

# TROPHIC ECOLOGY OF THE MEDITERRANEAN HAKE *MERLUCCIVS MERLUCCIVS* IN THE SICILY STRAIT

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## Abstract

The trophic ecology of the Mediterranean hake, *Merluccius merluccius* was analysed in the Sicily strait, based on both stomach content and stable isotope analyses of nitrogen and carbon. Overall results showed a preference for pelagic prey, especially small cephalopods (i.e. sepiolids), fishes (i.e., *Engraulis encrasicolus* and *Gadiculus argenteus*) and crustaceans (mysids, euphausiids and natantian decapods). An ontogenetic shift in the diet was observed with small individuals mostly preyed on small crustaceans (the mysid *Lophogaster typicus* and the decapod *Chlorotocus crassicornis*) and cephalopods, and larger ones on fishes. Stable isotopes also evidenced such shift with adults displaying the greatest  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  values. This study contributes to elucidate the complexity of pelagic food webs, displaying great meso-scale variability.

**Keywords:** Food webs, Pelagic, Fishes, Stable isotopes, Sicily Channel

## Introduction

The Mediterranean hake is one of the most important commercial species for Mediterranean fisheries. Although there is a plenty of information on different aspects of the biology and ecology of this species, spatial variations in prey availability call for specific studies in the different sub-basins of the Mediterranean sea. Surprisingly there are no data on the trophic ecology of this species from the Sicilian Strait (Central Mediterranean), notwithstanding the importance of this resource for the local fleet. Within this context the objective of this work is to elucidate the trophic ecology of the Mediterranean hake, *Merluccius merluccius*, by means of both stomach contents (SCA) and stable isotope analyses of nitrogen and carbon (SIA).

## Materials and methods

Samples were collected in June 2011 by means of a midwater pelagic trawl net. Overall, a total of 134 specimens were analysed for SCA and 31 for SIA. Specimens ranged between 7.2 and 37.5 cm. Two main size classes were considered (class I: specimens < 16 cm; class II: up to 22 cm), with only 3 individuals of greater size (up to 37 cm). Fishes were dissected and stomachs and a piece of white dorsal muscle were analysed according to standard protocols for SCA and SIA (see Fanelli & Cartes, 2010).

## Results and discussion

The analysis of 108 full stomachs evidenced a preference for pelagic prey, especially small cephalopods (i.e. sepiolids), fishes (i.e., *Engraulis encrasicolus* and *Gadiculus argenteus*) and crustaceans (mysids, euphausiids and natantian decapods: Fig. 1).

□ Fish   □ Cephalopods   □ Mysids   □ Natantian decapods   ■ Euphausiids

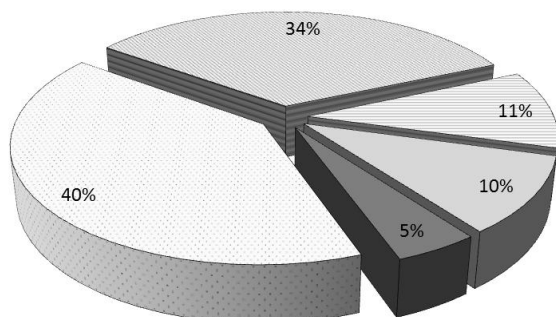


Fig. 1. Prey contribution (in terms of % by weight) to the diet of Mediterranean hake in the Sicily Strait

An ontogenetic shift in the diet was observed with small individuals mostly preyed on small crustaceans (chiefly the mysid *Lophogaster typicus* and the

decapod *Chlorotocus crassicornis*) and small cephalopods (i.e. sepiolids), and larger ones on fishes and cephalopods (i.e. *Alloteuthis* spp.). These results partially confirmed previous findings from the Northern Sicily (Sinopoli et al. 2012) but highlighted differences in some food preferences (i.e. greater contribution of cephalopods to diet in the Sicily Strait) probably associated to local abundance of these prey in the area. Accordingly, stable isotopes showed significant variations in  $\delta^{15}\text{N}$  values by size, pointing to diet changes during the life-span (Fig. 2). Still, significant differences were evidenced in  $\delta^{13}\text{C}$  values by size (Fig. 2) with adults relying on prey with greater  $\delta^{13}\text{C}$ , mostly linked to benthopelagic resources or food caught at deeper bottoms (Cartes et al. 2009).

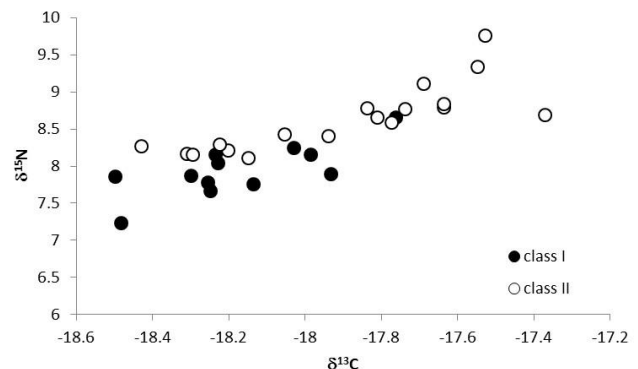


Fig. 2.  $\delta^{15}\text{N}$  and  $\delta^{13}\text{C}$  values vs. specimen size of Mediterranean hake in the Sicily Strait. Class I: specimens < 16 cm; class II: 17-22 cm.

## References

- 1 - Cartes J.E., Hidalgo M., Papiol V., Massuti E., Moranta J., 2009. Changes in the diet and feeding of the hake *Merluccius merluccius* at the shelf-break of the Balearic Islands: Influence of the mesopelagic boundary community. *Deep Sea Res. I* 56:344-365.
- 2 - Fanelli E., Cartes J.E., 2010. Temporal variations in the feeding habits and trophic levels of deep-sea demersal fish from the Western Mediterranean Sea based on stomach contents and stable isotope analyses. *Mar. Ecol. Prog. Ser.* 402:213-232.
- 3 - Sinopoli M., Fanelli E., D'Anna G., Badalamenti F., Pipitone C., 2012. Assessing the effects of a trawling ban on diet and trophic level of hake, *Merluccius merluccius*, in the southern Tyrrhenian Sea. *Sci. Mar.* 76:677-690.