

CONTRIBUTION OF THE POLYCHAETOUS ANNELIDS TO THE DIET OF *CHEILODACTYLUS BERGI* (PISCES, CHEILODACTYLIDAE) IN ARGENTINA

Running head: Polychaetes in the diet of hawkfish, Argentina

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Abstract

The hawkfish (castañeta) *Cheilodactylus bergi* Norman, 1937 is distributed in the Atlantic Ocean, from southern Brazil (22°S) to San Jorge Gulf in Argentina (47°S), between 50 and 150m depth, and constitutes a fishing resource of commercial value. Previous studies indicated that polychaetes constitute its main food. The contribution of different families of worms to the diet of hawkfish and the relationships between those taxa and the benthic fauna of the feeding grounds are presented in this paper. A total of 522 specimens of fish was measured, weighed and the gut contents analyzed. Polychaete families, mainly Onuphidae, Lumbrineridae and Eunicidae, were the most important feeding items in specimens from 28 to 51cm total length, both in percent of frequency (%F) and percent of weight (%W). Occasional presence of Aphroditidae, Arbellidae, Palmyridae, Lysaretidae and Dorvilleidae was recorded. Bibliographic data on faunistic composition of feeding grounds indicate that polychaetes constitute between 12% to 21% of number of taxa of macroinvertebrates. *C. bergi* feed upon 25-38% of species of polychaetes present in the area. It is concluded that *C. bergi* feed on polychaetes which are mandibulated, implying mobility over the benthic surface.

Studies on trophic ecology on the Argentine continental shelf mention that polychaetes are fed upon by these fishes: whitemouth croaker (*Micropogonias furnieri*) (Sánchez et al., 1991), sea bass (*Acanthistius brasiliensis*) (Goldstein and Cousseau, 1987), silverside (*Odontesthes smitti*) (García, 1994), skate (*Raja agassizi*) (Loez, 1982) and skate (*Sympterygia bonapartei*) (Barrera Oro and Maranta, 1980). The hawkfish, *Cheilodactylus bergi* Norman 1937, is distributed in the Atlantic Ocean, from southern Brazil (22°S) to San Jorge Gulf, Argentina (47°S), between 50 and 150 m depth (Wohler and Sánchez, 1994). The main concentration is found in the Argentine-Uruguayan Common Fishing Zone (34°S - 39°30'S). This species was heavily exploited during the sixties, leading to overfishing, and presently constitutes a potential resource (Wohler, 1995). The analysis of anatomo-histological characteristics of the digestive

tract indicate that hawkfish is typically carnivorous, feeding on small preys (Maggese, 1967), related to benthic feeding items (Cotrina, 1971). Previous studies on *C. bergi* mention that polychaetes constitute its primary food item (Wöhler and Sánchez, 1994). The present study examines the contribution of polychaete families to the diet of hawkfish, and relates the results with the composition of benthic communities in its primary feeding grounds.

Materials and Methods

Samples were collected from commercial catches carried out in Buenos Aires coastal zone during 1989, and from bottom trawls carried out in Patagonian northern shelf during reserach cruises (R/V “Cap. Oca Balda”, INIDEP) during summer 1988 and autumn 1989 (Fig. 1). A total of 552 fishes was measured, weighed, and the stomachs were preserved in 10% formaldehyde. Prey items were identified to family level, counted and weighed. The relative contribution of different food items to the total diet was determined as follows: percent by frequency of occurrence ($\% F = \text{number of stomachs in which a prey item occurred divided by the total number of stomachs with contents} \times 100$), percent by weight ($\% W = \text{weight of a prey item divided by the total prey weight (from all stomachs)} \times 100$) and feeding intensity (FI = number of stomachs with contents divided by the number of stomachs with contents each month)(Wöhler and Sánchez, 1994). Size class analysis was made following information based on principal components ordination (Wöhler and Sánchez , 1994). On the basis of available information on benthic fauna from the study area (Roux et al., 1993, 1995; Roux and Bremec, 1994; Bremec and Roux, 1995a, b, 1997; Bremec and Lasta, 1998), percentages of frequency of taxonomic groups and polychaete families were estimated, in order to compare stomach contents and taxa availability in different feeding grounds.

Results

Trophic spectrum. Over 510 fishes examined from Buenos Aires shelf (commercial catches), 260 (50.98 %) had stomach contents, and a total of 42 stomachs from Patagonian northern shelf (research cruises), 39 (92.85 %) fishes had contents. From 28 items identified (Fig. 2), polychaetes (61.15%) and crustaceans (59.03%) were the main food items. The size class between 28-51 cm mainly fed on polychaetes, followed by crustaceans and fishes. The size class between 21-27 cm consumed fishes as the main prey, followed by crustaceans, and polychaetes which presented low values both in percent of frequency and percent of weight.

Buenos Aires shelf. Onuphidae, Lumbrineridae and Eunicidae were the most frequent polychaete families. Gammarid amphipods and unidentified fishes were also important. The monthly diet variation is showed in Figure 3. Polychaetes and crustaceans were the most frequent items eaten during the study period, except in July. Polychaetes were dominant in May, June, August and October; crustaceans constituted the main food item in April and September and fishes in July. Relative variations in percent of weight were observed. Polychaetes presented less biomass variation if compared with crustaceans and fishes (Fig. 4). Lumbrineridae, Onuphidae and Eunicidae were the most frequent families with higher values of percent of weight. The other families were occasionally fed upon (Fig. 5). FI% was higher in May, June, August and September, with lesser values in October (Fig. 6a). Polychaetes FI% was highest during August (Fig. 6b).

North Patagonian shelf. The samples studied represent the feeding habits of juvenile fish, corresponding to the size class between 11 and 21 cm (Fig. 7), indicating that onuphids and euphausiids were frequent food items. The FI was high (92.85 %), and polychaetes FI reached 76.20 %.

Feeding grounds. Figure 8 shows the faunistic composition in different bottoms located in the area of distribution of *Cheilodactylus bergi*.

Discussion

Polychaetes reached 61.15 % of frequency in the stomachs of *Cheilodactylus bergi* examined. The most frequent families were Lumbrineridae, Onuphidae and Eunicidae, whereas Aphroditidae, Arbellidae, Palmyridae, Lysaretidae and Dorvilleidae were eaten occasionally. In North Patagonia, the diet of juvenile hawkfish was primarily euphausiids, although the consumption of polychaetes was also important; similar values were obtained by Wöhler and Sánchez (1994). Onuphidae was the most frequent family. The feeding intensity was high during all the months, except in October, which corresponded with the heterogeneous spatial distribution and migration of *Cheilodactylus bergi* (Wöhler and Sánchez, 1994). The feeding intensity on polychaetes was variable, being most important during June and August.

The availability of prey in the feeding grounds has not been previously considered in studies on trophic ecology of fishes from the Argentine Sea (Sánchez *et al.*, 1991; Goldstein and Cousseau, 1987; García, 1994; Loez, 1982, Barrera Oro and Maranta, 1980; Wöhler and Sánchez, 1994; Wöhler, 1995). The diet of hawkfish, based on the availability of different families of polychaetes, was estimated in the feeding grounds of the area. Although they were the most frequent group among the food items in adult individuals, they were not dominant (12 – 21 %) in the benthic communities. Molluscs and crustaceans were more frequent and abundant in the area (Fig. 8). However, our estimations indicate that the polychaetes consumed by *C. bergi* reached between 25 to 38 % of the total polychaete taxa available. On the other hand, previous studies in the South Atlantic report similar estimations of percentage of polychaetes ingested by different Brazilian fish species and percentage of polychaetes available (Amaral *et al.*, 1994).

The life habits of the polychaete families consumed by the hawkfish were considered as a possible explanation of some prey selection involved in the feeding behavior of *C. bergi*. All the polychaete families found in the stomach of hawkfish have similar life habits in that they are mobile and jawed except Palmyridae (Fauchald and Jumars, 1979). The food habits of these polychaete families imply mobility, behavior that apparently could favor the predator in feeding on more conspicuous preys. Trophic studies on *Cheilodactylus fuscus*, from rocky reefs in Australia, and *Nemadactylus macropterus*, from sandy-muddy bottoms in New Zealand, showed similar results (Bell, 1979), indicating the preference of polychaete families with similar life habits. Both predator preference and prey availability were considered important factors to determine prey selection in *Solea solea* (Molinero and Flos, 1991). In the present case, anatomical and histological characteristics of the digestive tract of *C. bergi* support the preference of this carnivorous species for small animals (Maggese, 1967).

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