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PENSOFT

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First records of xanthochromism in common snook, *Centropomus undecimalis* (Actinopterygii: Carangiformes: Centropomidae), collected in the Gulf of Mexico

Armando T. WAKIDA-KUSUNOKI[1], Vicente ANISLADO-TOLENTINO[2], Luis Fernando DEL MORAL-FLORES[3], Rodolfo CASTRO-BARBOSA[4]

1 *Centro Regional de Investigación Acuícola y Pesquera de Yucalpetén, Instituto Mexicano de Investigación en Pesca y Acuacultura Sustentables, Yucalpetén, Progreso, YUC, Mexico*

2 *Grupo de Investigadores Libres Sphyrna, Querétaro, QUE, Mexico*

3 *Facultad de Estudios Superiores Iztacala, Universidad Nacional Autónoma de México (UNAM), Tlalnepantla, MEX, Mexico*

4 *Centro Regional de Investigación Acuícola y Pesquera de Ciudad del Carmen, Instituto Mexicano de Investigación en Pesca y Acuacultura Sustentables, Carmen, CAM, Mexico*

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Corresponding author: Vicente Anislado-Tolentino (anislado@gmail.com)

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Abstract

The first case of xanthochromism in a female common snook, *Centropomus undecimalis* (Bloch, 1792), in the southern Gulf of Mexico is described. The specimen supporting this record was caught off the coast of Tabasco, Mexico and it represents the first fish case of this abnormal coloration in the Gulf of Mexico. The analyzed specimen measured 774 mm in total length. Its body was entirely orange with a lighter shade of orange on the belly, while the normal coloration of this fish species is dark to opaque grey with yellow to green tints on the dorsal part, silvery lateral side, white belly, and black lateral line. It is uncertain what caused this abnormality, but it is hypothesized that multiple environmental stressors, natural and anthropogenic, were responsible for the appearance of this particular abnormality and other similar cases in the area. Additional sampling and long-term monitoring are needed to determine the possible causes and their ecological impacts.

Keywords

abnormalities, coloration, southwestern Gulf of Mexico, Tabasco, xanthism

Introduction

Colors and color patterns are particularly rich in fishes. The two primary functions of pigments in animals are to shield them against sunlight and hide from predators (Nüsslein-Volhard and Singh 2017). Color variation is an imperative component of inter- and intra-specific species interactions (e.g., predation, competition, sexual selection, and life stage identification), learning, and communication (Siebeck et al. 2008; Price et al. 2009; Leclercq et al. 2010).

Xanthism or xanthochromism (yellow) is a particular form of hypomelanosis, where bright yellow or orange body coloration becomes prevalent (Jawad et al. 2017). This is recognized as a genetic disorder that reduces the production of black melanin and causes dominance of yellow pigments in certain parts or the whole body of the animal (Colihueque 2010). Cases of total xanthochromism

have been identified in several marine and freshwater fish families (Schwartz 1978). There are also many reports in which only body parts are xanthochromic (Jawad and Ibrahim 2018). In marine fishes, specifically, this abnormality has been reported (totally or partially expressed) in a total of 68 species, including seven chondrichthyans and 61 teleosts (Bañón et al. 2023). This article reports the first case of xanthochromism in a common snook, *Centropomus undecimalis*.

Materials and methods

A common snook with an abnormal coloration was landed on 12 May 2021 from a commercial catch of a small-scale fleet in José María Morelos y Pavón, Tabasco, southern Gulf of Mexico (18°25′31″N, 093°8′26″W). The specimen was captured 10 km northeast of José María Morelos y Pavón, Tabasco, Mexico (18°30′13″N, 093°6′54″W; Fig. 1), by a 7.62 m fishing boat with an outboard motor, using gill net with 152.4 mm mesh size, at a maximum depth of 22 m. The depth information was given by the fisherman, and this was estimated using a Garmin fish finder. The taxonomic key of Rivas (1986) was utilized to identify the species. The individual was measured to the nearest 0.1 cm total length (TL) and standard length (SL) following the morphometrics proposed by Rivas (1986). Gutted weight was obtained using a commercial Torrey weight scale. Once the fisherman eviscerated the specimen, the gonads were analyzed to determine sex and maturity stage using the table of macroscopic characteristics of Caballero-Chávez (2011). Since the common snook is a commercial species, after landing, it was transported to the La Viga fish market in Mexico City.

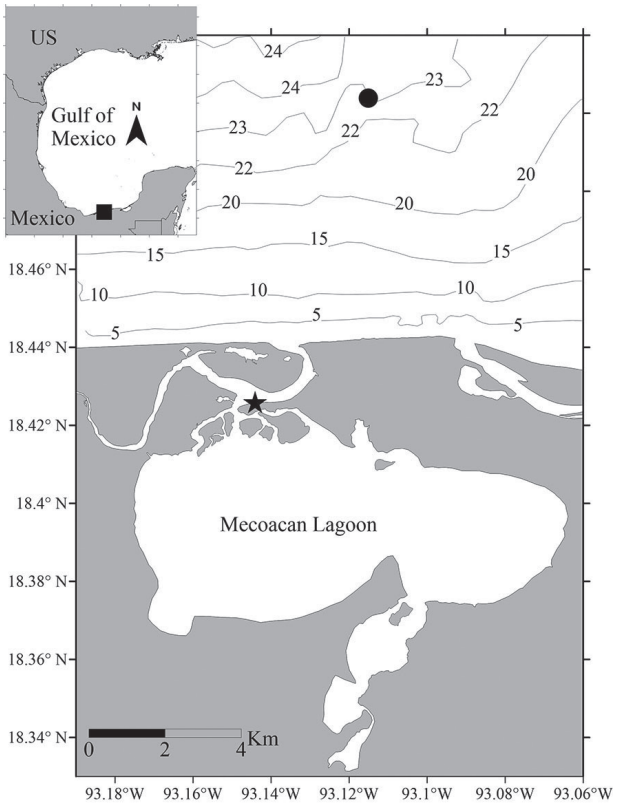

Figure 1. Capture site of a common snook, *Centropomus undecimalis*, with abnormal coloration from the southern Gulf of Mexico. Black circle marks the capture location, and the star indicates the landing site of specimen.

Results

The TL of the female specimen was 774 mm, and the gutted weight was 5 kg. Most of the fish surface, including the fins, lateral line, and dorsal part of the body, was orange, whereas the ventral part was whitish orange (Fig. 2A). The specimen was identified as *Centropomus undecimalis* based on the following combination of characteristics: an anal fin with three spines and six rays; 72 scales in the lateral line; the pectoral fins similar in length to the pelvic fins; and the third dorsal spine higher than the fourth when the fin is extended. Specimens of *C. undecimalis* normally have coloration ranges from dark brown to dull gray with a yellow to green tint on the dorsal surface (Fig. 2B). The lateral surface tends to be silvery, and the ventral surface is generally white. The pectoral fins, pelvic fins, second dorsal fin, and the dorsal lobe of the caudal fin usually are all bright yellow in color, however, some specimens are considerably darker.

Discussion

In Mexico there are four described cases of xanthochromism in fishes representing different families such as Leuciscidae (see Contreras et al. 1985), Epinephelidae (see Irygoyen-Arredondo et al. 2017), Kyphosidae (see Valencia-Méndez et al. 2018), and Pomacentridae (see Palacios-Salgado and Rojas-Herrera 2012). None of these cases were reported from the Gulf of Mexico.

The presently reported, common snook with the abnormal coloration had a normal and clearly healthy appearance (Fig. 2). According to some authors, the survival rate of organisms with xanthochromism is low compared to organisms with normal coloration because they are easier to detect by predators. However, the organisms that have been reported are healthy specimens and capable of reproducing, which could suggest that the abnormality in their coloration does not affect their ability to survive (Endler 1980; Golani et al. 2019; Jawad et al. 2021).

Among the possible causes or triggers of xanthochromism that are mentioned are: nutrition (Leclercq et al. 2010), the mutation of recessive genes (Dunham and Childers 1980; Pawar and Jawad 2017; San Gil-León and Angulo 2021), parasitic infections (Irigoyen-Arredondo et al. 2017), the presence of contaminants (Macieira et al. 2006; Irigoyen-Arredondo et al. 2017), or the presence of wounds caused by other organisms during antagonistic interactions (Colman 1972). The cause of the abnormality of the presently reported specimen is unknown.

According to the fisherman, this is not the first time that the phenomenon has been observed in the area. They mention that cases of xanthochromism had been observed in the common snook (Fig. 3), as well as in other species such as the crevalle jack, *Caranx hippos* (Linnaeus, 1766). On the other hand, cases of color and morphological abnormalities have recently been reported in the common snook and other fish species in the area (Wakida-Kusunoki et al. 2023); this suggests that there is one or more environmental stressors that could be causing these alterations. In this particular area, oil extraction and related activities are intense, so pollution is also a possible cause, although this has not been proven. Therefore, it is necessary to carry out more exhaustive studies and sampling focused on determining the causes of these abnormalities.

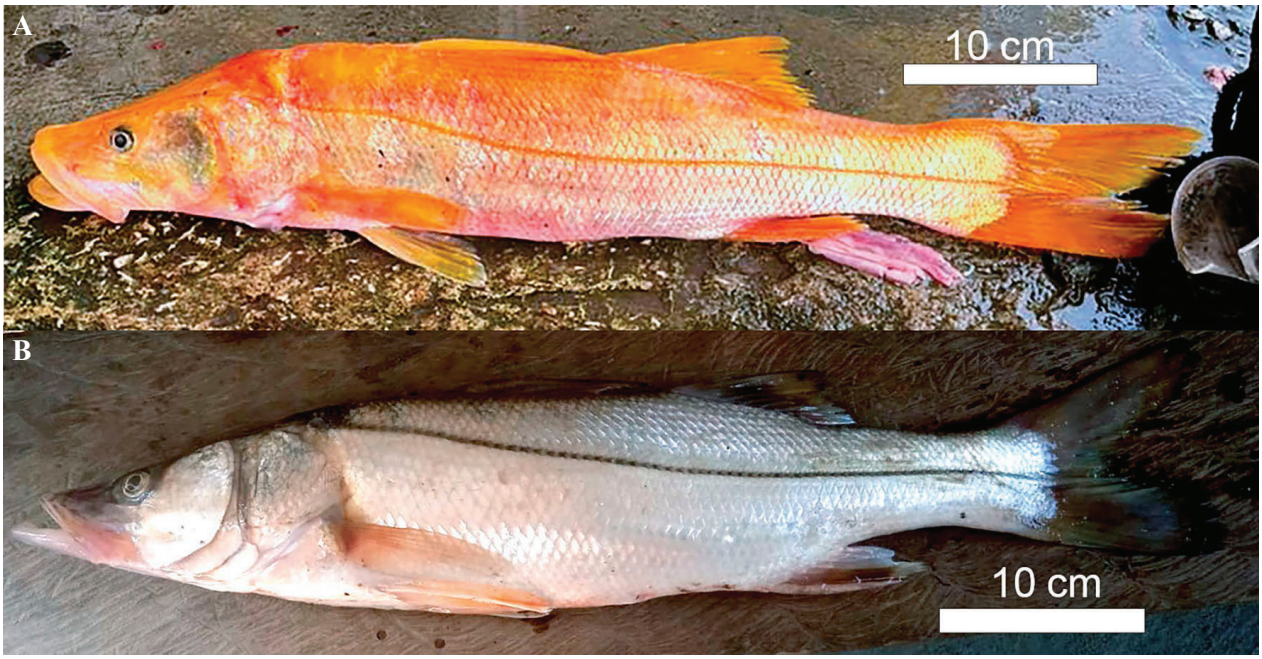

Figure 2. Lateral view of a common snook, *Centropomus undecimalis*, with xanthochromism reported in this study (774 mm TL) (**A**); Lateral view of common snook with normal color, (600 mm TL) (**B**).

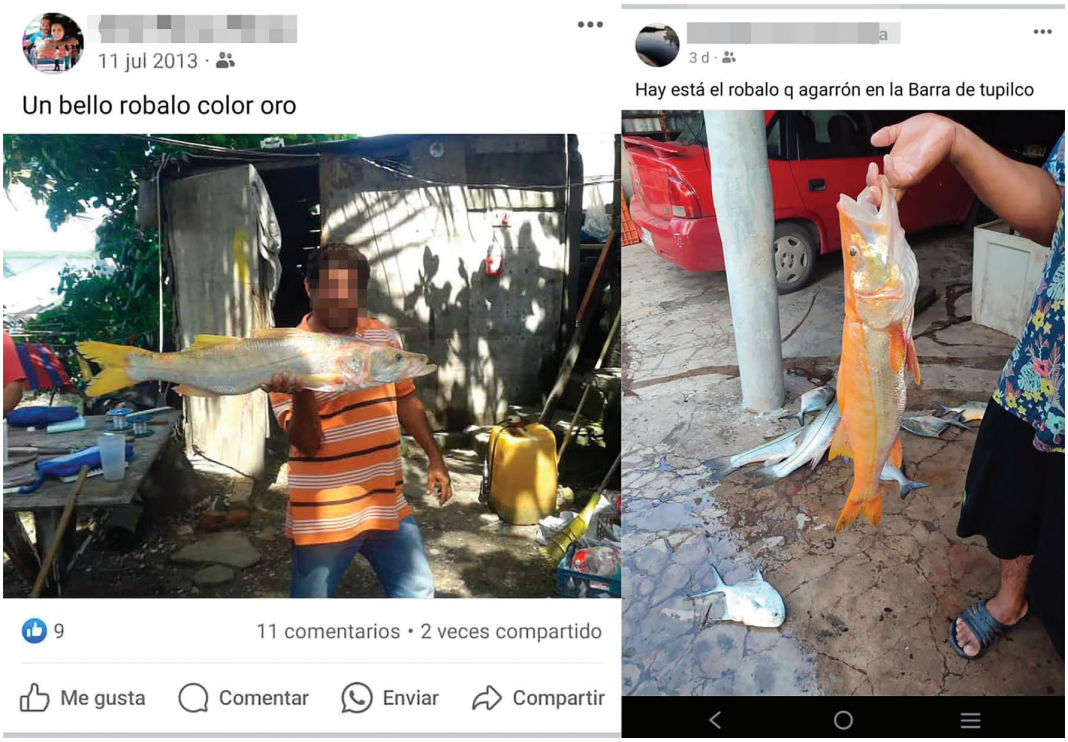

Figure 3. Photographs of other cases of xanthochromism in common snook, *Centropomus undecimalis*, reported in social networks from the same area.

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