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THE SYNGNATHID SPECIES FROM TUNISIAN WATERS (CENTRAL MEDITERRANEAN): A SURVEY

Mohamed Mourad BEN AMOR & Mohamed BEN SALEM

Unité de Recherches Zoologie et Écologie des Milieux Aquatiques, Faculté des Sciences, Campus universitaire,
Le Belvédère, 1060 Tunis, Tunisie
E-mail: benamor7@yahoo.fr

Jamila BEN SOUSSI

Département des Ressources animales, halieutiques et des Technologies Agroalimentaires, Institut National Agronomique de Tunisie,
1082 Tunis, 43 avenue Charles Nicolle, cité Mahrajène, Tunisie

Christian REYNAUD & Christian CAPAPÉ

Laboratoire d'Ichtyologie, case 104, Université Montpellier II, Sciences et Techniques du Languedoc, 34095 Montpellier cedex 05, France

ABSTRACT

Seven syngnathid species have been recorded to date in Tunisian waters: the short-snouted seahorse Hippocampus hippocampus (Linnaeus 1758), the long-snouted seahorse H. ramulosus Leach, 1814; the straight-nosed pipefish Nerophis ophidion (Linnaeus 1758), the black-striped pipefish Syngnathus abaster Risso 1826, the greater pipefish S. acus Linnaeus 1758, the deep-snouted pipefish S. typhle Linnaeus 1758 and Nilsson's pipefish S. rostellatus Nilsson 1855. Description, main morphometric measurements, counts, habitat and distribution are presented and commented for each species. They have been found mainly in estuarine and brackish waters, such as Bizerte Lagoon, Tunis Southern Lagoon and in the Bahiret El Biban. Both seahorses seem to be more frequent in the Tunisian waters than the 5 other syngnathid species, probably due to the fact that the former constitute the focus of intense fishery, while the latter are generally discarded at sea by fishermen.

Key words: Osteichthyes, Syngnathidae, Tunisian waters, Central Mediterranean

INDAGINE SULLE SPECIE DI SIGNATIDI IN ACQUE TUNISINE (MEDITERRANEO CENTRALE)

SINTESI

Sette specie di signatidi sono state confermate per le acque tunisine: il cavalluccio marino Hippocampus hippocampus (Linnaeus 1758), il cavalluccio camuso H. ramulosus Leach, 1814; il pesce ago sottile Nerophis ophidion (Linnaeus 1758), il pesce ago di rio Syngnathus abaster Risso 1826, il pesce ago S. acus Linnaeus 1758, il pesce ago cavallino S. typhle Linnaeus 1758 ed il pesce ago di Nilsson S. rostellatus Nilsson 1855. L'articolo riporta la descrizione, le principali misure morfometriche, il numero di individui, l'habitat e la distribuzione per ogni singola specie. Gli esemplari sono stati raccolti principalmente negli estuari ed in acque salmastre, quali la Laguna di Bizerte, la Laguna meridionale di Tunisi e il Bahiret El Biban. Entrambe le specie di cavallucci appaiono più frequenti in acque tunisine che non le cinque specie di pesce ago, probabilmente perchè i cavallucci vengono intensamente pescati, mentre i pesci ago vengono rigettati in mare dai pescatori.

Parole chiave: Osteichthyes, Syngnathidae, acque tunisine, Mediterraneo centrale

INTRODUCTION

Syngnathid species, sea-horses and pipe-fishes are widely distributed and their occurrence has been reported in marine, brackish and freshwater areas. In all, 232 species have been recorded throughout the world (Dawson, 1982; Whitfield, 1995; Lourie *et al.*, 1999). Of the 17 syngnathid species known from the Mediterranean (Dawson, 1985; Lourie *et al.*, 1999), 7 have been recorded in Tunisian waters (Bradaï *et al.*, 2004; Ben Amor *et al.*, 2006, 2007a, b, 2008): the short snouted seahorse *Hippocampus hippocampus* (Linnaeus 1758), the long-snouted seahorse *Hippocampus ramulosus* Leach, 1814, the straight-nosed pipefish *Nerophis ophidion* (Linnaeus 1758), the black-striped pipefish *Syng-*

nathus abaster Risso 1826, the greater pipefish *Syngnathus acus* Linnaeus 1758, the deep-snouted pipefish *Syngnathus typhle* Linnaeus 1758, and Nilsson's pipefish *Syngnathus rostellatus* Nilsson 1855.

In the present article, 7 Tunisian syngnathid species are presented, including a description based on specimens collected during the investigations conducted in the area since 2000, and we comment on the local distribution of these species, compared and contrasted with other Mediterranean areas. Syngnathids are close to being threatened (Lourie *et al.*, 1999), and as the species occurring in Tunisian waters have been poorly studied, we have attempted to assess the real status of these species in the region and, concomitantly, to establish a national plan for their protection in the same region as well.

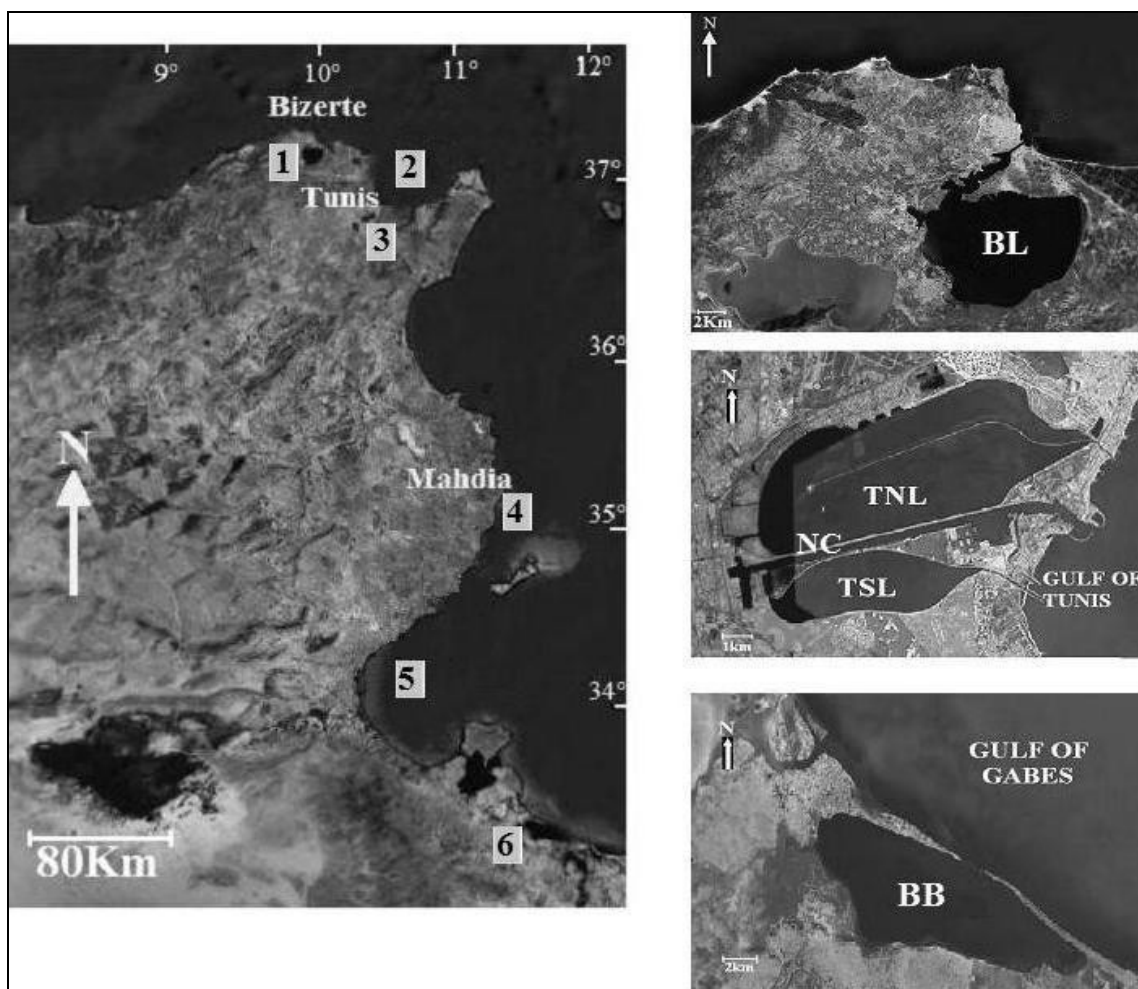


Fig. 1: Map of Tunisia showing the capture sites of syngnathid species in Tunisian waters: 1 – Bizerte Lagoon (BL); 2 – Gulf of Tunis; 3 – Tunis Northern Lagoon (TNL) and Tunis Southern Lagoon (TSL) separated by navigation channel (NC); 4 – Off Mahdia; 5 – Gulf of Gabès; 6 – Bahiret El Biban (BB).

Sl. 1: Zemljevid Tunizije in njenega teritorialnega morja z označenimi lokalitetami, na katerih so bile ulovljene različne vrste morskih konjičkov in šil: 1 – Laguna Bizerte (BL); 2 – Tuniški zaliv; 3 – Tuniška severna laguna (TNL) in Tuniška južna laguna (TSL), ki ju loči kanal za ladijsko plovbo (NC); 4 – Mahdijske vode; 5 – Gabeški zaliv; 6 – Bahiret El Biban (BB).

MATERIAL AND METHODS

Investigations were conducted between 2000 and 2005 at fish landings located along the Tunisian coast and close to brackish areas such as Bizerte Lagoon, Tunis Southern Lagoon and the Bahirat El Biban (Fig. 1). Observations were carried out at least three times per month. The observed specimens were caught by commercial gill-nets with 22 mm mesh size, off the Tunisian coast. Concomitantly, experimental samplings were carried out monthly to explore both shallow coastal and lagoon brackish waters, using landing net, with 2 mm mesh size, experimental mobile fishing gear (dredging) and SCUBA diving. All studied specimens are preserved in 5% buffered formalin solution and deposited in the Ichthyological Collection of the Faculté des Sciences of Tunis. We have also examined specimens preserved in the Ichthyological collection of the Museum National d'Histoire Naturelle (MNHN) of Paris and the British Natural History Museum (BMNH) in London. The specimens were measured and meristic counts carried out following the protocol defined for sea-horses by Lourie *et al.* (1999) and for pipefishes by Dawson (1982). Methods of measurements are plotted in Figure 2 for sea-horses, and in Figures 3 and 4 for pipefishes.

RESULTS AND DISCUSSION

Genus *Hippocampus* Rafinesque, 1810*Hippocampus hippocampus* (Linnaeus, 1758) (Fig. 5A)

Material. A total of 236 examined specimens, 158 males and 78 females, were collected in the Lagoon of Bizerte. Males ranged between 83 mm and 156 mm in total length, females between 74 mm and 138 mm. In addition, 4 specimens from MNHN in Paris were also examined.

Description. Wedge-shaped coronet with five rounded knobs. Snout short with poor developed nose spine. Inconspicuous spines and tips. Cutaneous filaments rudimentary or lacking. Head-length 1.31–2.17 in pre-anal length, 4.69–6.71 in total-length; snout-length 1.65–4.28 in head-length; eye rounded 3.89–8.13 in head length; pre-orbital length 1.9–2.76 in head-length; post-orbital length 2.05–2.75 in head-length; pre-dorsal length 2.86–5.0 in total-length; dorsal length 0.58–0.77 in dorsal base; dorsal fin slender with 14–22 soft rays; pectoral with 12–17 soft rays; anal with 3–5 soft rays; 12–13 trunk rings before anus; 31–32 tail rings; 43–45 total rings. Colour brownish to darkish, white spots lacking, some specimens sometimes lighter or reddish. Dorsal greyish with large strip.

Distribution. Although *H. hippocampus* occurs in temperate and warm temperate waters, it has been reported from the North Sea, the Channel and from off the

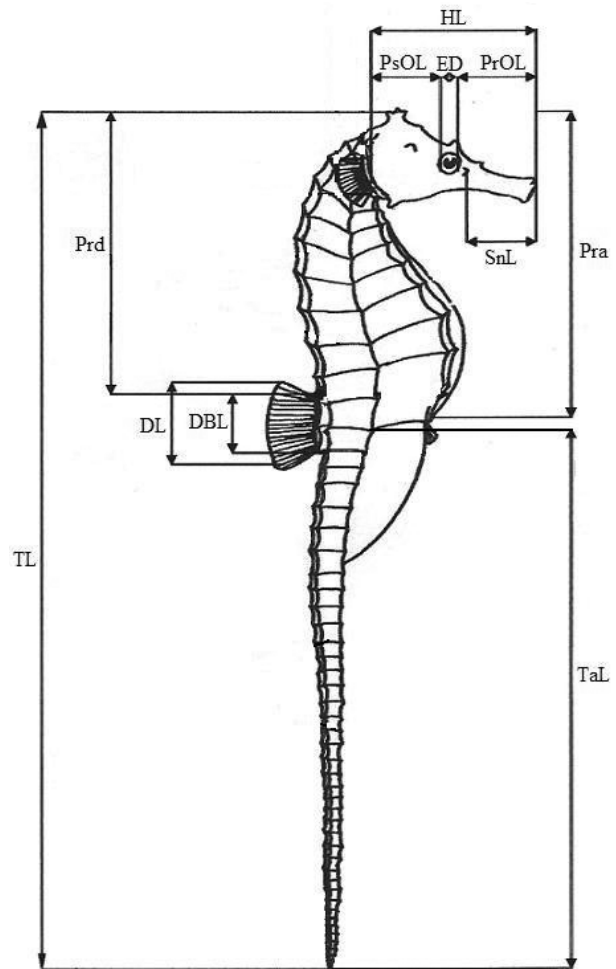


Fig. 2: Measurements carried out on genus *Hippocampus* (specimen redrawn from Lourie *et al.* (1999)). **Legend:** DBL – dorsal fin base length; DL – dorsal fin length; ED – eye diameter; HL – head length; Pra – pre-anal fin distance; Prd – pre-dorsal fin distance; PrOL – pre-orbital length; PsOL – post-orbital length; SnL – snout length; TaL – tail length; TL – total length.

Sl. 2: Izmere, napravljene na rodu *Hippocampus* (primerki prerinani po Lourieju *et al.* (1999)). **Legenda:** DBL – osnova hrbtne plavuti; DL – dolžina hrbtne plavuti; ED – premer očesa; HL – dolžina glave; Pra – dolžina od vrha glave do začetka zadnjične plavuti; Prd – dolžina od vrha glave do začetka hrbtne plavuti; PrOL – preorbitalna dolžina; PsOL – postorbitalna dolžina; SnL – dolžina gobca; TaL – dolžina repa; TL – celotna dolžina.

eastern Atlantic from the Bay of Biscay to the Gulf of Guinea. *H. hippocampus* occurs throughout the Mediterranean, in the Adriatic and Black Seas (Bauchot & Pras, 1980; Dawson, 1986; Fredj & Maurin, 1987). In Tunisian waters, *H. hippocampus* has been reported from their northern areas by Azzouz (1971, 1974) and

Bradaï *et al.* (2004), and from the south of the Gulf of Gabès by Vinciguerra (1882–1883, 1884), Ben Othman (1971, 1973) and Bradaï *et al.* (2004). We found *H. hippocampus* only in the northern Bizerte Lagoon.

Habitat. According to Tortonese (1970) and Bauchot & Pras (1980), *H. hippocampus* inhabits sandy bottoms between 0 and 30 m, rich in organic nutrients, as well as sea grass beds where it seeks for shelter and food.

While Bradaï (2000) noted that the species was common in Tunisian waters, we have found rather uncommon in the region, possibly due both to over-fishing and pollution (Lourie *et al.*, 1999). According to Tortonese (1970) and Lourie *et al.* (1999), a single population may occur in the Mediterranean and in the eastern Atlantic. In the Red Sea, *H. hippocampus* has been replaced by *H. fuscus*, which entered the Mediterranean Sea through the Suez Canal and has been recorded by Golani & Fine (2002) off the Mediterranean coast of Israel and by Gokoglu *et al.* (2004) off the Turkish coast. Additionally, a species closely related to *H. fuscus* has been recorded in Tunisian waters, but further identification is needed for confirmation.

***Hippocampus ramulosus* Leach, 1814 (Fig. 5B)**

Material. A total of 1773 specimens, 897 males and 876 females, were collected in the northern areas, such as Bizerte Lagoon, in the Gulf of Tunis, and southward off Mahdia and in the Gulf of Gabès. Males ranged between 63 mm and 176 mm in total length, females between 70 mm and 170 mm. Additionally, 64 specimens from the MNHN in Paris were examined.

Description. Snout long, spines, knobs and tips well developed. Filaments thick and branched, mainly on head and coronet. Head-length 1.02–2.33 in pre-anal length, 4.27–7.31 in total-length; snout-length 1.26–3.71 in head-length; eye rounded 3.69–8.16 in head length; pre-orbital length 1.65–8.88 in head-length; post-orbital length 2.06–3.13 head-length; pre-dorsal length 2.77–5.87 in total-length; dorsal length 0.51–0.93 in dorsal base; dorsal fin slender with 14–23 soft rays; pectoral with 12–19 soft rays; anal with 3–5 soft rays; 12–13 trunk rings before anus; 29–34 tail rings; 41–46 total rings. Brownish variable to greenish with white spots. Large brownish strip on dorsal.

Distribution. *H. ramulosus* occurs off the eastern Atlantic from the British Isles to Morocco and around Madeira and Azores (Dawson, 1986), throughout the Mediterranean and in the Black Sea. In Tunisian waters, *H. ramulosus* has previously been reported from the Gulf of Gabès (Ben Othman, 1973; Bradaï *et al.*, 2004). We have collected specimens from both northern and southern Tunisian coast, such as in the Gulf of Tunis, Gulf of Gabès, and off Mahdia. *H. ramulosus* successfully entered the Bizerte Lagoon.

Habitat. *H. ramulosus* inhabits shallow coastal and brackish waters (Bauchot & Pras, 1980; Lourie *et al.*, 1999), sandy-muddy bottoms and/or sea grass beds covered by marine phanerogams and algae.

In Tunisian waters, *H. ramulosus* has been more frequently observed than its close relative species. The phenomenon could possibly be the result of interspecific competition between both species. *H. ramulosus* reaches a larger size and is consequently more abundant in reduced areas, while in larger areas, such as the Bizerte Lagoon, it coexists with it.

Genus *Nerophis* Rafinesque, 1810

***Nerophis ophidion* (Linnaeus, 1758) (Fig. 5C)**

Material. We have examined 14 female specimens collected in the Bahiret El Biban, ranging between 159 mm and 166 mm in total length. In addition, twenty-five specimens from the MNHN in Paris were also examined.

Description. Body elongate, rounded, smooth without spines; head slender rather prominent, head-length 4.8–7.5 in pre-anal fin length, 14.0–17.4 in total length; snout slightly stout rounded at distal end with a slight large coronet, snout-length 2.2–3.0 in head-length; eye rounded 4.5–7.2 in head-length; pre-orbital length 1.7–2.5 in head-length; post-orbital length 1.7–2.7 in head-length; pre-dorsal fin length 2.4–3.4 in tail length; dorsal fin slender with 30–36 soft rays on 11–12 rings; dorsal fin length 7.9–10.1 in total length and 1.1 approximately in dorsal fin base; anus located at mid-part of dorsal fin base; 11–12 under dorsal rings, 28 trunk rings, 65–68 tail rings, 104–108 total rings. Colour greenish to brownish, with lateral edges rather darkish; black and white notches on head.

Distribution. According to Bauchot & Pras (1980), *N. ophidion* is widely distributed in the Eastern Atlantic from Norway to Morocco (excluding the region from Denmark to Netherlands), as well as throughout the Mediterranean and the Black Sea. Dieuzeide *et al.* (1954) reported *N. ophidion* off the Algerian coast. By contrast, *N. ophidion* has not been recorded off Libya (Al Hassan & El Silini, 1999) and off the Mediterranean coast of Egypt (El Sayed, 1994). Golani (2005), however, reported on *N. ophidion* from off the Mediterranean coast of Israel.

Habitat. According to Bauchot & Pras (1980), Pérès & Picard (1964), *N. ophidion* is a sedentary species inhabiting sea-grass beds and herbaria at depths between 10 and 15 m, and is known to have entered various lagoons. The species has probably found favorable environmental conditions in the Bahiret El Biban, which could explain its occurrence in the area.

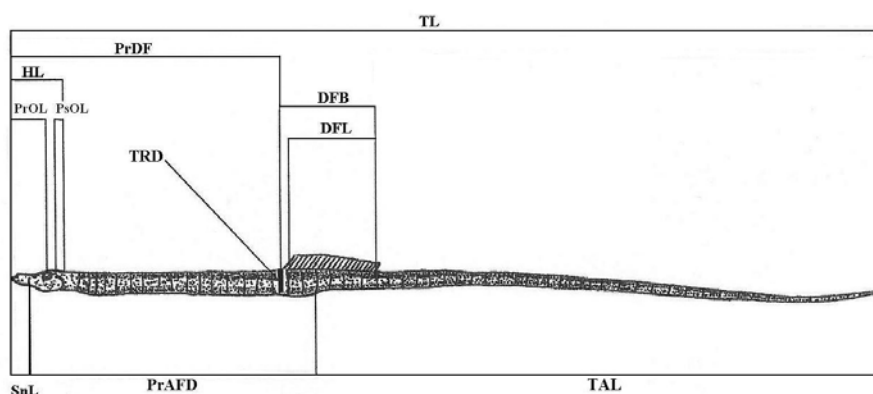


Fig. 3: Measurements carried out on genus *Nerophis* (specimen redrawn from Nijssen & Buizer (1983)). Legend: DFB – dorsal fin base; DFL – dorsal fin length; ED – eye diameter; HL – head length; PrAFD – pre-anal fin distance; PrDF – pre-dorsal fin distance; PrOL – pre-orbital length; PsOL – post-orbital length; SnL – snout length; TAL – tail length; TL – total length; TRD – trunk depth.

Sl. 3: Izmere, napravljene na rodu *Nerophis* (primerki prerasani po Nijssen & Buizer (1983)). Legenda: DFB – osnovna hrbtne plavuti; DFL – dolžina hrbtne plavuti; ED – premer očesa; HL – dolžina glave; PrAFD – dolžina od vrha glave do začetka zadnjične plavuti; PrDF – dolžina od vrha glave do začetka hrbtne plavuti; PrOL – preorbitalna dolžina; PsOL – postorbitalna dolžina; SnL – dolžina gobca; TAL – dolžina repa; TL – celotna dolžina; TRD – globina trupa.

Dawson (1986) wrongly noted the occurrence of *N. ophidion* in Tunisian waters, from where the species has never been reported according to Bradaï (2000) and Bradaï et al. (2004). The first findings of *N. ophidion* in the area were reported by Ben Amor et al. (2007a).

Genus *Syngnathus* Linnaeus, 1758

Syngnathus abaster Risso, 1810 (Fig. 5D)

Material. A total of 104 Tunisian specimens, 40 males and 64 females, have been examined. They were collected in the Tunis Southern Lagoon and in the Navigation Channel of Halq El Oued. Males ranged between 74 mm and 198 mm in total length, females between 70 mm and 174 mm. Twenty-seven specimens from MNHN in Paris have also been examined.

Description. Body elongate, rounded rather prominent, head-length 2.32–4.81 in pre-anal length, 5.35–12.80 in total-length; snout slightly rounded without knobs, but with an inconspicuous keel on upper surface, snout-length 1.50–5.67 in head-length; eye rounded and minute, 3.71–8.86 in head-length; pre-orbital length 1.22–2.75 in head-length; post-orbital length 1.59–3.31 in head-length; pre-dorsal length 2.20–2.96 in total-length; dorsal base 7.02–14.06 in total length, dorsal length 0.76–0.98 in dorsal base; pre-anal length 2.05–3.02 in total-length; dorsal fin slender with 16–35 soft rays on 5–7 rings; pectoral with 10–16 soft rays; anal with 3–4 soft rays; caudal with 9–13 soft rays; anus located under the beginning of the dorsal fin; 14–18 trunk rings before anus, 24–37 tail rings, 39–53 total

anus, 24–37 tail rings, 39–53 total rings. Colour greenish to brownish or reddish, body with white lines and spots, snout rather brownish, with a blackish spot before eyes, black spots arranged in a line under the dorsal base. Belly whitish or beige.

Distribution. *S. abaster* had previously been recorded throughout the southern coast of the Mediterranean: off Algeria (Dieuzeide et al., 1954), Libya (Al Hassan & El Silini, 1999), Egypt (El Sayed, 1994) and Israel (Golani, 2005). Our investigations showed that the species was being caught mainly in the northern areas, such as Tunis Southern Lagoon, which is in agreement with Chaouachi & Ben Hassine (1998). Rare specimens had been caught southward (D'Ancona, 1934; Seurat, 1934). Bradaï (2000), for instance, reported the capture of a single specimen in the Gulf of Gabès.

Habitat. Dawson (1982, 1986) noted that the straight-nosed pipefish inhabited shallow coastal waters and estuaries, usually at 4–20 m. The recent environmental restoration of the Tunis Southern Lagoon allowed a colonization of fish species previously unknown in the area, including *S. abaster*. In the area, the species found sufficient resources to live as well as to possibly develop and reproduce there.

The records of *S. abaster* in Tunisian waters have shown that it inhabits protected areas. Outside such areas, the species has been subjected to severe competition pressure, both inter and intra specific. Additionally, the specimens captured by craft fishery and/or by trawls were discarded at sea.

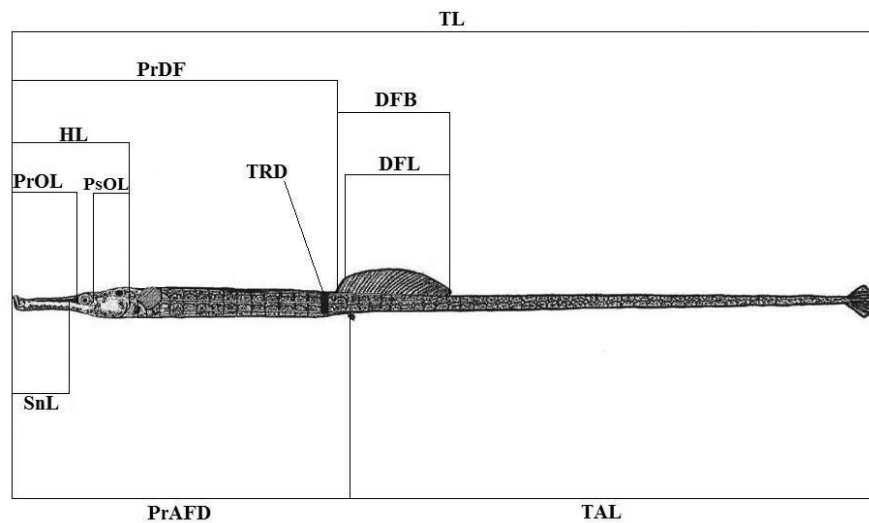


Fig. 4: Measurements carried out on genus *Syngnathus* (specimen redrawn from Tortonese (1970)). Legend: see Figure 3.

Sl. 4: Izmere, napravljene na rodu *Syngnathus* (primerki prerisani po Tortoneseju (1970)). Legenda: glej sliko 3.

Syngnathus acus Linnaeus, 1758 (Fig. 5E)

Material. A total of 267 specimens have been examined: 92 males and 175 females. They were collected in the Tunis Southern Lagoon, in the Gulf of Tunis and in the Bahiret El Biban. Males ranged between 74 mm and 199 mm in total length, females between 71 mm and 207 mm. In addition, 30 specimens from MNHN in Paris have also been examined.

Description. Body elongate, snout slightly compressed with inconspicuous medial ridge, eyes round. Head-length 2.32–4.74 in pre-anal length, 5.35–11.28 in total-length; snout-length 1.70–3.41 in head-length; eye rounded and minute, 3.70–9.06 in head-length; pre-orbital length 1.42–2.94 in head-length; post-orbital length 1.59–3.34 in head-length; pre-dorsal length 2.20–2.79 in total-length; dorsal base 7.78–14.54 in total length; dorsal length 0.86–0.99 in dorsal base; dorsal fin slender with 22–35 soft rays; pectoral with 11–16 soft rays; anal with 3–4 soft rays; caudal with 9–13 soft rays; 14–18 trunk rings before anus; 27–47 tail rings, 41–63 total rings. Colour greyish, brown, yellowish, marking variable. Belly whitish or beige.

Distribution. According to Bauchot & Pras (1980), *S. acus* is an Atlantic-Mediterranean species known from Morocco to Norway, in the Mediterranean, in the Adriatic and Black Seas (Tortonese, 1970; Dawson, 1986; Fredj & Maurin, 1987). The species is known from south of the Strait of Gibraltar to South Africa (Dawson, 1986). It has also been reported from off China and Indonesia, from off the northern Tunisian coast (Azzouz, 1971, 1974) and the Gulf of Gabès (Ben Othman, 1971, 1973; Bradaï et al., 2004). We have recorded *S. acus* in the Gulf of Tunis, in the Tunis Southern Lagoon, and in the Bahiret El Biban.

Habitat. *S. acus* preferentially inhabits shallow coastal and estuarine waters, rarely brackish waters to 50m depth and probably more (Bauchot & Pras, 1980; Nijssen & Buizer, 1983; Dawson, 1985). It is found on sandy and muddy as well as detritic bottoms. The Tunisian specimens were caught on sea grass beds, including *Posidonia oceanica* and some algae species such as *Caulerpa prolifera*, *C. racemosa*, *Cystoseira stricta*, *C. crinita* and *Rythiphlaea tinctoria*.

S. acus is the most common syngnathid species. It is probably able to develop and reproduce more easily than its congeneric species, possibly due to the fact that it prefers to inhabit detritic shallow coastal waters and sea grass beds, where it is able to avoid both fishing and competition pressures.

Syngnathus rostellatus Nilsson, 1855 (Fig. 5F)

Material. The single examined specimen was collected in the Gulf of Tunis. It has been deposited in the Ichthyological Collection of the Faculté des Sciences of Tunis (reference FST-SYN-rostellatus-01) and compared with seven specimens from the BMNH in London.

Description. Body elongate, rounded slightly compressed, head rather prominent, head-length 2.77 in pre-anal length, 6.72 in total length; snout elongate and compressed; mouth without true teeth, small, and terminal on a protruding cylindrical snout narrow and tubular and with a keel on upper surface, snout-length 1.9 in head length; post-orbital length 3.02 in head-length; pre-dorsal length 2.52 in total length; dorsal fin slender with 35 soft rays on 9 rings; dorsal base 9.95 in total length; 18 trunk rings; 39 tail rings; 57 total rings; pectoral with 12 soft rays; anal with 4 soft rays; caudal with 11 soft rays. Colour greyish to brownish, with darkish bars on

dorsal and flanks. Belly beige with silvery sheen on head and trunk. Dorsal fin hyaline. Its total length is 211 mm.

Distribution. *Syngnathus rostellatus* was reported from off the eastern Atlantic coast off Norway and the British Isles (Wheeler, 1969), from the Bay of Biscay (Bauchot & Pras, 1980) and from off the coast of Portugal (Albuquerque, 1954–1956). In contrast, the species has not been known to occur south of the Strait of Gibraltar (Dawson, 1986). *S. rostellatus* had previously been recorded three times only in the Mediterranean Sea, in the Alboran Sea (southern Spain) by Reina-Hervas et al. (1981–1982), off Banyuls (Gulf of Lions, southern France) by Louisy (2002), and off the Anatolian coast (southern Turkey) by Gokoglu et al. (2004).

Habitat. Vincent et al. (1995) noted that *S. rostellatus* occurs in "sandy areas and shallow seagrass beds, lying on the bottom or aligned with the eelgrass". They added that the specimens were "cryptic in either case".

The recovery of *S. rostellatus* is the first from Tunisian waters and the fourth from the Mediterranean Sea. Altogether, six specimens were recorded by Reina-Hervas (1989) in the Alboran Sea. The Spanish records of *S. rostellatus* could be explained by the vicinity of the Atlantic. The specimens easily entered the Alboran Sea through the Strait of Gibraltar. Off Banyuls, Louisy (2002) recorded a single female, while off Turkey, Gokoglu et al. (2004) observed 4 specimens. They occurred in waters warmer than those usually required by the

species. The absence of *S. rostellatus* during more than twenty years in Mediterranean areas between Spain and other Mediterranean areas could be explained by misidentification with its close relative species. Additionally, the syngnathids have not been subjected to a thorough research and have been generally discarded at sea by fishermen due to their low economic value.

***Syngnathus typhle* Linnaeus, 1758 (Fig. 5G)**

Material. Thirty female specimens, caught in the Bahiret El Biban and ranging between 153 mm and 307 mm in total length were examined. In addition, we have examined 61 specimens from the MNHN in Paris.

Description. Body elongate, rounded; head rather prominent, head-length 2.3–4.8 in pre-anal length, 4.8–6.8 in total length; snout compressed rather straight and with a keel on upper surface, snout-length 1.2–2.2 in head-length; eye rounded and minute 8.3–13.8 in head-length; pre-orbital 1.3–1.7 in head-length; post-orbital length 1.4–4.7 in head-length; pre-dorsal length 1.8–2.5 in total-length; dorsal fin slender with 29–39 soft rays on 8 rings; dorsal-base 5.8–12.6 in total-length; 18 trunk rings; 30–32 tail rings; 56–58 total rings, pectoral with 13–19 soft rays; anal with 3–4 soft rays; caudal with 8–13 soft rays. Colour greenish to olivaceous, snout with dark lines and spots. Belly whitish or argenteous.

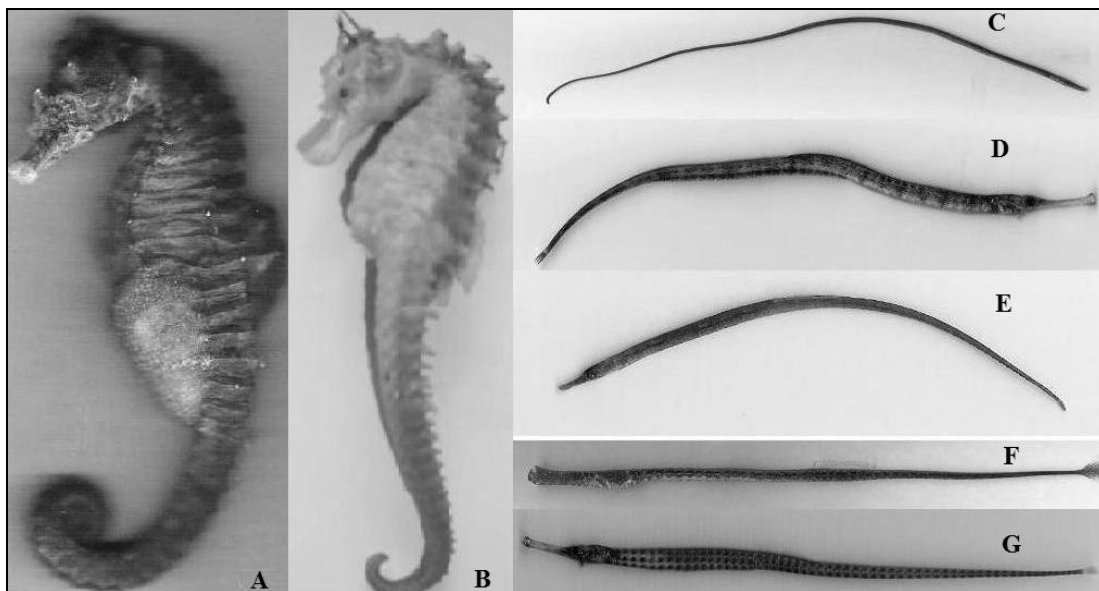


Fig. 5: Syngnathid species found in Tunisian waters. (A) *Hippocampus hippocampus* (Linnaeus, 1758); (B) *H. ramulosus* Leach, 1814; (C) *Nerophis ophidion* (Linnaeus, 1758); (D) *Syngnathus abaster* Risso, 1810; (E) *S. acus* Linnaeus, 1758; (F) *S. typhle* Linnaeus, 1758; (G) *S. rostellatus* Nilsson, 1855.

Sl. 5: Vrste morskih konjičkov in šil, ki so jih avtorji zabeležili v tunizijskih vodah. (A) *Hippocampus hippocampus* (Linnaeus, 1758); (B) *H. ramulosus* Leach, 1814; (C) *Nerophis ophidion* (Linnaeus, 1758); (D) *Syngnathus abaster* Risso, 1810; (E) *S. acus* Linnaeus, 1758; (F) *S. typhle* Linnaeus, 1758; (G) *S. rostellatus* Nilsson, 1855.

Distribution. *S. typhle* is known to occur off the eastern Atlantic coast from Scandinavia to Morocco (Bauchot & Pras, 1980; Dawson, 1986; Riedel, 1991), throughout the Mediterranean, in the Adriatic and Black Seas. From Tunisian waters, it had formerly been reported by D'Ancona (1934), Tortonese, (1970), mainly from the Gulf of Gabès (Seurat, 1934), by Bradaï (2000) and Bradaï *et al.* (2004); unfortunately no specimen has been available for confirmation. The recent work by Ben Amor *et al.* (2007b) reports on captures in the Tunis Southern Lagoon and in the Bahiret El Biban, with these findings confirming the occurrence of *S. typhle* in Tunisian waters.

Habitat. According to Dawson (1986), *S. typhle* inhabits mainly shallow coastal and estuarine waters between 4 and 20 m depth. It occurs on sandy and muddy bottoms, as well as in sea grass beds.

Although *S. typhle* seems to be rather rare in the areas from which the species has been reported, Tortonese (1970) found changes in morphological characters between juveniles and adults, and males and females; consequently, the species diagnosis remains somewhat difficult. *S. typhle* is larger and lives at lower depths than its congeneric species, which makes it sensible to fishing pressure. The species presents no economical interest and it is discarded at sea by fishermen soon after capture.

CONCLUSIONS

The seven syngnathid species are not equally distributed in Tunisian waters. The long-snouted sea-horse *Hippocampus ramulosus* was the most frequently observed species; in contrast, we have collected a single Nilsson's pipefish *Syngnathus rostellatus*, locally recorded for the first time and for the fourth time in the entire Mediterranean area.

Globally, the two sea-horse species seemed to be more common than the five other pipefish species. The former are well known by fishermen and constitute the focus of intense fishery for medicines, aquarium fishes and curiosities for tourists as in other marine regions throughout the world. In northern Tunisian areas, for instance, they are targeted by fishermen throughout the year. The latter are by-catch species, without commercial value, and are generally discarded at sea by fishermen. Additionally, for a non-specialist it is not very easy to distinguish syngnathid species between them.

Of the 17 syngnathid species recorded in the Mediterranean, only 7 occur in Tunisian waters. Consequently, other recoveries of syngnathid species in the area could not be excluded due to migrations inside the Mediterranean Sea, but also outside the Red Sea through the Suez Canal and the eastern Atlantic through the Strait of Gibraltar.

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PREGLED MORSKIH KONJIČKOV IN ŠIL (SYNGNATHIDAE) V TUNIZIJSKIH VODAH (OSREDNJE SREDOZEMLJE)

Mohamed Mourad BEN AMOR & Mohamed BEN SALEM

Unité de Recherches Zoologie et Écologie des Milieux Aquatiques, Faculté des Sciences, Campus universitaire,

Le Belvédère, 1060 Tunis, Tunisie

E-mail: benamor7@yahoo.fr

Jamila BEN SOUSSI

Département des Ressources animales, halieutiques et des Technologies Agroalimentaires, Institut National Agronomique de Tunisie,

1082 Tunis, 43 avenue Charles Nicolle, cité Mahrajène, Tunisie

Christian REYNAUD & Christian CAPAPÉ

Laboratoire d'Ichtyologie, case 104, Université Montpellier II, Sciences et Techniques du Languedoc, 34095 Montpellier cedex 05, France

POVZETEK

V tunizijskih vodah je bilo doslej ugotovljenih sedem vrst iz družine morskih konjičkov in šil: kratkonosi morski konjiček *Hippocampus hippocampus* (Linnaeus 1758) in dolgonosi morski konjiček *H. ramulosus* Leach, 1814; kačje šilo *Nerophis ophidion* (Linnaeus 1758), malo šilo *Syngnathus abaster* Risso 1826, veliko šilo *S. acus* Linnaeus

1758, ploskonoso šilo *S. typhle* Linnaeus 1758 in šilo vrste *S. rostellatus* Nilsson 1855. Opisane so vse zabeležene vrste, skupaj z njihovimi glavnimi morfometričnimi dimenzijami, številom prešetih osebkov, habitatom in razširjenostjo. Vrste so bile najdene predvsem v obrežnih in brakičnih vodah v območjih, kot so Laguna Bizerte, južna tuniška laguna in Bahiret El Biban. Obe vrsti morskih konjičkov se v tunizijskih vodah zdita pogostejši kot pet vrst morskih šil, bržkone zaradi dejstva, da konjička tvorita žarišče intenzivnega ribištva, medtem ko šila ribiči večinoma zavržejo že na morju.

Ključne besede: Osteichthyes, Syngnathidae, tunizijske vode, osrednje Sredozemlje

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