## **Research Article**



## Environmental DNA for Disclosing of *Luciobarbus barbulus* (Cyprinidae: Teleostei) in the Shatt Al-Arab River, Iraq

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Abstract | Shatt Al-Arab River represents the estuary in the North-West Arabian Gulf. It is affected by many ecological challenges. Conditions of freshwater reduction from upstream and penetration of marine tide of the Arabian Gulf cause a decrease of many intolerant native fish species. Cyprinid Luciobarbus barbulus locally called Nabash is one of the important ecological and commercial fish species. L. barbulus has been often reported to be absent in fishing product of the Shatt Al-Arab River. Surveying of fish fauna in water bodies by using traditional methods did not often reveal accurate views of underwater. The environmental DNA method (eDNA) was used in this study to detect the cyprinid L. barbulus. Four stations in the River were chosen. Samples of water were then collected and filtered. Epithelial cells that detached from living organisms are used to extract genomic DNA. The gene of mitochondrial cytochrome C oxidase (COI) used as a diagnostic marker. Therefore, specific primers were designed to amplifying COI followed by sequencing. The results proved L. barbulus existence in the northern Shatt Al-Arab River. the sequence alignment matched the L. barbulus COI gene sequence which had been recorded in the GenBank from Iraqi and neighboring Iranian inland waters. The phylogenetic tree and sequence alignment confirm that the COI gene sequence belongs to L. barbulus fish species. Then the COI gene sequence deposited in the GenBank under an Accession number PQ608516. This is the first time in Iraq that used the eDNA to detect fish species and it can conclude that the eDNA method proved its effectiveness and it could be used to detect threatened or exotic fish species in Iraqi waters.

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Keywords | COI, eDNA, Luciobarbus barbulus, Shatt Al-Arab River

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## Introduction

 $\mathbf{B}$  iodiversity is the master key in the ecological studies. While the living stocks in the aquatic environment are vulnerable due to both natural and

anthropogenic factors (Kumar *et al.*, 2024). A large percentage of fish is consumed in the world due to its high quality of protein level (Javaid *et al.*, 1992; Foran *et al.*, 2005; Salam *et al.*, 2005; Naeem and Ishtiaq, 2011). Therefore, fish population decreases rapidly

