



Scientific Note

Confirmed occurrence of the royal flagfish, *Aulopus filamentosus* (Osteichthyes: Aulopidae) in Tunisian waters (Central Mediterranean)

JAMILA BEN SOUSSI¹, LAMIA GARGOURI BEN ABDALLAH², MOHAMED MOURAD BEN AMOR^{3,4}, MOHAMED BEN SALEM⁴ & CHRISTIAN CAPAPÉ⁵

¹Département des Ressources Animales, Halieutiques et des Technologies Agroalimentaires, Institut National Agronomique de Tunisie, 43 avenue Charles Nicolle, cité Mahrajène, 1082 Tunis, Tunisia

²Département de Biologie, Faculté des Sciences de Tunis, Université de Tunis El Manar, Le Belvédère, 2092 Tunis, Tunisia

³Institut National des Sciences et Technologies de la Mer, port de pêche, 2025 La Goulette, Tunisia

⁴Unité de Recherches Zoologie et Ecologie des Milieux aquatiques, Faculté des Sciences de Tunis, Université de Tunis El Manar, Le Belvédère, 2092 Tunis, Tunisia

⁵Laboratoire d'Ichtyologie, case 104, Université Montpellier II, Sciences et Techniques du Languedoc, 34 095 Montpellier cedex 5, France. Corresponding author: capape@univ-montp2.fr

Abstract. Two records of mature female *Aulopus filamentosus* confirm the presence of the species in Tunisian waters. The specimens were captured in the Gulf of Tunis, that constitutes the northernmost extension range of the species in the area.

Key words: Morphology, morphometric measurements, meristic counts, warming waters

Resumen. Occurencia confirmada del lagarto real *Aulopus filamentosus* (Osteichthyes: Aulopidae) en aguas de Túnez (Mediterráneo Central). La captura de dos hembras maduras del pez lagarto real *Aulopus filamentosus* (Bloch 1792) confirman la occurencia de esta especie en aguas de Túnez. Este registro representa la extensión mas al norte de la especie en el área.

Palabras clave: morfologia, medidas morphométricas, conteo meristico, aguas cálidas

The royal flagfish *Aulopus filamentosus* (Bloch 1792) lives in temperate and sub-tropical waters at depths of up to 1, 000 m but mostly at shallower waters (Sulak 1984, 1990). The species is known in the eastern Atlantic; however the coast of Portugal seems to be its northernmost extension range according to Quéro *et al.* (2003). South Strait of Gibraltar, *Aulopus filamentosus* is reported from off Morocco (Lloris & Rucabado 1998), Mauritania (Maurin *et al.* 1978), Senegal (Cadenat 1961), Guinea-Bissau (Sanchès 1991) and southward to the Gulf of Guinea (Blache *et al.* 1970, Vakily *et al.* 2002). The royal flagfish is commonly caught off Canaries (Brito 1991), Madeira Archipelago (Ferreira *et al.* 2008) and Cape Verde Archipelago

(Menezes *et al.* 2004). Elsewhere, the species is also reported in the northwestern Atlantic (Mead 1966), the Caribbean (Claro & Parenti 2001) and the Gulf of Mexico (McEachran & Fechhelm 1998).

In the Mediterranean, *Aulopus filamentosus* is known from the southern Italian seas where it is occasionally caught and landed at fish markets according to Tortonese (1970). Dulcic (2006) confirmed the occurrence of the royal flagfish in Adriatic Sea The species occurred off Greece (Economidis 1973), Turkey (Bicelenoglu *et al.* 2002), in the eastern Levantin Basin (Saad 2005, Golani 2005, Golani *et al.* 2006). Southward it is known off Egypt (El Sayed 1994) and off Libya (Al-Hassan & El-Silini 1999).

Recent investigations were regularly and permanently conducted in Tunisian waters, especially in northern areas, that allowed capture of two specimens, presented and described in this paper. Consequently, the new distribution of *A. filamentosus* in Tunisian waters and beyond in the Mediterranean is herein commented.

The two flagfishes were caught on 28 July 2009, off Sidi Daoud, city located at the northwestern end of Cape Bon, northeastern Tunisia, $37^{\circ} 02' 58''$ N, $10^{\circ} 50' 39''$ E (Fig. 1), by demersal

gill-nets, at 60 m depth approximately (Fig. 2). Morphometric measurements, meristic counts following Sulak (1984), Dulcic (2006) and Golani *et al.* (2006) and masses were recorded on fresh specimens. All data collected were summarized in Table I. Measurement were carried out to the nearest millimetre while masses to the nearest decigramme. Both specimens were preserved in the Ichthyological Collection of the Institut National Agronomique of Tunisia located in Tunis, with catalogue numbers, AUL-Fi-01 and AUL-Fi-02.

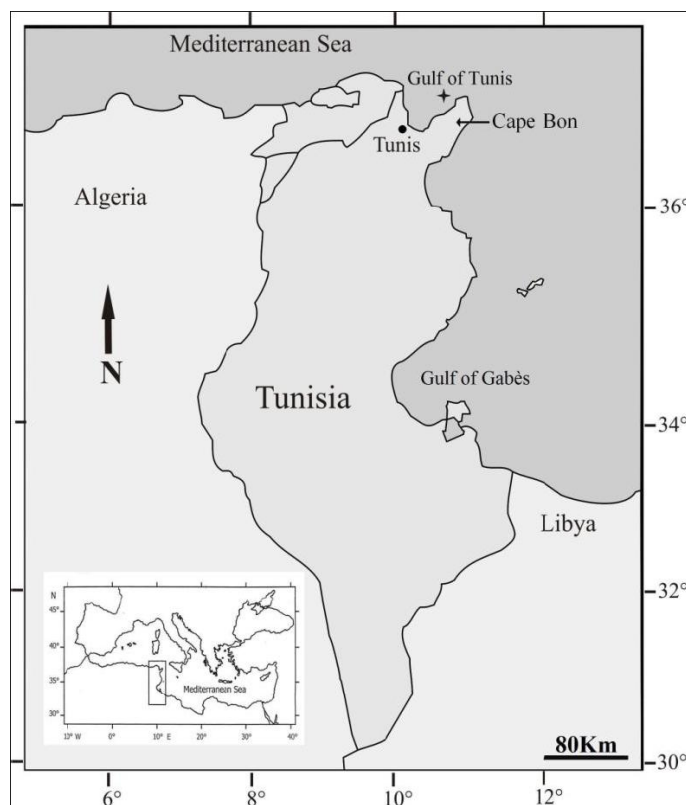


Figure 1. Map of Tunisia showing the capture site (black star) of two *Aulopus filamentosus*.



Figure 2. *Aulopus filamentosus* (ref. AUL-Fi-02) captured in Tunisian waters (scale bar = 50 mm).

Table I. Morphometric measurements (in mm and as % TL), meristic counts and masses recorded in two *Aulopus filamentosus* caught in Tunisian waters.

Reference	AUL-Fi-01		AUL-Fi-02	
	mm	% TL	mm	% TL
Morphometric measurements				
Total length	457	100	369	100
Forked length	431	94.31	345	93.50
Standard length	391	85.56	314	85.09
Head length	117.19	25.64	95.61	25.91
Interorbital space	30.77	6.73	25.73	6.97
Eye diameter	21.89	4.79	19.4	5.26
Snout length	21.76	4.76	17.43	4.72
Pectoral fin length	50.4	11.03	43.4	11.76
Pectoral fin base	11.67	2.55	11.4	3.09
Dorsal fin length	88.86	19.44	82.69	22.41
Dorsal fin base	69.82	15.28	66.48	18.02
Pelvic fin length	61.5	13.46	57.77	15.66
Pelvic fin base	18.41	4.03	17.33	4.70
Anal fin length	30.85	6.75	29.32	7.95
Anal fin base	41.68	9.12	36.64	9.93
Body height	60.48	13.23	56.74	15.38
Body depth	56.4	12.34	49.55	13.43
Pre-pectoral length	115.85	25.35	99.8	27.05
Pre-dorsal length	136.73	29.92	113.54	30.77
Pre-anal length	298	65.21	223	60.43
Pre-pelvic length	127.82	27.97	109.76	29.75
Pre-adipose fin	317	69.37	258	69.92
Total mass in g	709		459	
Gonad mass in g	25.52		20.88	
Meristic counts				
Dorsal fin soft rays		14		15
Pelvic fin soft rays		9		9
Anal fin soft rays		11		11
pectoral fin soft rays		12		13
Caudal fin soft rays		19		19
Lateral line scale		51		49

The royal flagfish is a medium size species according to Golani *et al.* (2006), with body elongated to slender and slightly compressed, head conical, large and robust, eyes large elliptical; upper jaw reaching to or beyond eye centre, posteriorly expanded; jaw teeth simple, short and depressible (except outer row), as also within mouth. Pseudobranch well developed. Dorsal fin origin above or behind pelvic fin origin. Adipose fin present. Caudal fin forked. Scales ctenoid, adherent, small axillary scales present at bases of pectoral and pelvic fins. Colour of body brownish-green with darker markings on flanks, belly beige.

Description of general morphology, morphometric measurements and meristic counts of the two specimens captured were in agreement with

Tortonese (1970), Sulak (1984), Dulcic (2006) and Golani *et al.* (2006). Both specimens described in this paper were adult female having conspicuous developing oocytes in ovaries. The stomach of the largest specimen (ref. AUL-Fi-01) was empty, while this of the smallest one (ref. AUL-Fi-02) contained remains of the European squid *Loligo vulgaris* Lamarck 1798 and of a shrimp, probably belonging to genus *Processa*. These data suggested that *A. filamentosus* could locally develop and reproduce in the area, however further observations are needed for confirmation.

The recent records reported herein confirmed the occurrence of the species in the Tunisian waters, where a single record was reported in the southern Gulf of Gabès (Ben Othman 1973,

Bradaï 2000, Bradaï *et al.* 2004). Because of that, these new and recent records constituted the northernmost extension range of *Aulopus filamentosus* in the area. They also constituted a new instance of migration of southern teleost species toward northern areas such as the bluespotted cornetfish, *Fistularia commersonii* Rüppell 1835 (see Ben Souissi *et al.* 2004, Hemida & Capapé 2009), the reticulated leatherjack *Stephanolepis diaspros* Fraser-Brünner 1940 (see Bdioui *et al.* 2004, Ben Amor & Capapé 2008) and the blunthead puffer *Sphoeroides pachygaster* (Müller & Troschel, 1848) (see Hemida *et al.* 2009). These migrations could be related to the gradual warming of the sea environment that occurred in the Mediterranean, since three decades at least (Francour *et al.* 1994, Quignard & Tomasini 2000). Additionally, this new occurrence of *A. filamentosus* off northern Tunisian coast may be also considered as an indicator of probable future changes of fish biodiversity in local marine waters.

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