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SHORT COMMUNICATION

Maximum length report of *Gonostoma denudatum* Rafinesque, 1810 in the Eastern Mediterranean Sea

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ABSTRACT

The present paper reports the maximum length of the rare seen deep-sea fish bristlemouth *Gonostoma denudatum* Rafinesque, 1810 in the Mediterranean. One specimen of *G. denudatum* was caught using a trawler from the deep seas of Northern Cyprus waters on June 22th 2019. The total length (TL) of the specimen was 165 mm, the standard length (SL) was 149.5 mm, and the total weight was 16.2 g. Till today, this sample shown to this species maximum length (TL), which was recorded for the Mediterranean as well as in Eastern basin waters.

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Introduction

The bristlemouth *Gonostoma denudatum* Rafinesque, 1810, is a species mainly found in Atlantic tropical and subtropical waters. Its distribution extends until Eastern Atlantic Ocean, Mediterranean Sea, and off southern Africa spreading from the Atlantic slopes and western Atlantic (Schaefer et al., 1986).

G. denudatum is a deep mesopelagic species usually associate with continental and island slopes. The species exhibits diel vertical migrations for juveniles and adults in 400-700 m by daytime and 100-200 m by nighttime (Badcock, 1984). It was commonly feeding on Euphausiids and copepods (Costa et al., 1991; Froese and Pauly, 2019).

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The first record of *G. denudatum* from the Turkish waters was reported from Iskenderun coast in 2014 (Bilecenoglu et al., 2014). The species was recorded in the ichthyoplankton samples belonging to *Gonostoma* genus from Cyprus waters in 1998 (Çoker and Cihangir, 2015) and Mersin, Erdemli, in 2018 (Bayhan and Ergüden, 2019). Later, the species was reported from the eastern Mediterranean Cyprus coast in 2019 (Akbora et al., 2020).

Up today, the sampling reported by the present paper shows the maximum length recorded for *G. denudatum* in the Mediterranean as well as in Eastern Mediterranean waters. By this way, this study aims to contribute to the knowledge of the bristlemouth, especially regarding size and distribution in the North Cyprus waters.

Material and Methods

On June 22th 2019, one specimen of the bristlemouth *G. denudatum* with a total length of 165.0 mm was caught by a trawler in the deep seas of Northern Cyprus, Eastern Mediterranean (Fig 1), (34.466 N, 36.0075 E) at a depth of 550 m. The sample was measured and stored in the Museum of Systematic, Faculty of Fisheries, Mersin University (catalogue number MEUFC-19-11-128). All values agree with the literature (Ahlstrom et al., 1984; Quéro et al., 1990).

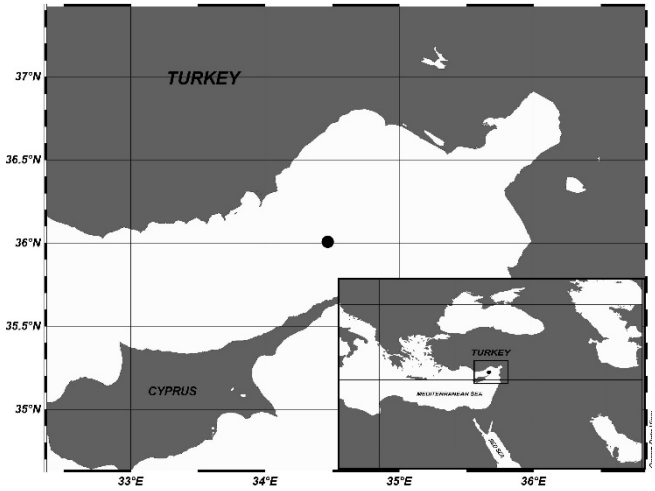

Figure 1. Catch location of *G. denudatum* caught off the Coast of Northern Cyprus Sea

Results

The total length of the specimen is 165 mm, it has a 149.5 mm of standard length, and total weight is 16.2 g. Body moderately elongated. Standard length proportions of head length (HL), pre-dorsal length, pre-anal length, pre-pectoral length, and maximum body depth is 21.5%, 62.8%, 64.2%, 22.7%, and 16.7%. Head length proportions of eye diameter, snout length, and pre-orbital length is 18%, 14.3%, and 27.1%. Meristic counts of dorsal fin rays 14, pectoral fin rays 12; pelvic fin rays 8, anal-fin rays 28 and gill rakers 16 (on first arch). These values are included within the ranks proposed by Badcock (1984) and Schaefer et al. (1986) for *G. denudatum*. The body color of the fresh specimen is transparent and light brown. The fish's head and cheek were naked and bluish. Photophores appears silvery gray, and the caudal peduncle is light brown (Fig 2). The geographical comparison data are shown in Table 1.

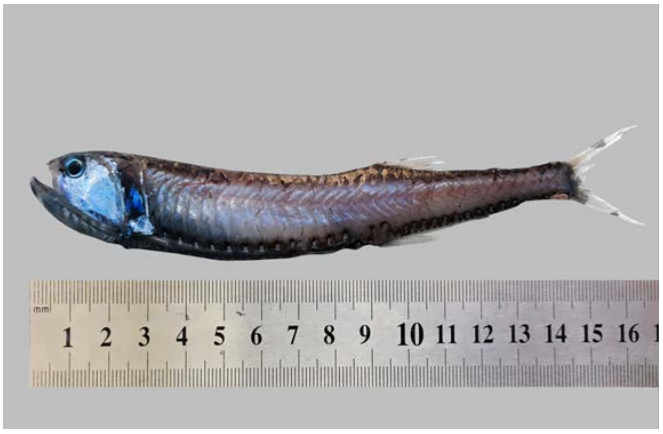

Figure 2. *G. denudatum* (149.5 mm SL) (Photo: Deniz AYAS)

Discussion

In fishery researches, information about the maximum length-weight data is crucial for calculating theoretical parameters (Borges, 2001). In the literature, the maximum total length of *G. denudatum* reported was 140 mm standard length in the eastern Atlantic (Quéro et al., 1990), 118 mm in Eastern Mediterranean, Iskenderun Bay (Bilecenoglu et al., 2014), 117.5 mm in the Northeastern Mediterranean, Turkey (Bayhan and Ergüden, 2019) and 122.5 mm in the Eastern Mediterranean, N. Cyprus (Akbora et al., 2020). The size of the present specimen was the maximum length ever registered not only for the Eastern Mediterranean and but also for the other Mediterranean regions. Moreover, the present study also reported the maximum length for the species (149.5 mm, SL), namely bigger than the maximum published standard length, 140 mm (Quéro et al., 1990) in FishBase. In Mediterranean waters, the maximum lengths of this species in the other previous studies were shown in Table 1.

Although *G. denudatum* is widespread throughout the Eastern Central Atlantic, the existence of this species has been identified in the Mediterranean waters in recent years. According to Çoker and Akyol (2015), Cyprus waters are subject to significant currents flowing across the eastern Mediterranean Basin, where the Atlantic current entering the Mediterranean Sea through the Straits of Gibraltar sweeps along the North African shores eastwards. This species most likely possibility for the present finding is that it comes with by active migration.

Table 1. The reported maximum length of bristlemouth, *G. denudatum* from different locations

Authors	Location	Sample Time	Sample Size	Sampling Gear	Depth (m)	Total Length, TL (mm)	Standard Length, SL (mm)
Battaglia et al. (2010)	Mediterranean Sea (Strait of Messina), Italy	2007-2009	1	Trawl	80-300	-	131.2
Bilecenoglu et al. (2014)	Eastern Mediterranean, Turkey	2002-2014	1	Trawl	200	-	118.0
Çoker and Cihangir (2015)	Northern Cyprus	July 1998	Larvae*	Bottom Trawl	300-1200	-	-
Bayhan and Ergüden (2019)	North-Eastern Mediterranean, Turkey	July 2019	1	Bottom Trawl	595	130.7	117.5
Akbora et al. (2020)	Eastern Mediterranean, N. Cyprus	May 2018	1	Bottom Trawl	420-640	128.0	122.0
This study	Northern Cyprus	June 2019	1	Bottom Trawl	550	165.0	149.5

Note: *; These larvae values are given for frequency of appearance as 4.38

Up to date, no species-specific conservation measures take place for *G. denudatum* in the Mediterranean. Ragonese et al. (2001) stated that *G. denudatum* is taken as by-catch during red shrimp targeted deep-water bottom trawls.

The present data record informs the maximum length of *G. denudatum* along the Eastern Mediterranean Sea, including the Cyprus waters. To the authors' knowledge, this study is a new reference for the size of *G. denudatum* species for the whole Mediterranean.

Conclusion

In recent years, the number of non-indigenous immigrant fish species to the Eastern Mediterranean has rapidly increased (Bilecenoglu et al., 2014; Bayhan and Ergüden, 2019; Ergüden et al., 2019). Further longer-term monitoring surveys should be carried out, particularly in deep-sea investigations to support the fisheries development and management.

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Compliance with Ethical Standards

Authors' Contributions

DA and DE is interested in searching and studied the fish species, including the subject of the current study and designed the final study and HDA is checked and re-revised the final edit of this paper.

Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical Approval

This study was conducted in accordance with ethics committee procedures of animal experiments.

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