Poeciliid Research

Ecological and biological insights into *Xenophallus umbratilis* (Meek, 1912): A freshwater fish endemic to Central America

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Abstract. *Xenophallus umbratilis*, commonly known as the "shadow toothcarp" or "olomina," is a small, viviparous freshwater fish endemic to Central America, specifically Costa Rica and Nicaragua. It inhabits pelagic freshwater environments at depths of 10–20 meters, with water temperatures ranging from 21°C to 37°C, and is found in habitats with diverse flow conditions at altitudes of 35–590 meters. The species displays omnivorous feeding behavior, primarily consuming detritus, filamentous algae, and aquatic invertebrates, contributing to nutrient cycling within its ecosystem. Reaching sexual maturity at 3–4 months, *X. umbratilis* gives birth to 15–50 live young after a 28-day gestation period. Morphologically, the species is characterized by a translucent, yellowish body, distinct black markings on the dorsal fin, and an asymmetrical gonopodium in males. Despite its ecological adaptability, *X. umbratilis* is classified as Vulnerable on the IUCN Red List due to habitat degradation and pollution in its native range. Conservation efforts focusing on habitat protection and population monitoring are essential to ensure the survival of this ecologically significant species.
Key words: carotenoid pigments, fairy shrimps, ornamental fish, Poeciliidae.

Origins and Distribution. *Xenophallus umbratilis* (Meek, 1912), commonly known as the "shadow toothcarp," or "olomina" is a freshwater fish species belonging to the family Poeciliidae, subfamily Poeciliinae (Lucinda 2003) (Figure 1). This species is endemic to Central America, specifically found in Costa Rica and Nicaragua. Its distribution includes the Lake Nicaragua basin as well as rivers such as the Parismina and Tenorio (Bussing 1998).

Environment. *X. umbratilis* inhabits freshwater pelagic environments, typically at depths ranging between 10 and 20 meters (Bussing 1998). The water temperature in its habitat varies from 21°C to 37°C, with a water hardness of up to 3 dH and a pH of up to 7.2. The species is commonly found in diverse water flow conditions at altitudes between 35 and 590 meters (Bussing 1998).

Biology. The shadow toothcarp is often observed in small groups in streams, brooks, and along riverbanks. *X. umbratilis* primarily feeds on detritus and filamentous algae, which form a major component of its diet, alongside aquatic insects and other small invertebrates (Bussing 1998). This trophic behavior reflects its role as an omnivorous species that contributes to nutrient cycling within its freshwater habitats. The ingestion of detritus suggests its adaptability to ecosystems where organic matter from decaying plants and animals is abundant, while its consumption of algae and invertebrates highlights its ecological versatility (Bussing 1998). Such feeding habits allow the species to thrive in a variety of environmental conditions, including slow-moving and fast-flowing waters.

Reproduction. *X. umbratilis* exhibits viviparous reproduction, a characteristic feature of the family Poeciliidae, meaning that it gives birth to live young instead of laying eggs. After 28 days gestation, about 15 to 50 young are born. Sexual maturity is reached after 3-4 months (Baensch & Riehl 1985). Maximum length: 4.5 cm SL male/unsexed (Bussing 1998).

Figure 1. *Xenophallus umbratilis* (Meek, 1912) observed in Costa Rica by Abraham Hernández Bacca (licensed under http://creativecommons.org/licenses/by-nc/4.0/).

Description. Body thin, translucent and yellowish (Bussing 1998). Base of the first dorsal rays with a black blotch; in males the posterior edge of the dorsal fin is also black and sometimes the remainder of the fin is brilliant yellow (Bussing 1998; Froese & Pauly 2024). The males and young have 5 to 10 black bars on the side which are diffuse or absent in females (Froese & Pauly 2024). The gonopodium is asymmetrical and either dextral or sinistral (Nielsen & Johnson 2023; Nielsen et al 2023); the apex of which in mature males bears a long upper projection and swelling below, both of which are membranous (Bussing 1998).

Ecology and Conservation. This species plays a role in the study of ecological adaptation, particularly regarding its ability to thrive across a range of water flow conditions and temperatures. *X. umbratilis* has most recently been assessed for The IUCN Red List of Threatened Species in 2019. *X. umbratilis* is listed as Vulnerable under criteria B1ab(iii) (Lyons & McMahan 2020). Conservation efforts are focused on monitoring its populations, as habitat alterations or pollution in its native range could potentially threaten its survival.

Conclusions. *Xenophallus umbratilis* is a small, viviparous freshwater fish endemic to Central America, with a restricted distribution across Costa Rica and Nicaragua. Its ability to inhabit diverse freshwater environments with varying temperatures, water flow conditions, and altitudes highlights its ecological adaptability. Feeding primarily on detritus, algae, and small invertebrates, it plays a significant role in nutrient cycling within its habitat. Despite its resilience, the species faces threats from habitat alterations and pollution, as reflected in its Vulnerable status on the IUCN Red List. Conservation

efforts should prioritize habitat preservation and monitoring to ensure its long-term survival and to protect this valuable component of Central America's freshwater biodiversity.

Conflict of Interest. The author declares that there is no conflict of interest.

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