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OCCURRENCE OF THE LONGJAW SNAKE EEL, *OPHISURUS SERPENS* (OPHICHTHIDAE), IN TUNISIAN WATERS (CENTRAL MEDITERRANEAN SEA)

Sihem RAFRAFI-NOUIRA
Université de Carthage, Unité de Recherches Exploitation des Milieux Aquatiques, Institut Supérieur de Pêche et d'Aquaculture de Bizerte, BP 15, 7080 Menzel Jemil, Tunisia

Rimel BENMESSAOUD & Mourad CHÉRIF
Institut National des Sciences et Technologies de la Mer, port de pêche, 2025 La Goulette, Tunisia

Christian REYNAUD
Laboratoire Interdisciplinaire en Didactique, Education et Formation, Université de Montpellier, 2, place Marcel Godechot, B.P. 4152, 34092 Montpellier cedex 5, France

Christian CAPAPÉ
Université de Montpellier, 34095 Montpellier cedex 5, France
e-mail: capape@orange.fr

ABSTRACT

This paper documents an additional and rare record of the longjaw snake eel, Ophisurus serpens *(Osteichthyes: Ophichthidae), in Tunisian waters. The individual, captured off Ras Jebel, was a juvenile measuring 330 mm in total length and weighing 19.8 g. This constitutes the sixth overall and fifth well-documented record of* O. serpens *in Tunisia, suggesting the successful establishment of a viable population in the region. The study provides a detailed description of the specimen, including morphometric measurements and meristic counts.*

Key words: *Ophisurus serpens,* morphometric data, meristic counts, brackish area, Tunisian waters

PRESENZA DEL PESCE SERPENTE, *OPHISURUS SERPENS* (OPHICHTHIDAE), NELLE ACQUE DELLA TUNISIA (MAR MEDITERRANEO CENTRALE)

SINTESI

Il presente lavoro documenta un ulteriore e raro ritrovamento del pesce serpente, Ophisurus serpens *(Osteichthyes: Ophichthidae), nelle acque tunisine. L'esemplare, catturato al largo di Ras Jebel, era un giovane con una lunghezza totale di 330 mm e un peso di 19,8 g. Si tratta del sesto record complessivo e del quinto ben documentato di* O. serpens *in Tunisia, che suggerisce il successo dell'insediamento di una popolazione vitale nella regione. Lo studio fornisce una descrizione dettagliata dell'esemplare, comprese le misure morfometriche e i conteggi meristici.*

Parole chiave: *Ophisurus serpens*, dati morfometrici, conteggi meristici, area salmastra, acque tunisine

INTRODUCTION

The serpent eel, *Ophisurus serpens* (Linnaeus, 1758), has a broad distribution spanning the western Indian Ocean, from southern Mozambique to South Africa, and the western Pacific, including waters off Japan and Australia (Bauchot, 1986). The species also occurs in the eastern Atlantic, from the northern coast of the Iberian Peninsula to South Africa (Bauchot, 1986), with additional records around the Madeira Islands (Wirtz *et al*., 2008).

O. serpens has occurred in the Mediterranean Sea since Dieuzeide *et al*. (1954) first recorded the species off the Algerian coast. It has since been reported from multiple Mediterranean regions, including Italian waters (Tortonese, 1970), the Alboran Sea (Abad *et al*., 2007), the Aegean Sea (Ulaş & Akyol, 2015), and the Adriatic Sea (Soldo & Lipej, 2022).

Bauchot (1986) remarked that the species was only found in the western Mediterranean Basin. However, Kousteni & Christidis (2019) reported occurrences off the Libyan coast (Shakman & Kinzelbach, 2007) as well as the Egyptian coast (El Sayed *et al*., 2017), and further east, with 8 records from Turkish and 4 from Greek waters over the past 50 years. In the eastern Mediterranean, the species occurs in the Turkish Aegean Sea (Ulas & Akyol, 2015; Tuncer *et al*., 2020), Mersin Bay (Ergüden *et al*., 2016), the Sea of Marmara (Uzer *et al*., 2024), and the Levant Basin, where it was recorded off the Lebanon coast (Bariche & Fricke, 2020).

While a few specimens of *O. serpens* have been recorded in the northern areas of Tunisia (Ben Amor *et al*., 2009, 2017; Rafrafi-Nouira *et al*., 2015), the species – as previously reported (Bradaï, 2000) – seems to be unknown in Tunisian southern waters. This new capture allows us to comment on the species' true status in the area.

MATERIAL AND METHODS

Information on the capture of a specimen of *O. serpens* was provided by local fishermen familiar with the fishing grounds. The individual was collected on 30 August 2020, off Ras Jebel, a city in northeastern Tunisia (37°15′27.00″ N and 10°09′44.03″ E) (Fig. 1). It was captured using a trammel net with 30 mm mesh size, at a depth of 45 m over rocky sandy bottom, alongside mullid, scorpaenid and soleid species.

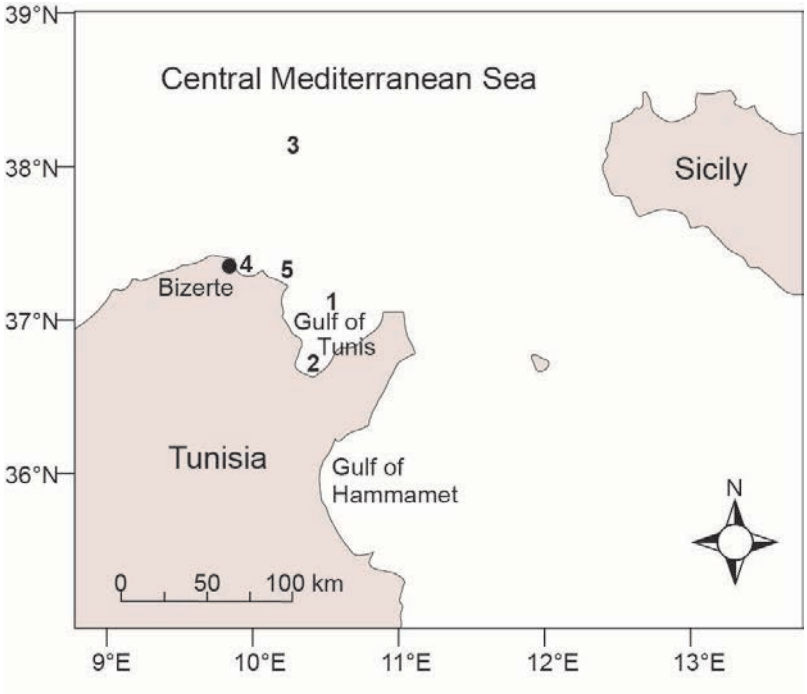

Fig. 1: Map of the northern Tunisian coast indicating the capture sites of** O. serpens **in the area. 1. Gulf of Tunis (Lubet & Azouz, 1969). 2. Tunis Southern Lagoon (Ben Amor** et al.**, 2009). 3. Near Skarkis Bank (Rafrafi** et al.**, 2015). 4. Lagoon of Bizerte (Ben Amor** et al.**, 2017). 5. Off Ras Jebel (this study).
Sl. 1: Zemljevid severno tunizijske obale z označenimi lokalitetami ulova vrste** O. serpens **na obravnavanem območju. 1. Tuniški zaliv (Lubet & Azouz, 1969). 2. Tuniška južna laguna (Ben Amor in sod., 2009). 3. Blizu lokalitete Skarkis Bank (Rafrafi in sod., 2015). 4. Laguna v Bizerti (Ben Amor in sod., 2017). 5. V vodah okoli Ras Jebel (ta študija).

All measurements of the specimen were taken using a digital calliper, with total length recorded to the nearest millimetre and total weight to the nearest 0.1 gram. The measurements are summarised in Table 1, along with meristic counts. The specimen was fixed in 10% buffered formaldehyde, preserved in 75% ethanol, and deposited in the Ichthyological Collection of the Institut Supérieur de Pêche et d'Aquaculture de Bizerte (Menzel Jemil, Tunisia), under catalogue number ISPAB Oph serp 01.

RESULTS AND DISCUSSION

The present specimen measured 330 mm in total length (TL) and weighed 19.8 g (Fig. 2). It was identified as *Ophisurus serpens* based on a combination of key morphological characters: body extremely elongated, cylindrical and scaleless; eyes relatively small; snout slender and conical with protruding upper jaw, both jaws elongated and extending posteriorly beyond the eye; teeth in one-two series in jaws, canines in front, teeth in one row on vomer, enlarged anteriorly; dorsal, anal, and pectoral fins well-developed, pelvic and caudal fins absent; origin of dorsal fin slightly posteriorly to pectoral fin; anus in the anterior half of the body; coloration brownish-olive dorsally, silvery with yellow iridescences ventrally, dorsal and anal fins with grey margins, pore apertures in *linea lateralis* blackish.

The number of pores in the *linea lateralis* counted in the present specimen of 330 mm TL was 140, which is fewer than the 149 reported by Ben Amor *et al*. (2009) in a specimen measuring 333 mm TL. Such difference is consistent with the findings of Kousteni & Christidis (2019), who noted a positive allometry between body size and the number of pores in *linea lateralis*.

The morphometric measurements and meristic counts of the present specimen are consistent with previous descriptions of *O. serpens* by Dieuzeide *et al*. (1954), Tortonese (1970), Bauchot (1986), Rafrafi-Nouira *et al*. (2015), and Kousteni & Christidis (2019). This specimen therefore constitutes an additional record for Tunisian marine waters. According to Kousteni & Christidis (2019), *O. serpens* is sporadically caught in most areas, typically with 1 or 2 specimens recorded, except for Iskenderun Bay in eastern Türkiye, where Sangun *et al*. (2007) reported the capture of 41 specimens ranging from 210 to 410 mm TL, which allowed the establishment of an isometric relationship between body size and weight. This represents the highest number of *O. serpens* recorded to date from a single catch in the Mediterranean Basin. The individuals were relatively small, suggesting that a viable population may be locally established, despite the absence of larger specimens in the sample. This area could also be a hotspot for the species in the eastern Mediterranean; however, this hypothesis requires confirmation through additional captures.

Tab. 1: Morphometric data (in mm and % of TL), meristic counts, and total body weight (in grams) of the *O. serpens* ***specimen captured off Ras Jebel (catalogue no. ISPAB Oph serp 01).***
Tab. 1: Morfometrični podatki (v mm in % of TL), meristična štetja in celokupna telesna masa (v gramih) pri primerku *O. serpens****, ujetem v vodah blizu Ras Jebel (kataloška številka no. ISPAB Oph serp 01).***

Reference	**ISPAB-Oph-ser 01**	
Morphometric measurements	**mm**	**% TL**
Total length	330	100
Preanal length	145	43.9
Predorsal length	100	30.3
Prepectoral length	30	9.1
Dorsal fin length	230	69.7
Anal fin length	180	54.5
Pectoral fin length	2.5	0.8
Body depth	9.1	2.8
Maximum body height	11.6	3.5
Snout length	12.9	3.9
Head length	29.5	8.9
Eye diameter	2	0.6
Pre-orbital length	6.4	1.9
Length of upper jaw	12.4	3.8
Length of lower jaw	10.5	3.2
Pectoral fin height	7.4	2.2
Pectoral fin-vent	149	35.8
Dorsal fin-vent	45	13.6
Counts		
Number of pores in *linea lateralis*	140	
Pectoral fin soft rays	13	
Total body weight (in gram)	19.8	

In Tunisian waters, *O. serpens* was first recorded by Lubet & Azouz (1969) in the Gulf of Tunis; however, no information was provided regarding the number of specimens captured, suggesting a probable local scarcity of the species. Since that initial record, only four specimens were reported from the area. Two were caught in open marine waters and two in restricted

Fig. 2: Specimen of** O. serpens **captured off Ras Jebel on the northern Tunisian coast (catalogue no. ISPAB Oph serp 01). Scale bar = 200 mm.
Sl. 2: Primerek vrste** O. serpens**, ujet v vodah pri lokaliteti Ras Jebel na severni tunizijski obali (katalog no. ISPAB Oph serp 01). Merilo = 200 mm.

brackish environments, specifically the Tunis Southern Lagoon (Ben Amor *et al.*, 2009) and the Lagoon of Bizerte (Ben Amor *et al.*, 2017). This suggests that in northern Tunisia, *O. serpens* inhabits a variety of aquatic environments and occurs at variable depths.

The local sample of *O. serpens* includes both juvenile and adult specimens, suggesting that a viable population is successfully established in the region. According to Kousteni & Christidis (2019), *O. serpens* nowadays occurs throughout the Mediterranean Sea. Its apparent rarity is likely due to the species' low commercial value, which often leads to discarding at sea when captured. Additionally, it may be misidentified as other closely related species within the same family or as other serpentiform fishes, such as congrid eels.

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POJAVLJANJE ZOBATE JEGULJE, *OPHISURUS SERPENS* (OPHICHTHIDAE), IZ TUNIZIJSKIH VODA (OSREDNJE SREDOZEMSKO MORJE)

Sihem RAFRAFI-NOUIRA
Université de Carthage, Unité de Recherches Exploitation des Milieux Aquatiques, Institut Supérieur de Pêche et d'Aquaculture de Bizerte, BP 15, 7080 Menzel Jemil, Tunisia

Rimel BENMESSAOUD & Mourad CHÉRIF
Institut National des Sciences et Technologies de la Mer, port de pêche, 2025 La Goulette, Tunisia

Christian REYNAUD
Laboratoire Interdisciplinaire en Didactique, Education et Formation, Université de Montpellier, 2, place Marcel Godechot, B.P. 4152, 34092 Montpellier cedex 5, France

Christian CAPAPÉ
Université de Montpellier, 34095 Montpellier cedex 5, France
e-mail: capape@orange.fr

POVZETEK

Avtorji poročajo o novem in enem od maloštevilnih zapisov o pojavljanju zobate jegulje, Ophisurus serpens *(Osteichthyes: Opichthidae), v tunizijskih vodah. Primerek, ujet pri Ras Jebelu, je bil mladič, ki je v skupno dolžino meril 330 mm in tehtal 19,8 g. Gre za šesti skupni in peti dobro dokumentiran zapis o pojavljanju vrste* O. serpens *v Tuniziji, kar kaže na uspešno vzpostavitev preživetja sposobne populacije v regiji. Raziskava obravnava podroben opis primerka, vključno z morfometričnimi meritvami in merističnim štetjem.*

Ključne besede: *Ophisurus serpens*, morfometrični podatki, meristično štetje, brakični predel, tunizijske vode

REFERENCES

Abad, E., I. Preciado, A. Serrano & J. Baro (2007): Demersal and epibenthic assemblages of trawlable grounds in the northern Alboran Sea (western Mediterranean). Scient. Mar., 7(3), 513-524.

Bariche, M. & R. Fricke (2020): The marine ichthyofauna of Lebanon: an annotated checklist, history, biogeograpphy, and conservation status. Zootaxa, 4775(1), 1-157.

Bauchot, M.L. (**1986):** Ophichthidae (including Echelidae). In: Whitehead, P.J.P., M.L. Bauchot, J.-C. Hureau., J. Nielsen J. & Tortonese. E. (eds.), pp. 577-585. Fishes of the North-eastern Atlantic and the Mediterranean, Vol 2, Unesco, Paris.

Ben Amor, M.M., J. Ben Souissi., M. Ben Salem & C. Capapé (2009): Confirmed occurrence of the longjaw snake eel, *Ophisurus serpens* (Osteichthyes: Ophichthidae) in Tunisian waters (Central Mediterranean). Pan-Amer. J. Aquat. Sci., 4(3), 251-254.

Ben Amor, M.M., K. Ounifi-Ben Amor & C. Capapé (2017): Unusual record of longjaw snake eel, *Ophisurus serpens* (Osteichthyes: Ophichthydae) in Tunisian waters (Central Mediterranean). Thalassia sal., 38, 35-41.

Bradaï, M.N. (2000): Diversité du peuplement ichtyque et contribution à la connaissance des sparidés du golfe de Gabès. Thesis, University of Sfax, Tunisia. 600 pp.

Dieuzeide R., M. Novella & J. Roland (1954): Catalogue des poissons des côtes algériennes. Bull. Stat. Aquicult. Pêch. Castiglione, nouv. Sér., 6, vol. II, Ostéoptérygiens, 258 pp.

El Sayed, H., K. Akel & P.K. Karachle (2017): The marine ichthyofauna of Egypt. Egypt. J. Aquat. Biol. Fish., 21(3), 81-116.

Ergüden, D., Y.K. Bayhan, S.A. Ergüden & A. Altun (2016): Confirmation of the record of the Serpent Eel, *Ophisurus serpens* (Family: Ophichthidae) from Mersin Bay (NE Mediterranean, Turkey). J. Environ. Sci. Eng., B5, 523-527.

Kousteni, V. & G. Christidis (2019): Historical records and new occurrence of the rare serpent eel *Ophisurus serpens* (Linnaeus, 1758) in the Mediterranean Sea. Reg. Stud. Mar. Sci., 25, 1-4. https://doi.org/10.1016/j.rsma.2018.100493.

Lubet, P. & A. Azouz (1969): Étude des fonds chalutables du golfe de Tunis. Bull. Inst. nat. Scient. Tech. Océanogr Pêch., Salammbô, 3, 87-111.

Rafrafi-Nouira, S., C. Reynaud, M. Boumaïza, O. El Kamel-Moutalibi & C. Capapé (2015): Unusual captures of teleost species from the northern coast of Tunisia (central Mediterranean). J. Ichthyol., 55(3), 337-345.

Sangun, L., E. Akamca & M. Akar (2007): Weight-length relationships for 39 fish species from north-eastern Mediterranean coast of Turkey. Turk. J. Fish.s Aquat Sci., 7(1), 37-40.

Shakman, E. & R. Kinzelbach (2007): Commercial fishery and fish species composition in coastal waters of Libya. Rostocker Meer. Gleiche Beit., 18, 65–80.

Soldo, A. & L. Lipej (2022): An annotated checklist and the conservation status of Chondrichthyans in the Adriatic. Fishes, 7(245). http://doi.org/10.3390/fishes7050245.

Tortonese, E. (1970): Osteichthyes: pesci ossei. [Oesteichthyes: bony fishes.]. Calderini editor, Bologna, Italy. [In Italian.]

Tuncer, S., H.T. Koç & A. Zilifli (2020): The confirmed occurrence of serpent eel *Ophisurus serpens* in Saros Bay (northern Aegean Sea), Turkey. Croat. J. Fish., 78, 157-164.

Ulaş, A. & O. Akyol (2015): Occurrence of the serpent eel, *Ophisurus serpens* (Linnaeus, 1758) (Osteichthyes: Ophichthidae), close to the Bay of Izmir (Aegean Sea, Turkey). Turk. J. Zool., 39, 191-193.

Uzer, U., N. Cömert, H. Kabasakal & F.S. Karakulak (2024): First record of the *Ophisurus serpens* (Linnaeus, 1758) (Osteichthyes: Ophichthidae) in the Sea of Marmara, Türkiye. Thalassas, 40, 593-600.

Wirtz, P., R. Fricke & M.J. Biscoito (2008): The coastal fishes of Madeira Island - new records and an annotated check-list. Zootaxa, 1715, 1-26.