DNA Barcoding Application in Study of Icthyo- Biodiversity in Rivers of Pakistan

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Abstract : Fish taxonomy plays a fundamental role in the study of biodiversity. However, traditional methods of fish taxonomy rely on morphological features, which can lead to confusion due to great similarities between closely related species. To overcome this limitation, modern taxonomy employs DNA barcoding as a species identification method. This involves using a short standardized mitochondrial DNA region as a barcode, specifically a 658 base pair fragment near the 5' ends of the mitochondrial cytochrome c oxidase subunit 1 (CO1) gene, to exploit the diversity in this region for identification of species. To test the effectiveness and reliability of DNA barcoding, 25 fish specimens from nine different fish species found in various rivers of Pakistan were identified morphologically using a dichotomous key at the start of the study. Comprising nine freshwater fish species, including Mystus cavasius, Mystus bleekeri, Osteobrama cotio, Labeo rohita, Labeo culbasu, Labeo gonius, Cyprinus carpio, Catla catla and Cirrhinus mrigala from different rivers of Pakistan were used in the present study. DNA was extracted from one of the pectoral fins and a partial sequence of CO1 gene was amplified using the conventional PCR method. Analysis of the barcodes confirmed that genetically identified fishes were the same as those identified morphologically at the beginning of the study. The sequences were also analyzed for biodiversity and phylogenetic studies. Based on the results of the study, it can be concluded that DNA barcoding is an effective and reliable method for studying biodiversity and conducting phylogenetic analysis of different fish species in Pakistan.

Keywords : DNA barcoding, fresh water fishes, taxonomy, biodiversity, Pakistan

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