

Discrimination of red mullet populations (Teleostean, Mullidae) along multi-spatial and ontogenetic scales within the Mediterranean basin on the basis of otolith shape analysis



Otolith shape analyses were conducted on three different species of Mullidae (*Mullus barbatus barbatus*, *M. b. ponticus* and *M. surmuletus*). The otolith shape was described by 19 harmonics from elliptic Fourier descriptors. In a first step, their comparison through canonical discriminant analyses (CDA) was run for all fish with right otoliths, left otoliths and both otoliths pooled. The latter possibility had a higher discriminating power and allowed much more visually explicit results. This implied that the two otoliths were not similar as often claimed, and had each their specific information. In a second step, the CDA demonstrated strong spatial discrimination of local populations from various areas within the Mediterranean basin, i.e. NW Mediterranean, Aegean Sea and Black Sea, and between sites within each area. The percentage of well classified individuals of *M. barbatus* in predefined groups varied between 78 to 100% depending on sites, and even reached 100% for each site for *M. surmuletus*. These spatial patterns were most likely linked to

differences in environmental conditions between areas and sites, such as effects of strong river runoffs and differences in depths and/or habitat types. In a third step, CDA also evidenced ontogenetic discriminations of mullet populations that could be linked (i) to influence of diet of fish of various sizes and (ii) to changes in physiological conditions according to the stage of development of the fish.

Auteurs du document : Fabien Morat, Yves Letourneur, David Nérini, Daniela Banaru, Ioannis E. Batjakas

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