



## Baseline

## Otolith mass asymmetry in three sparid fish species collected from the Iraqi waters

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## ABSTRACT

Saccular otolith mass asymmetry is examined in three sparid fish species, *Acanthopagrus bifasciatus*, *A. arabicus*, and *Sparidentex hasta* collected from Khor Abdullah at the North Persian Gulf. This characteristic was computed as the disparity between the weight of the right and left otoliths divided by mean otolith weight in the three sparid species investigated. According to the previous cases obtained on another symmetrical fish species, the absolute value of  $x$  in these species does not determine by fish length and otolith growth ratio, while the absolute rate of otolith weight disparity is boosted with the fish length. The estimate of  $x$  was between  $-0.2$  and  $+0.2$ . Otolith mass asymmetry can show some growth disorder of fish owing to environmental influence.

The life of the animal in general and that of fishes in particular is usually confronted by several unsuitable factors such as different abiotic and biotic factors, with fish species are more vulnerable than other animal species to impact caused by diverse contaminants such as pesticides, herbicides, and heavy metals originated from their environments (Yedier et al., 2018a, 2018b). In teleosts fish species, there are three pairs of otoliths inside their inner ear known as asteriscus, lapillus, and sagitta. These calcareous structures are distinguished in having a continuous growth during the life of the fish (Campana and Thorrold, 2001; Campana, 2004). The deposited materials, both organic and inorganic, and the fish body do not metabolize these materials; therefore, otoliths can hold continuous documentation of the fish life (Arai et al., 2007). The function of the otoliths in the fish body is vital for the continuous living of the fish and contains body balance, hearing, gravity sensation, and linear acceleration in the species (Nolf, 1985; Popper and Lu, 2000). Among the characteristics of the otoliths, they do not constantly grow equally in all dimensions (Campana, 1999; Campana and Thorrold, 2001). The otoliths are usually having bilateral symmetrical structures in the fish, but their weights are different between the left and right otolith, and this aspect is termed as otolith mass asymmetry.

The asymmetry in fish species is presumed to replicate the growth disarrays of fish due to diverse types of pressures such as genetic or environmental strain (Valentine et al., 1973). Regardless of whether the mass asymmetry increases or decreases, the result will affect negatively in fish activity, particularly, hearing and balance. Therefore, otolith mass asymmetry is not a natural phenomenon, but it has been utilized as a bioindicator to test the health of the environment that the fish living in (Grønkjær and Sand, 2003).

The three sparid fishes inspected in the current study are among the important marketable fish species alongside their geographical dispersal. They are marine species and often found in fresh and brackish waters. These species are non-migratory and they inhabit the same area during their lifetime. The two-bar seabream, *Acanthopagrus bifasciatus*, (Forsskål, 1775) living at depth range 2–20 meters associated with reefs (Lieske and Myers, 1994). Individuals of this species reaching an utmost total length of 400 mm (Bouhleb, 1988). They are found in the Western Indian Ocean from the Red Sea north, the Persian Gulf area, and to Pakistan eastward.

Individuals of the yellowfin seabream, *Acanthopagrus arabicus* (Houttuyn, 1782), prefer demersal habitats and frequently ingoing in river mouths and estuaries (Iwatsuki, 2013). They are reaching a

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