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Record of *Canthidermis macrolepis* (Family: Balistidae) in the Local Markets of Sana'a City, Yemen: A Preliminary Study

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Abstract:

This research outlined the presence of *Canthidermis macrolepis* in some local fish markets in Yemen, particularly in Sana'a city, which was not reported in the fish guides of Yemen nor the list of Known economic fishes. The fish was identified using its morphological characteristics. Field visits were conducted for preliminary information about its local name, season of availability, price, the public's desire for it, and the source. The results showed that this species has a good taste with a relatively low price, 500-1200 YR/kg, which could be considered a new protein food source for humans, especially in poor societies. *C. macrolepis* should be added to the Yemen fish guides.

Keywords: Balistidae, *Canthidermis macrolepis*, Sana'a, Yemen, Yemeni waters.



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INTRODUCTION

Fish is a marvelous food source that forms a rich source of important nutrients including protein, essential fatty acids, vitamins, and minerals (Hefnawy *et al.*, 2019; Iqbal and Ashraf, 2025; Noreen *et al.*, 2025; Shamsan *et al.*, 2025). It plays a significant role in global food security (Iqbal, 2025), providing over 3.3 billion people around the world with at least 20% of their animal protein intake (FAO, 2022). It also could help in fighting against malnutrition (Maulu *et al.*, 2021). Small-scale fisheries catch is important in populations of many coastal areas worldwide which form more than 15% of mean diets for about one quarter of coastal nations (Viana *et al.*, 2023).

Fish acquired its economic importance where fisheries and aquaculture support the livelihood of people, mainly in developing countries (FAO, 2022), and provide vital income and foreign exchange earnings in several countries (Sinha and Banerjee, 2025).

Yemen possesses a long coastline (2252 Km) extending from the southern part of the Red Sea, through the Gulf of Aden to the Arabian Sea on the boundaries of Oman (Nagi, 2021), forming unique tropical ecosystem. The territorial waters of Yemen comprise about 969 species of fish (Abubakr, 2004; Hamoud *et al.*, 2010) in addition to other marine resources. Approximately 70% of the annual fish production in Yemen was estimated to be consumed locally, the remaining quantity forms the second-largest export sector after oil (UNDP, 2021).

Fishes in Yemeni markets are recorded on checklists of traded species and included in reports issued by the Ministry of Fish Wealth (MFW). During a survey in the main fish market in Sana'a city (2021), a fish species was observed, although it was not included in the mentioned lists. That raised the question about this species and the reason for its non-inclusion in the official database of the fish in Yemen.

From this point, the author has conducted this investigation, which aimed to document the presence of this fish species and the reasons that could be behind its absence in the official

lists, as well as its availability and popularity in the market. The findings of the present investigation can serve as a basis for upcoming research efforts.

MATERIALS AND METHODS

The methods applied in this investigation can be illustrated as follows:

(1) Fish samples were purchased from the market; the morphological characteristics were recorded for identification. Measurements like total length (T.L), standard length (St.L), to the nearest mm of the collected specimens were measured, and weight in grams was also reported.

(2) Preliminary information about the local name, season of availability, price, the public's desire for it, and the source of the fish catchment was collected through interviews with fish vendors. Information about the catch of this fish during the previous years was gathered from competent authorities.

(3) Meat samples were given to several families, including the author, for tasting. Opinions of some customers about the taste of the fish were also taken.

Some fish specimens were photographed and preserved in 5 % formalin. The information was also tracked during 2022 - 2023.

RESULTS AND DISCUSSION

Yemeni waters possess a rich marine habitat with highly diverse marine fauna that includes 969 fish species. In the current investigation, the studied species has been spotted in two fish markets (Al Belily and Al Qua'a markets) in Sana'a city, Yemen. Based on morphological characteristics, it was identified as *Canthidermis macrolepis*, which belongs to the family Balistidae (Figure 1). Characteristics of the collected specimens were consistent with the description given previously (Gill and Randall 1997). It is worth noting that this species was

first recorded from the coastal waters of Oman by Boulenger (Boulenger, 1887) and re-described by Gill and Randall (Gill and Randall, 1997).

This species increasingly reported from different regions around the world: from the coasts of Pakistan on the Arabian Sea (Moazzam and Osmany, 2022) and from the Pacific Ocean (Matsunuma *et al.*, 2020).



Fig. 1. The species *C. macrolepis* collected from the fish markets of Sana'a, Yemen during 2021.

Measurements of the collected specimens were between 43 cm and 50 cm T.L., 34 cm – 37 cm Std L with a weight ranging from 900 g to 1200 g. It was offered under a local name, Al-Jamal which means camel, with a relatively low price of 500 – 1200 YR/kg during Summer: May-September (the season of its occurring in the market), it often extends into October.

Depending on the MFW guides (MSRRC, 2001; FIC, 2010) and the Ministry of Agriculture and Irrigation (Al-Hriri *et al.*, 2009), 13 species of the Family Balistidae have been collectively documented from Yemeni waters (Table 1).

However, the species *C. macrolepis* was not in the list of guides and reports of the fishes of Yemen, despite different species of this family, including *C. macrolepis*, being reported in the updated checklist of the Red Sea ecosystem (Golani and Bogorodsky, 2010), the Gulf of Aden (Parenti, 2021), and the Arabian Sea (Manilo and Bogorodsky, 2003). This species was in the checklists of other countries that overlook the

Red Sea such as Saudi Arabia (Abu Shusha *et al.*, 2011), and the Gulf of Aqaba (Baranes, 2005). The family Balistidae was mentioned in a technical report (Zajonz *et al.*, 2000) as one of the predominant families with a wide range of distribution in the Socotra Archipelago, Yemen, rich in species (10 species were counted), but *C. macrolepis* was not included in the report. In 2019, *C. macrolepis* was added to the diversity of the Socotra Archipelago by Zajonz *et al.* (2019). Comparing the checklists of the Ministry of Fish Wealth with the preliminary checklist of the coastal fishes of the Socotra Archipelago (Zajonz *et al.*, 2019), we can reform the list of the species belonging to the family Balistidae that inhabiting Yemeni waters as 14 species (Table 1).

According to the merchants who supplied fish, *C. macrolepis* in Sana'a markets is brought from the coast of the Red Sea, Al-Hodeidah Governorate in particular. Subsequently, this might be the first report of this species from the Red Sea coastal waters of Yemen.

From an economic point of view, *C. macrolepis* was not mentioned within the economic fish species of Yemen (MFW, 2017; Red Sea Genral Fisheries Authority, 2024), and this could be attributed to two possible reasons. The first reason could be that *C. macrolepis* is being fished in small quantities that may be ignored in the reports. It is worth noting that the annual reports used to gather all the fish species with production of a small quantity under one category named 'various fishes' without any details.

Due to the ongoing crisis in Yemen and its dramatic effects on the economic conditions, people tend to consume cheap food to compensate for the food shortage; therefore, they were ready to resort to this fish species as a cheap food source.

The other possible reason for neglecting this species is that there was no actual catch of *C. macrolepis* in the past, and it was introduced into Sana'a markets in recent years, where the food culture of residents of this area makes them more flexible in accepting alternative fish food. This explanation was based on citing the

opinions of some specialists in the fishery sector and fishermen who confirmed that *C. macrolepis*

is usually caught as bycatch in other fish's nets, hence it is thrown back into the sea.

Table 1. List of Balistidae Species inhabiting Yemeni Waters.

Sr. No.	Species	Common name	Reference
1	<i>Abalistes stellatus</i> (Lecepede, 1798) ** <i>Balistes stellaris</i> (Bloch and Schneider, 1801)**	Starry triggerfish	(FIC, 2010; Zajonz <i>et al.</i> , 2019; MSRRC, 2001)
2	<i>Balistapus undulatus</i> (Park, 1797)	Orange-striped triggerfish	(MSRRC, 2001; FIC, 2010; Zajonz <i>et al.</i> , 2019)
3	<i>Balistoides viridescens</i> (Bloch and Schneider, 1801)	Titan triggerfish	(FIC, 2010; Zajonz <i>et al.</i> , 2019)
4	<i>Balistoides conspicillum</i> (Bloch and Schneider, 1801)	Clown triggerfish	(MSRRC, 2001; Zajonz <i>et al.</i> , 2019)
5	<i>Melichthys indicus</i> (Randall and Klauswitz, 1973)	Indian triggerfish	(Zajonz <i>et al.</i> , 2019)
6	<i>Odonus niger</i> (Ruppell, 1836)	Red-tooth triggerfish	(MSRRC, 2001; FIC, 2010; Zajonz <i>et al.</i> , 2019)
7	<i>Pseudobalistes flavimarginatus</i> (Ruppell, 1829)	Yellow-margin triggerfish	(FIC, 2010; Zajonz <i>et al.</i> , 2019)
8	<i>Pseudobalistes fuscus</i> (Bloch and Schneider, 1801)	Blue triggerfish	(FIC, 2010; Zajonz <i>et al.</i> , 2019)
9	<i>Rhinecanthus assasi</i> (Forsskal, 1775)	Picasso triggerfish	(Al-Hriri <i>et al.</i> , 2009; MSRRC, 2001; FIC, 2010; Zajonz <i>et al.</i> , 2019)
10	<i>Sufflamen albicaudatus</i> (Ruppell, 1829)	Blue-throat triggerfish	(FIC, 2010)
11	<i>Sufflamen fraenatum</i> (Latreille, 1804)	Masked triggerfish	(MSRRC, 2001; FIC, 2010; Zajonz <i>et al.</i> , 2019)
12	<i>Sufflamen chrysopterum</i> (Bloch and Schneider, 1801)	Half-moon triggerfish	(MSRRC, 2001; Zajonz <i>et al.</i> , 2019)
13	<i>Xanthichthys rigens</i> (Linnaeus, 1758)	Sargassum triggerfish	(MSRRC, 2001)
14	<i>Canthidermis macrolepis</i> (Boulenger, 1888)	Large-scale triggerfish	(Zajonz <i>et al.</i> , 2019)

** synonym

The taste experience has shown that *C. macrolepis* has a good taste, as rated by people who participated in the taste evaluation. This may reflect people's acceptance and the extent of the market's capacity to introduce new species.

This research finds that *C. macrolepis* has encouraging features that may make it a viable option, especially for poor communities. However, profound studies are necessary to confirm its nutritional value.

CONCLUSION

The present study concluded that *C. macrolepis* is not documented in the guides and reports of the Ministry of Fish Wealth, despite its availability in some fish markets of Yemen, which nominates this fish to be added to the official lists. It was also concluded that this fish is a cheap food item costing between 500 and 1200 YR/Kg. It has a good taste and can be available to most people in different parts of Yemen during its season. This finding highlights a new protein food source for humans, especially in poor societies, opening the door for this species, and may allow other species to be on the table.

RECOMMENDATIONS

Based on the present study, competent authorities in Yemen recommended updating the database of the fish and fisheries of Yemen. Where *C. macrolepis* is not documented, it should be added to the list of the fishes of Yemen. As well as re-identifying and evaluating the economic fishes in Yemen. Researchers also recommended investigating the biology, nutritional value, fisheries, and the possibility of marketing this fish and other uncommon species caught in small quantities, which can, in part, fill a gap in the fish markets.

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CONFLICT OF INTEREST

The author hereby states that there is no conflict of interest to declare.

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