, Pisa (Italia)

Résumé: *On décrit le changement des groupes trophiques dans une communauté de Polychètes de substrats rocheux entre 0 e 5m de profondeur. La communauté est dominée par les formes carnivores. Les herbivores abondent dans les premiers mètres tandis qu'en profondeur augmentent les filtrateurs et les limivores.*

Polychaetes are one of the most representative groups present in both hard and soft-bottom communities. These organisms show a large variety of feeding types and strategies and are involved in many levels of the marine food chain. An analysis of the trophic structure of this group could help us to understand the inter-relationships and energy exchanges which characterize the entire community. Moreover, such a functional analysis could clarify the distributional patterns of the species related to environmental parameters observed using other methods of analysis. Feeding guilds have been extensively used, particularly in studies of the soft-bottom community (Maurer & Leathem, 1981; Gambi & Giangrande, 1985) and, more rarely, in studies of the hard-bottom community (Desrosier et al, 1984).

In the present work, the trophic structure of Polychaetes along a cliff of Cape Romito (Leghorn) was analyzed. Samples were collected during the year of 1985 by scuba divers, scraping off an area of 400 sq cm at depths of 0, 1, 2, 3, 4 and 5 m. Biomass was measured as wet weight in 70° alcohol. The Polychaetes were classified and grouped into "feeding guilds" according to Fauchald & Jumars (1979). The abundance and the biomass measured for each group were percentages which reflected the abundance and biomass of all species within that group. The algal vegetation of the wall can be defined as belonging to the large assemblage of the Photophylic algae in a semi-exposed environment. In particular, at a depth of 4-5 m some sciaphilous species were present on a basal stratum of biogenic concretions.

Fig. 1 shows the trend of feeding guild percentages, referred to as the annual mean (1985) of the abundance (Fig.1a) and the biomass (Fig.1b), respectively. In both of these parameters we note a similar trend: The MICROCARNIVORES (most of the Syllidae) were always very abundant, with a constant distribution along the transect, while their biomass increased with increasing depth. The MICROHERBIVORES (some Exogoninae) tended to decrease both in abundance and in biomass with increasing depth. The MACROCARNIVORES (Aphroditidae and Eunicidae) decreased between 0 and 1 m, with a maximum abundance and biomass at a depth of 1 m. They were also very abundant between 3 and 5 m. The biomass peak was due to the species Eunice harassi, which was particularly linked to this depth of 1 m. Within this zone there was also noted the maximum for Anfipod abundance. Thus, it may be hypothesized that E. harassi feed on these organisms. The MACROHERBIVORES (Nereidae) were very abundant above 1 m, starting to decrease at 3 m, and disappearing at 5 m. The FILTER FEEDERS increased at a depth of 1 m, with a maximum both of abundance and biomass in the intermediate zone (2-4 m). The OMNIVORES, scarcely represented, had a maximum at a depth of 5 m. The only species belong to this group was Lysidice ninetta, which lives in the crevices of rocks, which are more abundant at the depth of 4-5 m. The BURROWERS, scarcely represented, in this particular environment had a maximum at 0 m. The only species belonging to this group, Protoaricia oerstedi, was linked to the superficial zone. It probably finds an environment suitable for its survival in the soft-substrate enclave trapped between the byssus threads of mussels. Finally, the DEPOSIT FEEDERS assumed more importance in the samples of greater depth.

The trophic structure of the Polychaete community in the environment considered was mainly based on the carnivore group. Proceeding from 0 to 5 m depths, some changes in relative abundance of the most represented groups (carnivores, herbivores and filter feeders) were noted. At a depth of 1 m, the relative predominance of herbivores and carnivores was inverted. The filter feeders also increased in number. Below this depth both carnivores and filter feeders remained very abundant.

From the above results, some considerations regarding the link between the energy input of the system and the trophic structure of the Polychaete community arise. For the upper community, the great importance of the herbivores suggests that the most important energy input in this zone is light energy, which produces a highly diversified algal substrate. At this depth, water movement acts mainly as an environmental (mechanical) stress. Below this zone, water movement can constitute the major energy input and the importance of the herbivores decreases, while the filter feeders tend to assume the role of the main secondary producers. For the deepest samples, a decrease in water movement probably causes an increase in sedimentation and the deposit feeders increase.

The main trophic discontinuity is located between the 0 to 1 m depth, where the increasing abundance and biomass of the carnivores can indicate an increase in structuralization of the community (Bianchi & Morri, 1985). Finally, it is interesting to note that this discontinuity is also demonstrated in the analysis of the species composition of this Polychaete community.

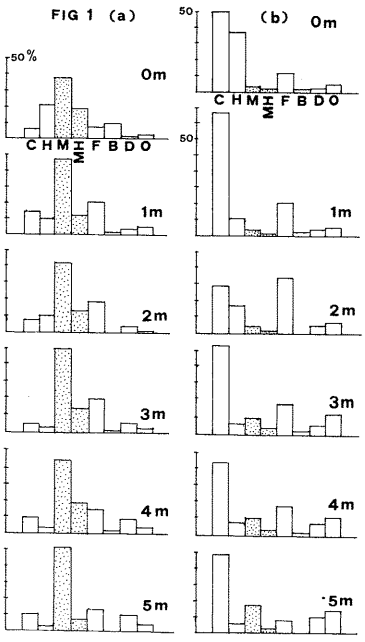


FIG. 1
Percent trends of mean annual abundance (a) and biomass (b) of Polychaete Feeding Guilds.
C = Macrocarnivores; H = Macroherbivores; M = Microcarnivores; MH = Microherbivores; F = Filter Feeders; B = Burrowers D= Deposit Feeders; O = Omnivores.

REFERENCES

BIANCHI C.N. & MORRI C. 1985. Oebalia XI N.S.: 203-214

DESROSIERS G., BELLAN-SANTINI D. et BRETHES J.C. 1984. Océanis. 10(7): 799-812

FAUCHALD K. & JUMARS P. 1979. Oceanogr. Mar. Biol. Ann. Rev. 17: 193- 284

GAMBI M.C & GIANGRANDE A. 1985. Rapp. Comm. Int. Mer. Medit. 29 (5): 233-235

MAURER D. & LEATHEM W. 1981. Mar. Biol. 62: 161-171

X-II2

POLYCHAETES FEEDING GROUPS IN COASTAL LAKES OF CENTRAL ITALY (LATIUM)

M.F. GRAVINA° and A. SOMASCHINI°°

° Museo Civico di Zoologia, Via U. Aldrovandi 18, Roma (Italia)
°° Dipartimento di Biologia Animale e dell'Uomo, Università "La Sapienza", Roma (Italia)

Resumé - La distribution des catégories trophiques des Annélides Polychètes a été étudiée dans les etangs côtiers du Latium (Italie centrale). En réfléchissant les caracteristiques du milieu, elle confirme les gradients de l'influence de la mer et de l'état trophique mis en evidence par l'analyse structurelle.

The concept of Polychaetes Feeding Groups was firstly proposed by Fauchald and Jumars (1979) to show the relations among food particle size and composition, mechanism involved in food intake and motility patterns associated with feeding.

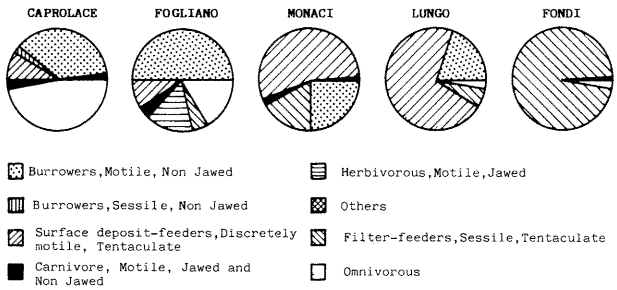
In the soft bottom benthic communities, Polychaetes are one of the most representative taxon as far as species richness and individuals numbers are concerned. Because of their close relation with sediment structure and type, the analysis of feeding groups composition and distribution in Polychaetes population become an interesting tool for understanding the ecosystems features. Till now Polychaetes feeding groups were examined only in marine ecosystems (Gambi and Giangrande, 1985).

In the present paper Polychaetes trophic characteristics have been analysed in lagoon benthic communities. The investigated area consists in five coastal Latium lakes, that resulted arranging along two foundamental gradients: marine influence, from Caprolace and Fogliano to Monaci, Lungo and Fondi, and trophic status, from Lungo and Monaci to Fondi, Fogliano and Caprolace (Gravina et al.,1985; Fresi et al.,1985).

Ten feeding groups have been identified on a total of 63,047 individuals and 48 species of Polychaetes: BMX (Burrowers, Motile, Non-Jawed), BSX (Burrowers, Sessile, Non-Jawed), SDT and SDX (Surface deposit-feeders, Descretely motile, Tentaculate and Non-Jawed respectively), CMA and CMX (Carnivore, Motile, Jawed and Non-Jawed respectively), HMJ (Herbivoruos, Motile, Jawed), SST (Surface deposit-feeders, Sessile, Tentaculate), FST (Filter-feeders, Sessile, Tentaculate), O (Omnivorous). The most abundant groups resulted BMX in Fogliano (50%), Omnivorous in Caprolace (47%), SDT in Monaci and Lungo (56% and 70% respectively) and FST in Fondi (97%). The highest diversity, in terms of functional (trophic)pattern, was found in Caprolace and Fogliano, where 10 and 9 different feeding groups were identified, as far as the structural analysis evidenced (Gravina and Giangrande, 1983-84; Gravina, 1985). Burrowers (BMX-BSX), dominant in Fogliano and Caprolace (37%, after Omnivorous), decreased in Monaci (25%) and Lungo (21%) and were completely missing in Fondi. Filter-feeders sporadically occurring in the first two lakes, little increased in Lungo (7%) and Monaci (16%), while in Fondi, represented by the unique Serpulids species Ficopomatus enigmaticus, made up almost the whole Polychaetes population.

In Caprolace and Fogliano marine influence produced less stressed environmental conditions and a higher diversity both in terms of population composition and trophic structure. The more oxygenated muddy sediment layers could widely colonized by sub-surface deposit-feeders (burrowers), common in organic-rich fine grained soft-bottom, characteristic of the highly productive water such as coastal embayement, deltas, lagoons,... In Monaci and Lungo the confinate situation produced a very organic enrichment in deposited detritus and euxinic conditions, corresponding to an increase of surface-deposit feeders to the detriment of burrowers. Filter-feeders, abundant in environments suffering high mechanical energy (hydrodinamics) were obviously not much represented in these lagoons, save in Fondi. Here the filter-feeders dominance appeared due not to the water movement but to the amount of suspended sesston owing to the input of the continental eutrophic water (Gravina, 1985).

The Polychaetes feeding groups distribution in coastal Latium lakes confirmed the pattern revealed by the structural analysis (Giangrande et al.,1983-84; Fresi et al., 1985) evidencing the same principal factors selecting in lagoon benthic communities, summarized mainly as marine influence and trophic status.



POLYCHAETES FEEDING GROUPS : PER CENT COMPOSITION

References

FAUCHALD K. and JUMARS P.A.,1979 - The diet of worms: a study of Polychaete feeding guilds. Oceanogr.Mar.Biol.Ann.Rev.,17:193-284.

FRESI E.,CARRADA G.C.,GRAVINA F.,ARDIZZONE G.D.,1985 - Considerations on the relationship between confinement, community structure and trophic patterns in Mediterranean coastal lagoons. Rapp.Comm.int.Mer Médit.,29,4.

GAMBI M.C.,GIANGRANDE A., 1985 - Caratterizzazione e distribuzione delle categorie trofiche dei Policheti nei fondi mobili del Golfo di Salerno. Oebalia, XI,N.S.:223-240.

GIANGRANDE A.,GRAVINA M.F.,GAMBI M.C.,FRESI E.,ARDIZZONE G.D.,1983-84 - Policheti di fondo mobile di aree costiere semichiuse: fattori di selezione in ambiente salmastro. Nova Thalassia, 6 Suppl.:155-163.

GRAVINA M.F.,GIANGRANDE A.,1983-84 - Il popolamento a Policheti dei laghi Pontini (Lazio). Nova Thalassia, 6 Suppl.:315-324.

GRAVINA M.F.,1985 - Ecology and distribution of Polychaetes in two lagoons of Central Italy (Latium): Fondi and Lungo. Oebalia, XI,N.S.:303-310.

GRAVINA M.F., ARDIZZONE G.D.,SCARDI M.,FRESI E.,1985 - Latium coastal lakes: the ecology of benthos and the management of the environment. Oebalia, XI-2,N.S.:467-470.

X