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A new report of Atlantic molly *Poecilia mexicana* (Steindachner 1863) from the Kayamkulam Backwater, Kerala, India

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Abstract

The Atlantic molly, *Poecilia mexicana* belonging to the family Poeciliidae was reported from the Kayamkulam Backwater, Kerala. Sex was determined from external morphology, the male possess a gonopodium and smaller than females. Female possess a bulged belly. Their presence in the natural waters possibly resulted from unintentional release of aquarium specimens.

Keywords: *Poecilia mexicana*, alien species, poeciliidae, kayamkulam estuary

Introduction

The family Poeciliidae (Order: Cyprinodontiformes) includes live-bearing fishes of small size (<200mm length) such as the guppy, molly, platy and sword tail, having diverse morphology and coloration, with distribution in the fresh and brackish environments of the eastern United States, South America, and Africa, including Madagascar (Moyle, 2002, Nelson, 2006) [13, 14]. The genus *Poecilia*, represented with 27 species and some species in the genus are euryhaline (Nelson, 2006) [14]. The exotic fishes ranging from tiny guppy (*Poecilia reticulata*) to large red pirhana (*Pygocentrus nattereri*) have got established in the peninsular rivers of India (Biju kumar, 2000). They made competition with indigenous fishes for food and habitat and sometimes prey upon native fishes and introduce new diseases and parasites. They cause genetic 'pollution' and degradation of the aquatic ecosystem. All these will subsequently lead to the lead to the loss of precious biodiversity (Nyman, 1991) [15]. The aquatic bio resources are experiencing serious threats to both biodiversity and ecosystem stability and a number of fishes were disappearing due to several anthropogenic factors and the invasion of exotic species (Singh *et al.*, 2013) [18]. Many fish species have spread through deliberate introduction because the species was perceived to have value in aquaculture or ornamental fish culture. *P. reticulata* is one of the most popular aquarium fish and have established populations in natural ditches connecting the main branches of Meenachil river, drainage canals of the Ernakulam city and connecting various natural water bodies including the Vembanad Lake (Krishnakumar *et al.*, 2009) [7].

Poecilia mexicana is a member of the viviparous poecilids and placed under the 'not evaluated' category of IUCN conservation status. Among this group, five species viz., *P. latipinna*, *P. reticulata*, *P. sphenops*, *P. velifera* and *P. wingei* were reported from Indian waters (Singh and Lakra, 2011) [17]. Most species of *Poecilia* have been effectively utilised for mosquito control (Fuller *et al.* 1999) [5] and the aquarium trade (Crossman and Cudmore 1999) [4] due to their short generation time, colorfulness, hardiness, and readiness to breed in captivity (Moyle 2002) [13]. However, there are no reports on the occurrence of *Poecilia mexicana* from the Indian waters, the present study assumes significance in this context. This paper provides morphometry and ecological details of *P. mexicana* collected from the estuarine waters of Kayamkulam backwaters.

Materials and Methods

Monthly sampling were conducted in the four selected sites of Kayamkulam estuary (Lat.9°2' & 9°16'N and Long.76°25' & 76°32'E), Alappuzha district, Kerala, as part of the fish diversity study during 2015- 2017(Fig.1). A total of 76 samples of *P. mexicana* were collected, by using

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cast net, from the Valiyazheekal region of the estuary. The specimens were identified in the laboratory according to the identification keys of Nelson (2006) ^[14] and Miller *et al.* (2006) ^[10]. The meristic and morphometric characters were taken with a digital caliper to the nearest 0.1mm following Jayaram (2002) ^[6] and Armbruster (2003) ^[11]. After taking measurements, the specimens were preserved in 100% Ethanol and kept in the laboratory (SDF1-76), Research Department of Zoology in Sanathana Darma College, Alappuzha district, Kerala. Further validation of specimen was confirmed by sequencing of mitochondrial CO1 gene.

Results and Discussion

The Atlantic molly, *Poecilia mexicana* was reported for the first time from India and the identification was based on seventy six specimens collected from the Valiyazheekal region of Kayamkulam estuary of Alappuzha district, Kerala, India (Fig.1).

Systematics

Kingdom	:	Animalia
Phylum	:	Chordata
Class	:	Actinopterygii
Super class	:	Pisces
Order	:	Cyprinodontiformes
Family	:	Poeciliidae
Genus	:	Poecilia
Species	:	<i>mexicana</i>

Description

The fishes were identified as *P. mexicana* (Fig.1) based on the following diagnostic characters by Miller *et al.* (2005). Body is torpedo shaped to deep and compressed; head depressed; front nostril not tubular; covering of eye not continuous with skin of head; mouth small, at front, slightly oblique, lower jaw slightly projecting, top jaw protractile, scales smooth and relatively large; 22-25 gill rakers; with 2 pairs of pores on top of snout before eyes; Sensory pores on the dorsal surface of the snout. 18 caudal peduncle scales. Dorsal fin with short base and 9 fin rays; anal fin with 9 soft rays; pelvic fin origin well behind pectoral base, near anal fin; tip of pelvic fin of males swollen, elongate; pectorals high on flank, 5th ray not scalloped in male; 3rd anal ray unbranched. Tail base relatively narrow; tail fin rounded. Males are brightly coloured compared with that of the females. Fins of male more heavily pigmented than in female. Body dark silver in color, lighter towards belly and with rows of orange spots along scale rows; dorsal fin spotted with black and yellow reticulations; tail fin with base blue white, center with several vertical rows of black spots, rear margin broadly dark orange in color. Sex was determined from external morphology, the male possess a gonopodium and smaller than females. Female possess a bulged belly. It's meristic formula is D,0+9; A,0+9; P,0+16; V,0+7. It has 27 scale rows in longitudinal series and 18 caudal peduncle scales.



The peculiar characters of this species which makes it different from other species of the genus poecilia are number of gill rakers, 2 pairs of pores on top of snout before eyes and the number of scales on lateral rows and around tail fin base. *P. mexicana* exhibits a large range of sizes that vary based on habitat the standard length is 24-54 mm for females and slightly smaller for males, around 20-42 mm (Menzel and Darnell,1973) ^[12] although many traits varied from population to population.

P. formosa, *P. latipinna*, *P. reticulata*. *P. mexicana* has been reported in coastal lagoons of Veracruz, Pueblo Viejo Lagoon and the Sontecomapan Lagoon (Lopez *et al.*, 2015) ^[3]. The Poeciliid family has an ability to invading and adapting the new environmental condition because of their high genetic diversity (Lindholm *et al.*, 2005) ^[8]. Genetic diversity of our native fauna is at risk due to the introduction of such exotic

species. They can alter ecological relationships among native species and can affect ecosystem function, economic value of ecosystems and human health. Unless stringent measures are taken to monitor the aquarium fish trade and the accidental release of exotic species into our waters, streams and rivers will soon emerge as their breeding ground and that will eventually wipe out the native species. In addition to the existing legislation, much effort must go towards identifying the specific conservation needs of most endangered species and implementing appropriate measures as soon as possible. The present paper provides baseline information on the occurrence of this exotic poeciliid in our natural waters. Like other introductions this species also raising many questions, more studies are necessary to check their impact on our aquatic environment.

Mitochondrial COI sequence of the sample

>SR703-F-CO

CACCCTTTATCTAGTATTTGGTGCTTGAGCCGGCATA
GTGGGAACAGCTCTGAGTCTTTTAATCCGAGCCGAA
CTCAGTCAACCAGGATCCCTCCTAGGCGATGATCAA
ATTTATAATGTAATCGTCACAGCTCATGCCTTTGTAA
TAATCTTTTTTATAGTTATGCCAATTATAATTGGCGG
CTTCGGTAATTGATTAGTACCAATAAATAATTGGTGCC
CCTGATATAGCCTTTCCACGAATAAATAATATGAGC
TTCTGACTTCTACCGCCCTCATTCCTCCTCCTCCTAG
CATCTTCTGGGGTAGAAGCAGGGGCTGGTACAGGTT
GAACCGTCTACCCACCTCTTGCAGGCAATTTAGCCC
ACGCTGGACCCTCTGTAGATCTAACTATTTTTTCACT
CCACCTGGCAGGTATTTCCCTCCATCCTAGGGGCAAT
CAACTTTATTACCACTATTATTAATAATAAAACCCCT
GCAGCATCTCAATACCAAACCCCTATTTGTCTGA
GCTGTAATGATTACAGCTGTACTTCTGCTTCTCCTCC
TTCCTGTACTCGCCGCTGGCATCACCATGCTTCTGAC
AGATCGAAATCTAAATACCACTTTCTTCGACCCTGCA
GGAGGGGGAGATCCAATTCTTTATCAACACCTATT

The CO1 sequence of sample is 100% similar to *Poecilia mexicana* (The Barcode of Life Data System-BOLD).

Conclusion

Wider problems arise when these invasive strains escape into the wild. Genetic diversity of our native fauna is at risk due to the introduction of such alien species.

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