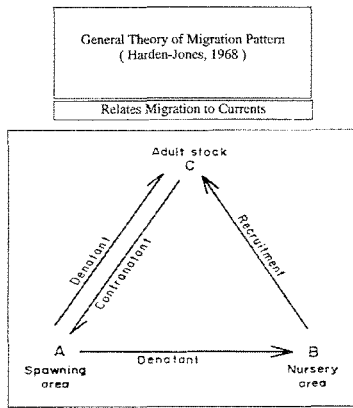


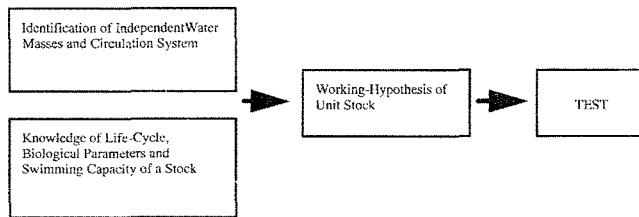
INDEPENDENCE OF WATER MASSES AND INDEPENDENCE OF STOCKS

Dino LEVI¹, M.G. ANDREOLI² & Pietro RIZZO¹

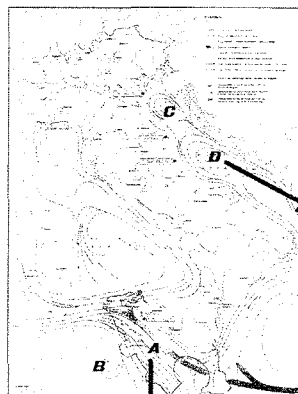
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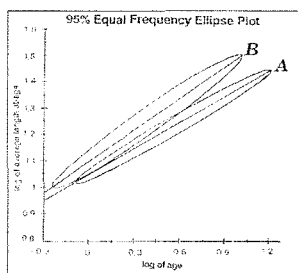
Flow-Chart of Hypothesis formulation and Testing



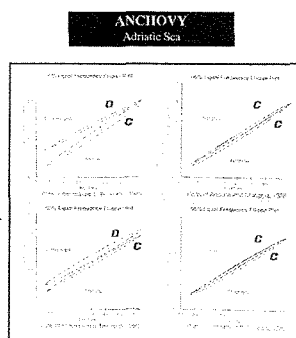
Identification of Independent Water Masses and Circulation System



RED MULLET Channel of Sicily



A POSSIBLE TEST



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MORPHOLOGICAL FEATURES OF THE BARBELS IN *MULLUS SURMULETUS* AND *MULLUS BARBATUS*

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Mullus barbatus and *Mullus surmuletus* are two very important species in the fisheries of the Catalan coast (NW Mediterranean), (MARTIN, 1991). *M. barbatus* is found on muddy bottoms while *M. surmuletus* mainly lives on rocky areas, even though both species have distributions with a considerable overlap. The study of their sensory structures, specially the barbels, could bring new data about their adaptation to the trophic resources in each substratum and the way these species share the same resource.

The ultrastructure of the barbels surface was observed in specimens from the two species of *Mullus* (between 13 and 22 cm of total length), using SEM standard procedures, usually employed in the study of sensory cells (DALE, 1976; KOTRSCHAL, 1992).

The surface of the barbels are fully covered by sensory pores (Fig. 1, 2). The structure of these pores is similar to other free chemoreceptors which are found in many groups of teleostean fishes (JANSSEN, 1990; KOTRSCHAL, 1992). The great abundance of chemoreceptors suggests a high sensibility of the barbels in front to the chemical stimulus. The lack of neuromasts indicates a secondary importance of the mechanical stimulus.

The two species are well differentiated in the density and distribution of the chemoreceptor cells. However, the pore ultrastructure is very similar in both species.

M. surmuletus has sensory cells sparsely distributed along the surface of the barbel. Usually they are isolated or found in little groups (2 or 3 cells) (Fig. 1a, 1b). The mean pore density is 15.4 SC/100.000 μm^2 .

M. barbatus has sensory cells found in well defined groups. The number of pores by group oscillates between 5 or 9. (Fig. 2a, 2b). Their mean density is 26.8 SC/100.000 μm^2 .

A higher density of sensory cells and more complex structure in *M. barbatus* should be related with a higher sensibility of their barbels to chemical stimulus than in *M. surmuletus*. Since the barbels are used to search preys (UIBLEIN, 1991), a greater sensibility in *M. barbatus* could be an improvement to locate their prey in muddy bottoms, were the visibility lower than in the rocky zones.

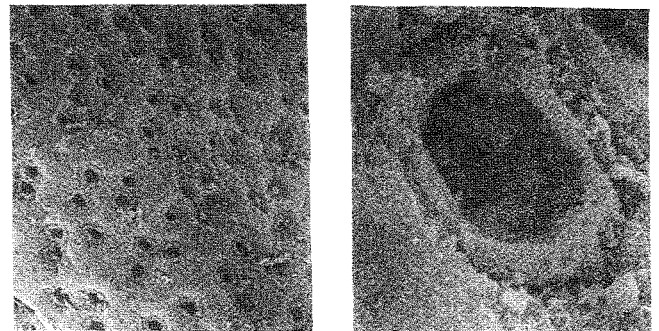


Fig. 1. Ultrastructure of the surface of the barbels in *M. surmuletus*. a: distribution of the sensory cells; scale bar, 200 μm . b: ultrastructure of a free neuromast; scale bar, 60 μm .

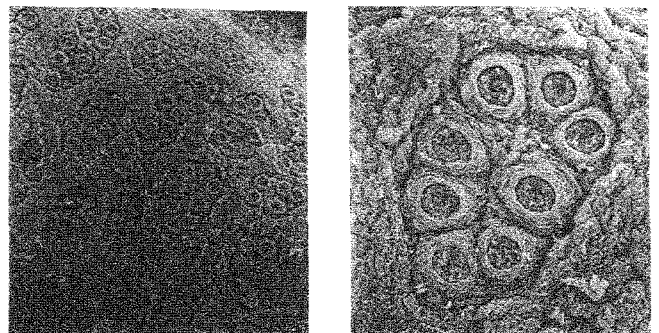


Fig. 2. Ultrastructure of the surface of the barbels in *M. barbatus*. a: distribution of the sensory cells; scale bar, 200 μm . b: Detail of a group of neuromasts; scale bar, 20 μm .

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