

ABOUT TELEOST SPECIES FROM DEEP MARINE TUNISIAN WATERS:
WITH ADDITIONAL RECORDS OF SLOANE'S VIPERFISH *CHAULIODUS SLOANI* AND CONFIRMED OCCURRENCE OF BLACKFIN SORCERER
NETTASTOMA MELANURUM

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ABSTRACT

*This paper reports additional records of Sloane's viperfish *Chauliodus sloani* Bloch & Schneider, 1801, and the first substantiated record of blackfin sorcerer *Nettastoma melanurum* Rafinesque, 1810, from the Tunisian coast. All specimens were collected by trawl during a commercial survey carried out in the northern area of the country. Both species were caught in deep waters, at depths between 600 and 1200 m. These captures suggest that viable populations of both species have successfully established in this region.*

Key words: Stomiidae, Nettastomatidae, description, morphometric measurements, meristic counts, occurrence, deep waters

SPECIE DI TELEOSTEI IN ACQUE MARINE PROFONDE TUNISINE: NUOVI
RITROVAMENTI DEL PESCE VIPERA *CHAULIODUS SLOANI* E PRESENZA
CONFERMATA DEL PESCE SERPE CODANERA *NETTASTOMA MELANURUM*

SINTESI

*L'articolo riporta nuovi ritrovamenti del pesce vipera *Chauliodus sloani* Bloch & Schneider, 1801, e il primo ritrovamento documentato del pesce serpe codanera *Nettastoma melanurum* Rafinesque, 1810, al largo della costa tunisina. Tutti gli esemplari sono stati pescati con una rete a strascico, durante un'uscita a fini commerciali effettuata nell'area settentrionale del paese. Entrambe le specie sono state catturate in acque profonde, tra i 600 e i 1200 m. A seguito di queste catture gli autori ipotizzano che popolazioni vitali di entrambe le specie si sono stabilite con successo in questa regione.*

Parole chiave: Stomiidae, Nettastomatidae, descrizione, misurazioni morfometriche, conte meristiche, ritrovamento, acque profonde

INTRODUCTION

Investigations regularly and frequently conducted in shallow coastal waters of the northern Tunisian coast and observations carried out at the fishing sites of Tabarka, Bizerte and Ras Jebel offered the opportunity to show that some changes occurred in the ichthyofauna biodiversity throughout the study area (Rafrafi-Nouira, 2016). These changes were displayed by the presence of species previously unknown in the area, consequences of internal migrations from southern Tunisian areas such as the Gulf of Gabès (Rafrafi-Nouira *et al.*, 2105a, 2015b) or incoming from the eastern tropical Atlantic through the Strait of Gibraltar (Azzouz *et al.*, 2010, 2011; Mansour *et al.*, 2011; Rafrafi-Nouira, 2016) and the Red Sea through the Suez Canal (Rafrafi-Nouira *et al.*, 2012).

Other investigations were concomitantly carried out focusing on the deep-sea areas of the same Tunisian

region. Preliminary data allowed collecting species rarely observed in local fish markets, among them Sloane's viperfish *Chauliodus sloani* Schneider, 1801 and the blackfin sorcerer *Nettastoma melanurum* Rafinesque, 1810. The occurrence of *C. sloani* in Tunisian waters was confirmed by Ben Amor *et al.* (2017), and in the present paper, we provide additional records of the species. *N. melanurum* was reported in the area by Bradaï *et al.* (2004), however no specimen was available for confirmation; the present capture of the specimens allowed us to give a short description of the species and comment on the distribution of the species in the region and in the Mediterranean Sea in general.

MATERIAL AND METHODS

On 4 December 2017, 3 specimens of *Chauliodus sloani* and 8 specimens of *Nettastoma melanurum* were captured by benthic trawl, off Bizerte, in northern Tunisia, at depths between 600 and 1200 m, on soft bottom, at 37°43'33.92" N and 8°45'06.32" E (Fig. 1). They were collected together with other species inhabiting deep marine waters, such as the rabbitfish *Chimera monstrosa* Linnaeus, 1758, the blackspot grenadier *Coelorhynchus caelorhynchus* (Risso, 1810), the hake *Merluccius merluccius* (Linnaeus, 1758), *Hoplostethus mediterraneus* Cuvier, 1829 and the Atlantic horse-mackerel *Trachurus trachurus* (Linnaeus, 1758), as well as two unidentified cephalopod species.

Fresh specimens were measured for total length (TL), standard length (SL) and all morphometric characters to the nearest millimetre, and weighed to the nearest gram. Two specimens of *C. sloani* and 3 specimens of *N. melanurum* were fixed in 10% buffered formaldehyde, preserved in 75% ethanol, and deposited in the Ichthyological Collection of Faculté des Sciences de Bizerte (Tunisia) under catalogue numbers FSB-Chau-slo-01 and FSB-Chau-slo-02, for *C. sloani*, respectively, and FSB-Net-mel-01, FSB-Net-mel-02 and FSB-Net-mel-03, for *N. melanurum*, respectively.

RESULTS AND DISCUSSION

Chauliodus sloani is considered a rare species in the Mediterranean Sea, probably because it lives in deep areas, poorly exploited by fishing gears, has no commercial value, and is generally captured as by-catch and then discarded at sea (Tortonese, 1970). The occurrence of *C. sloani* in Tunisian marine waters was reported by Ben Amor *et al.* (2017) based on specimens caught in the northern region.

The three collected specimens measured 168, 117 and 100 mm in TL, respectively, and weighed 5.9, 1.9 and 1.6 g, respectively (Fig. 2). They were identified as *C. sloani* based on a combination of general morphological features, morphometric measurements, meristic counts (see Tab. 1), and colour, which are in total agreement

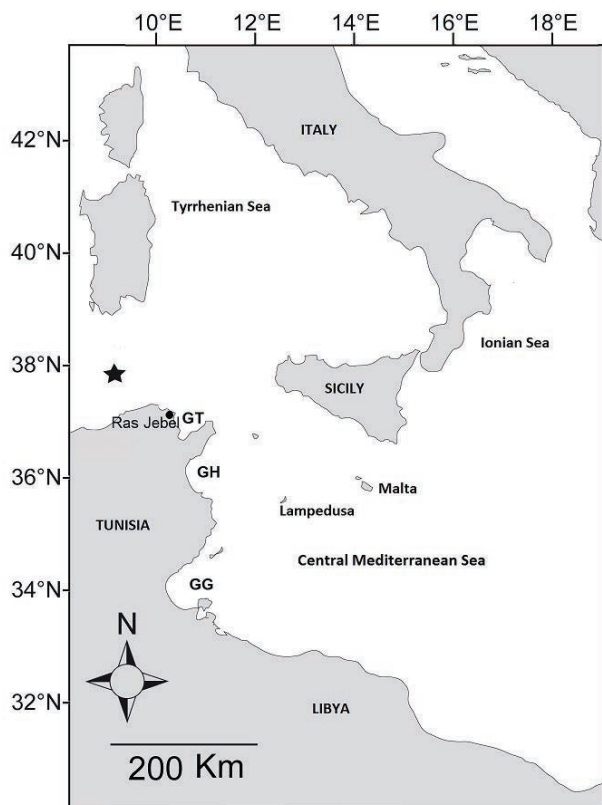


Fig. 1: Map of the Mediterranean Sea showing Tunisia and indicating the capture site [black star] of the specimens of *Chauliodus sloani* and *Nettastoma melanurum* in the northern region.

Sl. 1: Zemljevid Sredozemskega morja z označeno lokaliteto ob severnem predelu Tunizije [črna zvezda], kjer so bili ujeti primerki vrst *Chauliodus sloani* in *Nettastoma melanurum*.

Tab. 1: Morphometric measurements in mm and as percentages of total length (TL %), meristic counts and weights recorded in the specimens of *Chauliodus sloani* from the northern Tunisian region.

Tab. 1: Morfometrične meritve, izražene v milimetrih in kot delež celotne dolžine (TL %), meristika ter teže primerkov morskega gada *Chauliodus sloani* iz severnega dela Tunizije.

References	FSB-Chau-slo-01		FSB-Chau-slo-02	
	mm	% TL	mm	% TL
Morphometric measurements				
Total length (TL)	168	100.0	108.7	100.0
Standard length (SL)	160	95.2	100.6	92.5
Head length	24	14.3	22	20.2
Eye diameter	4.3	2.6	3	2.8
Preorbital length	6.8	4.0	3.5	3.2
Predorsal length	36	21.4	25	23.0
Preanal length	133	79.2	71.4	65.7
Dorsal fin base	10	6.0	6	5.5
Anal fin base	15	8.9	12.6	11.6
Meristic counts				
Dorsal fin rays		6		6
Anal fin rays		10		10
Pectoral fin rays		12		12
Pelvic fin rays		7		7
Caudal fin rays		11		11
Number of teeth in upper jaw		8		8
Number of teeth in lower jaw		14		14
Total body weight (g)		5.9		1.6



Fig. 2: Specimens of *Chauliodus sloani* from the northern Tunisian region; scale bar = 40 mm.

Sl. 2: Primerki vrste *Chauliodus sloani* iz severnega predela Tunizije; merilo = 40 mm.



Fig. 3: Specimen of *Chauliodus sloani* from the northern Tunisian region, captured [white arrow] by a squid belonging to the genus *Histiotheutis* Orbigny, 1841; scale bar = 100 mm.

Sl. 3: Primerek vrste *Chauliodus sloani* iz severnega predela Tunizije, ki ga je ujel ligenj iz rodu *Histiotheutis* Orbigny, 1841; merilo = 100 mm.

with Tortonese (1970), Gibbs (1984), Dalyan & Eryilmaz (2008) and Ben Amor *et al.* (2017). These 3 specimens constitute additional records of the species that confirm its occurrence in local marine waters, where it does not appear as rare as it was previously stated (Bradaï, 2000; Bradaï *et al.*, 2004). They probably were juvenile specimens, the species reaching more than 300 mm in standard length (Gibbs, 1984). *C. sloani* is a top predator feeding on teleost species exclusively (Battaglia *et al.*, 2018). Conversely, it could constitute prey for cephalopod, as in Fig. 3, which shows a specimen captured by a squid probably belonging to the genus *Histiotheutis*, Orbigny, 1841.

Nettastoma melanurum is known as a bathypelagic species widely distributed on either side of the Atlantic Ocean. Off the eastern Atlantic coast, *N. melanurum* occurs from Portugal to the Gulf of Guinea, and off the western Atlantic coast from the northern Gulf of Mexico and east Florida through the Caribbean to the Guianas (Saldanha, 1986). The species is also reported in the western Mediterranean, as a deep-sea species distributed between 415 and 1598 m (Porcu *et al.*, 2013). It is also known in the eastern Mediterranean, off the coast of Egypt (Farrag, 2016), and in the Levant Basin (Basusta *et al.*, 2002). The reproductive biology of the species is well known from the specimens collected off the south-

ern coast of Sardinia, in the central Mediterranean Sea (Porcu *et al.*, 2013).

Bradaï (2000) and Bradaï *et al.* (2004) reported the occurrence of *N. melanurum* in Tunisian waters, however, no description was provided of the species nor details on its capture. Therefore, in this note, we present the first substantiated records of *N. melanurum* in the area. A total of 8 specimens were studied, ranging between 460 and 630 mm in TL, and between 46.6 g and 142 g in total body weight. Following Porcu *et al.* (2013) for the specimens from the Sardinian coast, the size at sexual maturity is 535 mm in females and 505 mm TL in males, while the maximum TL in the specimens under study was 753 mm for females and 668 mm TL for males. Additionally, Porcu *et al.* (2013) noted that the smallest mature female and mature male were 420 mm and 446 mm long, respectively. Such patterns suggest that the sampled specimens were probably adults (Tab. 2).

The specimens were identified via the combination of following characters (Fig. 4): body very elongate, scaleless, and compressed posteriorly. Head long, anterior nostril tubular, jaws elongate, teeth in bands on jaws and vomer (Fig. 5). Dorsal anal and caudal fins confluent, well developed, dorsal fin origin over gill opening (Fig. 6). Brownish dorsally, belly pale whitish brown; posterior part of dorsal and anal fins with a

Tab. 2: Morphometric measurements in mm and as percentages of total length (TL %), meristic counts and weights recorded in the specimens of *Nettastoma melanurum* from the northern Tunisian region.

Tab. 2: Morfometrične meritve, izražene v milimetrih in kot delež celotne dolžine (TL %), meristika ter teže primerkov vrste *Nettastoma melanurum* iz severnega dela Tunizije.

References	FSB-Net-mel-01		FSB-Net-mel-02		FSB-Net-mel-03	
	mm	% TL	mm	% TL	mm	% TL
Measurements						
Total length	570	100.0	585	100.0	623	100.0
Preanal length	240	42.1	230	39.3	250	40.1
Predorsal length	85	14.9	78	13.3	83	13.3
Dorsal fin length	485	85.1	510	87.2	545	87.5
Anal fin length	327	57.4	350	59.8	375	60.2
Body depth	30	5.3	26	4.4	26	4.2
Head length	85	14.9	78	13.3	81	13.0
Eye diameter	10	1.8	6	1.0	9	1.4
Preorbital length	33	5.8	31	5.3	32	5.1
Interorbital length	3	0.5	4	0.7	4.5	0.7
Length of upper jaw	46	8.1	43	7.4	47	7.5
Length of lower jaw	44	7.7	41	7.0	43	6.9
Counts						
Number of pores in linea lateralis	48		48		48	
Number of pre-branchial pores	9		9		9	
Number of temporal pores	3		3		3	
Total body weight in gram	129.1		91.3		116.6	



Fig. 4: Specimen of *Nettastoma melanurum* from the northern Tunisian region (ref. FSB-Net-mel 01); scale bar = 50 mm.

Sl. 4: Primerek vrste *Nettastoma melanurum* iz severnega predela Tunizije (ref. FSB-Net-mel 01); merilo = 50 mm.



Fig 5: Head of a specimen of *Nettastoma melanurum* from the northern Tunisian region (ref. FSB-Net-mel 01); scale bar = 20 mm.

Sl. 5: Glava primerka vrste *Nettastoma melanurum* iz severnega predela Tunizije (ref. FSB-Net-mel 01); merilo = 20 mm.

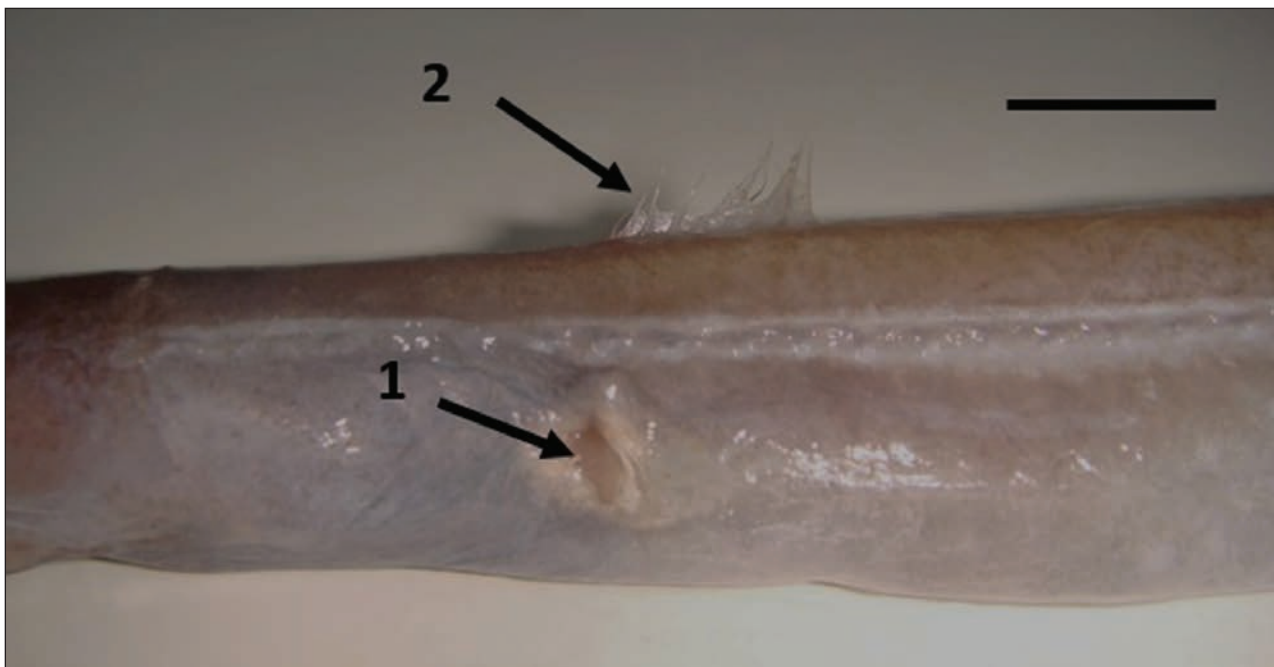


Fig. 6: Specimen of *Nettastoma melanurum* with indicated gill opening (1) and the beginning of dorsal fin (2) (ref. FSB-Net-mel 01); scale bar = 20 mm.

Sl. 6: Primerek vrste *Nettastoma melanurum* z označenimi škržnimi režami (1) in začetkom hrbtne plavuti (2) (ref. FSB-Net-mel 01); merilo = 20 mm.

black margin. It appears that description, measurements and percentage of TL (% TL) are in total agreement with Saldanha (1986) and Basusta *et al.* (2002), who provided morphological characters allowing to distinguish *N. melanurum* from other species occurring in the Mediterranean., among them the main character being the position of the gill opening over the beginning of the first dorsal fin.

Since the findings of *C. sloani* and *N. melanurum* confirm the occurrence of the two species in Tunisian

marine waters, these should be included in the local ichthyofauna. *C. sloani* and *N. melanurum* inhabit deep-sea areas poorly exploited by commercial vessels and fishing gears. Additionally, they are of low economic interest and generally discarded at sea after capture; such patterns explain their relative rarity in the area. However, the number of specimens collected for both species suggests that viable populations have established in the area, but further records are needed to confirm this well-reasoned hypothesis.

O RIBAH KOSTNICAH IZ GLOBOMORSKEGA OKOLJA OB TUNIZIJI: NOVI PODATKI O VRSTI *CHAULIODUS SLOANI* IN POTRJEN ZAPIS O VRSTI *NETTASTOMA MELANURUM*

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POVZETEK

*Avtorji poročajo o novih podatkih o pojavljanju morskega gada *Chauliodus sloani* Bloch & Schneider, 1801, in prvem zapisu o pojavljanju vrste *Nettastoma melanurum* Rafinesque, 1810, iz voda ob tunizijski obali. Vsi primerki so bili ujeti v povlečno mrežo pri komercialnem ribolovu v severnem delu države. Obe vrsti sta bili ujeti v velikih globinah med 600 in 1200 m. Ti podatki kažejo, da sta se v regiji ustalili viabilni populaciji obeh vrst.*

Ključne besede: Stomiidae, Nettastomatidae, opis, morfometrične meritve, meristika, pojavljanje, globokomorsko okolje

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