

SHORT COMMUNICATION

First record of the pipefish *Syngnathus typhle* (Linnaeus, 1758) (Teleostei: Syngnathidae) in Bosnia and Herzegovina

Mirza Čelebičić¹, Adla Kahrić^{1*}, Avdul Adrović¹, Dejan Kulijer²

¹Department of Biology, Faculty of Science and Mathematics, University of Tuzla, Tuzla, Bosnia and Herzegovina

²National Museum of Bosnia and Herzegovina, Sarajevo, Bosnia and Herzegovina

*Corresponding author: Adla Kahrić

Address: Univerzitetska 4, Tuzla 75000

Phone: +38761 343 333

ORCID: 0000-0002-5224-7502

E-mail: adla.k@hotmail.com

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ABSTRACT

The present study reports the first record of the broadnosed pipefish, *Syngnathus typhle* (Linnaeus, 1758), in Bosnia and Herzegovina. The specimen was observed at a depth of approximately 40 cm within a *Cymodocea nodosa* meadow over a muddy-sandy substrate in Neum Bay. The individual exhibited pronounced cryptic behavior, showing crypsis through morphological and behavioral mimicry of seagrass leaves, maintaining an inverted posture and closely aligning with surrounding vegetation. The specimen was documented using photography and was briefly handled in situ without being removed from the water. The observed individual was a brooding male, carrying eggs within the ventral brood pouch. This finding extends the known distribution of *S. typhle* in the Adriatic Sea and highlights the importance of continued field surveys in the relatively understudied coastal waters of Bosnia and Herzegovina.

Keywords: Adriatic Sea, Bosnia and Herzegovina, pipefish

INTRODUCTION

Pipefishes (family Syngnathidae) represent a diverse group of marine fishes widely distributed in coastal and estuarine habitats of the Mediterranean Sea (Dawson, 1986). Six species of the genus *Syngnathus* have been recorded throughout the Adriatic Sea along the coasts of Croatia, Italy, Montenegro, Albania, and Slovenia (Jardas, 1996; Lipej et al., 2010).

Syngnathus typhle (Linnaeus, 1758) is distributed throughout the eastern Atlantic from Norway to southern Spain, including the Baltic Sea and the British Isles. It can be considered endemic to pan-Europe. Within the Mediterranean Sea, the species has been recorded from the Iberian Peninsula, the Gulf of Lion, the Ligurian

Sea, Venice Lagoon, western Sicily, Croatian estuarine systems, as well as the Black Sea and the Sea of Azov (Pollom, 2014) (Figure 1).

Recent studies based on updated marine species checklists and consolidated survey data confirmed the presence of 106 fish species in the territorial waters of Bosnia and Herzegovina, providing the first structured preliminary inventory of the country's marine ichthyofauna. Representatives of the family Syngnathidae, including *Syngnathus tenuirostris*, *Hippocampus hippocampus*, and *Hippocampus guttulatus*, had previously been documented, whereas *Syngnathus typhle* had not been recorded (Kahrić and Gajić, 2016; Čelebičić et al., 2025).



Figure 1 Distribution of *Syngnathus typhle*. Reproduced from Pollom (2014) with permission for non-commercial use

The present study reports the first occurrence of *S. typhle* in Bosnia and Herzegovina and demonstrates the applicability of non-destructive photographic and morphometric methods for documenting rare, endangered or poorly studied marine species.

MATERIALS AND METHODS

The specimen was observed during a field survey conducted in Neum Bay, Bosnia and Herzegovina, at a depth of approximately 0.4 m within a *Cymodocea nodosa* meadow on muddy-sandy substrate

(42.913339°N, 17.625523°E). The individual was photographed underwater and briefly handled in situ, without removal from the water.

Species identification was based on external morphological characteristics and taxonomic keys provided in *Ribe Jadrana* (Šoljan, 1965). Diagnostic identification followed determination points 52, 54, 55, 57, 61, 65, and 66 of the key. Morphological features used for identification included body symmetry, non-protruding eyes, an elongated rigid oral tube with terminal mouth opening, a single soft dorsal fin,



Figure 2 *Syngnathus typhle* L. recorded in Neum Bay

body axis alignment, presence of pectoral fins, and proportional head morphology.

Taxonomic nomenclature was verified using WoRMS – World Register of Marine Species (2026), confirming *Syngnathus typhle* (Linnaeus, 1758) as the accepted species name.

Morphometric analysis was performed using ImageJ software on photographic material. After calibration using a known scale, morphometric characters were measured from the images. This methodology minimized specimen handling and avoided destructive sampling. The approach follows recent recommendations emphasizing the use of image-based morphometric techniques and non-invasive documentation in marine biological research (Rizzo et al., 2017; Andrialovanirina et al., 2020).

RESULTS

One specimen of *Syngnathus typhle* was recorded in Neum Bay, Bosnia and Herzegovina, at a depth of approximately 0.4 m within a *Cymodocea nodosa* meadow on muddy-sandy substrate (Figure 2). The specimen morphologically corresponded to *S. typhle*, possessing a robust cylindrical body, relatively short and broad snout, and a distinct ventral brood pouch enlargement characteristic of gravid males. Identification based on the determination key of Šoljan (1965) initially corresponded to *Siphonostoma typhle* KP.

However, verification through WoRMS confirmed *Syngnathus typhle* (Linnaeus, 1758) as the currently accepted name. The specimen was identified as a male

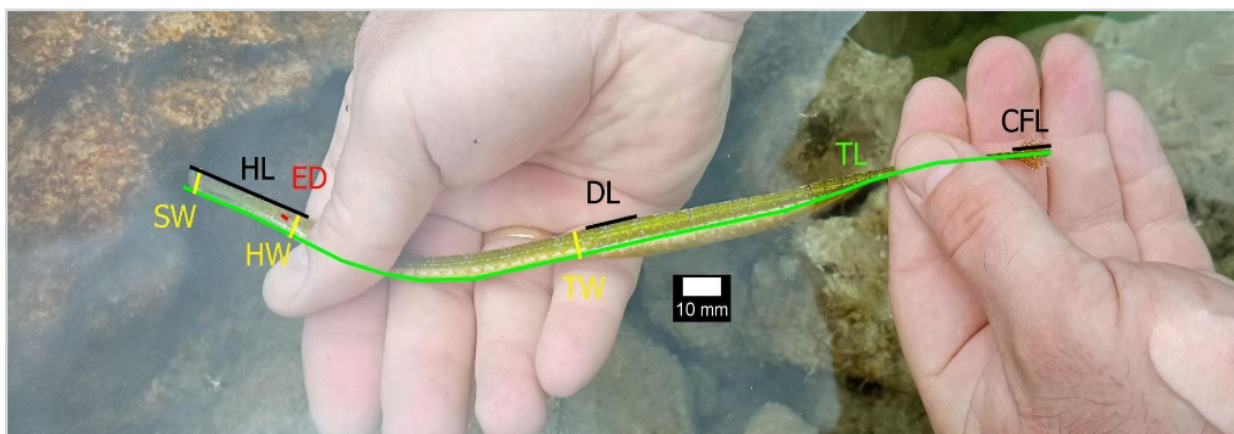


Figure 3 Morphometric measurements of *Syngnathus typhle* L.

due to the presence of a developed ventral brood pouch used for embryo incubation.

Morphometric measurements obtained using ImageJ are presented in Table 1 and Figure 3. The specimen had a total length of 234.97 mm. The use of digital image analysis enabled accurate morphometric characterization without removing the organism from its habitat or causing unnecessary stress. Such approaches are increasingly important in studies involving potentially rare, poorly known, or conservation-sensitive marine species.

Table 1 Morphometric measurements (mm) of the examined specimen including total length (TL), snout width (SW), head width (HW), trunk width (TW), head length (HL), caudal fin length (CFL), dorsal fin length (DL), and eye diameter (ED)

Characteristic	(mm)
TL – Total length	234.97
SW – Snout width	5.57
HW – Head width	5.81
TW – Trunk width	6.00
HL – Head length	32.65
CFL – Caudal fin length	9.30
DL – Dorsal fin length	12.80
ED – Eye diameter	1.12

The individual exhibited pronounced cryptic behavior, showing crypsis through morphological and behavioral mimicry of seagrass leaves, maintaining an inverted posture and closely aligning with surrounding vegetation. Such camouflage behavior is characteristic of syngnathid fishes inhabiting seagrass meadows and represents an important adaptation (Kendrick and Hyndes, 2005; Shokri et al., 2009).

DISCUSSION AND CONCLUSION

Syngnathus typhle is widely distributed throughout the Mediterranean Sea and has frequently been recorded along the Adriatic coasts of neighboring countries (Jardas, 1996; Lipej et al., 2010). Its occurrence in Bosnia and Herzegovina was therefore expected, although previously undocumented. The present record extends the known distribution of the species within the Adriatic Sea and contributes to the knowledge of the marine ichthyofauna of Bosnia and Herzegovina.

This finding represents a new species record within the family Syngnathidae and the second recorded species of the genus *Syngnathus* for the country (Čelebičić et al., 2025). The observation of the species within a *Cymodocea nodosa* meadow further emphasizes the ecological importance of seagrass habitats for syngnathid fishes. Syngnathids are often an important component of seagrass ecosystems, where they mimic macrophytes through cryptic coloration and body shape adaptations.

Species associated with seagrass habitats are considered important indicator organisms that can be used to assess the conservation value and ecological condition of estuarine and coastal seagrass beds. Consequently, the conservation of syngnathids may also provide broader ecological benefits for other species sharing the same habitats, as significant correlations in density and spatial assemblage structure with other fish species have been documented (Shokri et al., 2009).

The study additionally demonstrates the usefulness of non-destructive photographic documentation and digital morphometric analysis in marine biodiversity research. The applied methodology enabled accurate species identification and morphometric characterization without removing the specimen from its habitat, thereby minimizing stress and potential disturbance to the organism. Such approaches are increasingly important for studying rare, poorly known, or potentially vulnerable marine species and support ethical and precautionary research practices.

Further systematic investigations are necessary to better assess the diversity, distribution, ecological role, and conservation status of syngnathid fishes in Bosnia and Herzegovina and the wider Adriatic region.

CONTRIBUTIONS

Conception: MČ, AK, AA; Design: MČ, AK, AA; Supervision: DK, MČ, AK, AA; Materials: MČ, DK; Data Collection and/or Processing: DK; Analysis and / or Interpretation of the Data: MČ, AK, AA; Literature Review: MČ, AK, AA; Writing: MČ, AK, AA; Critical Review: MČ, AK.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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Prvi nalaz šila tupokljunog *Syngnathus typhle* (Linnaeus, 1758) (Teleostei: Syngnathidae) u Bosni i Hercegovini

SAŽETAK

U ovom radu se izvještava o prvom nalazu šila tupokljunog *Syngnathus typhle* (Linnaeus, 1758) u Bosni i Hercegovini. Jedinka je zabilježena na dubini od približno 40 cm unutar livade *Cymodocea nodosa* na muljevito-pjeskovitom dnu u Neumskom zaljevu. Uočena jedinka pokazivala je izraženo kriptično ponašanje, ostvarujući kriptičnost putem morfološke i bihevioralne mimikrije listova morske cvjetnice, zadržavajući inverzan položaj i usklađujući se s okolnom vegetacijom. Jedinka je dokumentovana in-situ fotografijom uz kratkotrajno rukovanje bez vađenja iz vode i analizirana ImageJ softverom. Uočeni primjerak bio je 23,5 cm dug, gravidni mužjak, s jajima u ventralnoj inkubacionoj vreći. Ovaj nalaz proširuje poznatu rasprostranjenost vrste *S. typhle* u Jadranskom moru i naglašava značaj daljnjih terenskih istraživanja u relativno nedovoljno istraženim obalnim vodama Bosne i Hercegovine.

Ključne riječi: Bosna i Hercegovina, Jadransko more, šilo tupokljuno