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## OTOLITH MASS ASYMMETRY OF *PAMPUS CANDIDUS* (OSTEICHTHYES, STROMATIDAE) FROM IRAQI MARINE WATERS

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**Otolith Mass Asymmetry of *Pampus candidus* (Osteichthyes, Stromatidae) from Iraqi Marine Waters. Qasim, A. & Jawad, L. A.** — The otolith mass asymmetry of the fish species *Pampus candidus* (Cuvier, 1833) was assessed. The findings indicated a significant level of asymmetry comparison with similar studies on other fish species. The level of asymmetry was shown to increase with the size of the fish, where the utmost estimate of the otolith weight irregularity was obtained. The detected otolith asymmetry may be linked to pollutants in the sampling area.

Key words: Ecology, Khor Abdullah, fish size, environment, pollution, Arabian Gulf.

### Introduction

The otoliths, sometimes known as ear bones, were rigid anatomical structures situated within the intrinsic auditory system of vertebrates that assist as sound receptors and balance organs (Schulz-Mirbach & Ladich, 2016; Tuset et al., 2021). In most species the sagitta is large, but in some species like Cypriniformes the asteriscus is the largest, and in Siluriformes, Characiformes, and Gymnotiformes the lapillus is the largest (Berra & Aday, 2004). These structures have been the basis of fundamental studies until today (Yu et al., 2014; Yilmaz et al., 2015; Jawad et al., 2017; Bostanci & Yedier, 2018; Ozpicak et al., 2021; Pavlov, 2022; Qasim et al., 2022; Jawad et al., 2023). The external features of otoliths are very exclusive and fluctuate greatly throughout fish families, but they can also be rather species-specific (Maisey, 1987). Recently, several investigations were published to disclose that otolith mass asymmetry is a very significant study area due to its role in acoustic performance (Lychakov et al., 2006; Jawad et al., 2011; Jawad et al., 2017; Yedier et al., 2018; Bouriga et al., 2021; Jawad et al., 2021). Due to its quantifying practicalities, the otoliths form an outstanding biological model for investigating the physiological implication of otolith weight irregularity (Lychakov et al., 2006).

Otolith shape is hereditarily controlled (L'Abée-Lund, 1988 and Jawad et al., 2021). However, environmental factors can affect the fish's metabolism, which later disturbs the body's cell development and therefore the calcium deposition amount placed in otoliths (Cardinale et al. 2004, Galley et al., 2006; Stransky et al., 2008). Other influences, like the growth phases as characterized by the length of the fish (Hüssy 2008), age (Castonguay et al., 1991), and reaching adulthood (Mérigot et al., 2007), might likewise be bearing on the surface morphology of the otoliths.