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RESEARCH ARTICLE

Occurrence of the rabbitfish (*Chimaera monstrosa* Linnaeus, 1758) in the deep seas of Northern Cyprus, Mediterranean Sea

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ABSTRACT

Rabbitfish (*Chimaera monstrosa*, Linnaeus 1758), which is a deep-sea holocephalan mostly seen between 200-1000 m in depth. The specimen of *C. monstrosa* was caught in the deep-seas of Northern Cyprus by a commercial bottom trawler from Turkey. The depth of sampling area is between 456 and 690 m. Species description fulfilled with the help of morphological features and metric measurements. The specimen was preserved in 4% formaldehyde and deposited in the Museum of the Systematic, Faculty of Fisheries, Mersin University, (Catalogue number: MEUFC-19-11-103).

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Introduction

Cartilaginous fishes are divided morphologically into two classes. The first of which included sharks and rays is the elasmobranchs, and the other one including chimaeras is the holocephalans (Gillis et al., 2011).

Holocephalans, including Chimaeridae family, has two genera; *Chimaera* and *Hydrolagus*. They differ from each other with a distinct morphological difference. Namely, *Hydrolagus* does not have an anal fin, but *Chimaera* has it separated with a kick from the ventral caudal fin (Kemper et al., 2010a).

A deep-sea holocephalan *C. monstrosa*, are mostly seen at depths between 200-1000 meters (Moura et al., 2005). The common name of this fish is rabbitfish, and it belongs to the Chimaeridae family of class Holocephali. Chimaeroid fishes characterized by their large heads and

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long pointed bodies. Adults can found in lengths between 60 cm and 1 m, including the whip-like tail. They have a caudal fin, a pair of pelvic and pectoral fins, and two dorsal fins. The first dorsal fin has a triangular shape and contains a spine in front of it (Didier et al., 2012). Dorsal spine was thought to play a role in the protection of the fish itself. However, the spines of *C. monstrosa* are venomous and can cause painful wounds (Calis et al., 2005). While the skin of adult fish is completely scaleless, the dorsal part of the head and trunk of newborns has fine denticles embedded in the skin. Under the neurocranium, there are gill arches that covered with a thick-walled operculum, supported by cartilage rays extending from the hyoid arch.

Contrary to elasmobranchs, on both sides of the body, there is a little opercular vent positioned from anterior to the pectoral fin base.

Males have frontal tenaculum, paired pelvic claspers, and prepelvic tenacula as sexual structures, while juvenile males do not have tenacula. Using those pelvic claspers, males transfer sperms inside the females' reproductive tract to perform internal fertilization (Didier et al., 2012). Like all chimeras, *C. monstrosa* is oviparous, and during hot seasons, they are laying egg capsules at depths below 100 meters (Calis et al., 2005). *C. monstrosa* has been reported to feed on Bryozoa, Cnidaria, Crustacea, Mollusca, Tunicata, and Teleostei (Eronat, 2016). The reason why chimeras are called rabbitfish is because of their rabbit mouth-like anterior tooth plates and their noses (Didier et al., 2012). The bodies of *C. monstrosa* covered with a distinct brown pattern, which is dorsally brownish and ventrally whitish. There are stripes and blotches on the lateral part of the body. The margins of the fins are more pale or whitish than the body. Brown and silver network patterns are available in some parts of the body (Jordan and Snyder, 2011; Luchetti et al., 2011). At times identification of chimaeroid is challenging. DNA barcoding can be used for identification of species with CO1 gene sequencing (Ward et al., 2008).

C. monstrosa has several records in the Mediterranean region. Some of those are: at Haifa Bay (Goren and Galil, 1997), Italy (Matarrese et al., 1996), North-East North Sea (Bergstad et al., 2003), Northern Tyrrhenian Sea in (Sartor et al., 2003), Syria (Ali, 2003), Balearic Sea (Sion et al., 2004), Sicily (Ragonese et al., 2013), Sea of Marmara (Dalyan, 2010) and the Aegean Sea (Geldiay, 1969).There is no record for *C. monstrosa* in Cyprus, until now. The present study is the first study showing the occurrence of *C. monstrosa* and new data for fish species in Cyprus.

Material and Methods

The deep-sea sampling was carried out on March 7, 2019, by a commercial trawl in the Northern Cyprus, Mediterranean Sea. The depth of sampling area is between 456 and 690 m. The coordinates of the capture zone are 36°07'11.6"N 34°34'14.6"E (Figure 1). The specimen of the rabbitfish (*C. monstrosa*) was preserved in 4% formaldehyde and deposited in the Museum of the Systematic, Faculty of Fisheries, Mersin University, (Catalogue no: MEUFC-19-11-0103) (Figure 2). The identification of the species was made according to Kemper et al. (2010b). All morphometric measurements were done to the nearest 0.01 cm using dial calipers (Table 1). Body length proportions (BDL%) were calculated using the following formula:

$$BDL\% = x\frac{100}{385}$$

In this formula, x is proportioned measurement, BDL is body length and is 385 mm.

Figure 1. Sampling location of the *C. monstrosa* specimen

Figure 2. The specimen of the *C. monstrosa* from the deep seas of Northern Cyprus (A: Top view; B: Lateral view)

Results

In this study, a specimen of *C. monstrosa* has 80.30 cm total length (TL), was caught from the deep seas of Northern Cyprus in March 2019, by bottom trawling operation which is carried out between 456 and 690 m. Morphometric characteristics for this individual were measured, and BDL% values calculated in Table 1.

Table 1. Body length proportions (BDL%) of *C. monstrosa* (female) caught from Northern Cyprus

Measurement	BDL%
TL	208.6
PCL	128.5
SVL	66.2
TRL	46.7
PD2	53.2
PD1	33.7
POB	13.7
POR	15.6
PRN	12.9
D2B	87.01
D2AH	5.5
D2PH	4.7
D1B	19.2
DSA	20.7
D1H	19.2
CDM	23.6
CDH	2.1
CTL	76.6
CVM	24.2
CVH	3.11
HDL	28.6
P1A	37.9
P2A	18.7
IDS	8.6
DCS	0.5
PPS	41.6
PAS	40.5
PCS	63.6
D1P1	18.2
D1P2	44.2
D2P1	31.2
D2P2	27
EYL	8.3
EYH	6.2

Note: Abbreviations used: TL (total length), PCL (precaudal length), BDL (body length), SVL (snout-vent length), TRL (trunk length), PD2 (pre-second dorsal length), PD1 (pre-first dorsal length), POB (pre-orbital length), POR (pre-oral length), PRN (pre-narial length), D2B (second dorsal fin base), D2AH (maximum height of anterior second dorsal fin), D2PH (maximum height of posterior second dorsal fin), D1B (first dorsal fin base), DSA (dorsal spine length), D1H (maximum height of first dorsal fin), CDM (dorsal caudal margin), CTL (total caudal fin length including filament), CVM (ventral caudal margin), HDL (head length), P1A (anterior margin of pectoral fin), P2A (anterior margin of pelvic fin), IDS (interdorsal space), DCS (dorsal-caudal space), PPS (posterior base of pectoral fin to anterior base of pelvic fin), PAS (posterior base of pelvic fin to origin of anal fin), PCS (posterior base of pelvic fin to origin of ventral caudal fin lobe), D1P1 (anterior edge of first dorsal fin base to anterior edge of pectoral fin base), D1P2 (anterior edge of first dorsal fin base to anterior edge of pelvic fin base), D2P1 (anterior edge of second dorsal fin base to anterior edge of pectoral fin base), D2P2 (anterior edge of second dorsal fin base to anterior edge of pelvic fin base), EYL (eye length), EYH (eye height).

Discussion and Conclusion

C. monstrosa inhabits Eastern Atlantic from Northern Norway and Iceland to the Azores and Western Africa. It is less distributed in the western and central parts of the Mediterranean and the northeastern region. There are a limited number of records of this species from the Northeast Mediterranean (Ali, 2003; Bilecenoğlu et al., 2014). The record of *C. monstrosa* from the Turkish coastline only reported in the Sea of Marmara (Dalyan, 2010) and the Aegean Sea (Geldiay, 1969). In the present study, a specimen of *C. monstrosa* reported in Northern Cyprus. The reported maximum total length of this species in literature is 150 cm, and the maturity length is approximately 45.9 cm (Moura et al., 2004). The total length of the specimen captured in this study is 80.3 cm, so it understood that our sample is an adult. Morphometric data of *C. monstrosa* in the previous studies from Levant Basin were not available; therefore, a comparison couldn't make. The morphometric measurements compared with a study from the Bahamas, and the results found 82% similar (Kemper et al., 2010b). The identification of chimaeroid species based on the absence of skeletal elements in dental plates. All chimeras have a total of six dental plates. One pair of these plates located in the lower jaw (mandibular), while the other two pairs located in the upper jaw (two small vomeral and two palatal). (Toscano et al., 2011). In this study, two mandibular plates were found on the lower jaw. This finding was beneficial and supportive in the identification of the species.

Figure 3. A pair of mandibular plates detected in the lower jaw of *C. monstrosa*

C. monstrosa, known to be widely distributed species in the Mediterranean. The reason for the lack of record for the island of Cyprus so far may be that target fishes are living shallow waters when compared with *C. monstrosa* so that fishers do not perform fishing operations in these depths.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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