



Tylosurus acus imperialis (Osteichthyes: Belonidae), a fish new to the Adriatic Sea

G. BELLO

Laboratorio Provinciale di Biologia Marina, Molo Pizzoli - 70123 Bari, Italy.

Abstract: Two male and one female specimens of the agujon needlefish, *Tylosurus acus imperialis*, were collected off the south-western Adriatic coast. This finding extends the distribution of the species to the Adriatic Sea. The examination of the ripe female showed that *T. acus imperialis* is a multiple spawner and that its eggs have sticky filaments, as is typical of the family Belonidae.

Résumé : Deux spécimens mâles et une femelle d'Aiguille voyageuse, *Tylosurus acus imperialis*, ont été récoltés au large de la côte sud-ouest de la mer Adriatique, ce qui étend la distribution de l'espèce à cette région. L'examen de l'ovaire de la femelle sexuellement mûre montre que cette espèce pond plusieurs fois et que ses œufs sont pourvus de filaments adhésifs, ce qui est typique de la famille des Belonidae.

Keywords: Osteichthyes, *Tylosurus acus imperialis*, occurrence, Adriatic Sea, oocyte.

Introduction

The needlefish family, Belonidae, is represented in the Mediterranean Sea by four species, namely *Belone belone* (Linnaeus, 1761), *Belone svetovidovi* Collette & Parin, 1970, *Tylosurus acus* (Lacepède, 1803), and *Tylosurus choram* (Rüppell, 1837); the last is a Lessepsian migrant (Collette & Parin, 1986; Bauchot, 1987).

According to the revision by Collette & Parin (1970), the agujon needlefish, *Tylosurus acus*, is a circumtropical polytypic species, which is divided into five geographical subspecies; the Mediterranean Sea is inhabited by *Tylosurus acus imperialis* (Rafinesque, 1810). This needlefish, the largest in the Mediterranean, has been reported in several discrete areas: the Levant Sea, Malta, Greece, Sicily, Gulf of Naples, Ligurian Sea, South of France, North of Spain

(Bini, 1970; Parin, 1973; Collette & Parin, 1986; Bauchot, 1987). It has never been recorded in the Adriatic Sea (see negative evidence in Šoljan, 1975).

Materials and methods

Two specimens of *T. acus imperialis* were captured along the coast of Mola di Bari (Italy, South Adriatic Sea) on 23 May 1994. They were caught soon before dawn by a gillnet set at the surface, about 500 m off the coast, where the water is 16 m deep. The needlefishes became entangled in the upper part of the net, which indicates that they were swimming close to the surface.

A third specimen was acquired by the author on 10 July 1995. It had been captured off Mola di Bari at dawn that same day, by a gillnet set at the surface, perpendicular to the coast, where the water is from 13 to 32 m deep. According to the fisherman who caught it, the specimen had become

caught in the net, together with another needlefish of supposedly the same species (not seen by the author), while swimming close to the surface, against the stream.

The measurements and counts of the specimens were taken prior to their preservation.

Results

The gills of the collected needlefish lacked gillrakers, a feature that distinguishes the genus *Tylosurus* from *Belone* (Collette & Parin, 1970). The animals were dark blue on the back and silver-white on the belly, with a dark blue stripe on both sides. The meristic counts of the south Adriatic needlefish (Table 1) discriminate the Mediterranean subspecies *T. acus imperialis* from the western Atlantic *T. acus acus* (Lacepède, 1803) and the Gulf of Guinea *T. acus rafale* Collette & Parin, 1970, as well as from the Indo-West Pacific *T. choram* one specimen of which was found in the eastern Mediterranean (Collette & Parin, 1970, 1986).

Table 1. Measurements and counts of three specimens of *Tylosurus acus imperialis* from the Adriatic Sea. In brackets: the range of fin ray counts and body length to fin length and fin height ratios for *T. acus imperialis* (after Collette & Parin, 1986). * = the weight of the stomach contents has been subtracted; n.c. = not counted.

Tableau 1. Dimensions et caractéristiques de trois spécimens de *Tylosurus acus imperialis* de la mer Adriatique. Entre parenthèses : la variation du nombre des rayons des nageoires, des rapports longueur du corps/longueur des nageoires et /hauteur des nageoires pour *T. acus imperialis* (d'après Collette & Parin, 1986). * = le poids du contenu stomacal a été déduit ; n. c. = non compté.

sex	specimen 1 specimen 2 specimen 3		
	male	male	female
weight (g)	728	1 138	1 315*
body length (cm)	55.2	58.6	61.2
head length (including snout) (cm)	24.2	25.8	25.7
standard length (cm)	79.4	84.4	86.9
total length (cm)	87.4	92.5	96.5
predorsal scales (370-430)	n.c.	394	375
vertebrae (93-96)	n.c.	93	n.c.
dorsal fin rays (23-26)	24	25	24
anal fin rays (22-23)	22	22	22
pectoral fin rays (12-14)	14	14	13
length of pectoral fin (cm)	5.4	6.3	6.6
body length/pectoral fin length (8.0-12.4)	10.2	9.3	9.3
length of pelvic fin (cm)	4.3	4.4	5.1
body length/pelvic fin length (10.0-14.1)	12.8	13.3	12.0
height of anterior dorsal fin lobe (cm)	4.4	4.9	5.3
body length/dorsal lobe height (10.5-13.3)	12.7	11.8	11.5
height of anterior anal fin lobe (cm)	4.9	5.6	6.1
body length/anal lobe height (9.7-11.7)	11.3	10.5	10.0
gonad length/abdominal cavity length	20.8/35.7	28.3/37.5	34.2/43.1

Both specimens found in May 1994 were males, sexually maturing. The right gonad, the only one to develop (Collette & Parin, 1970), extended in length for 58% and 75% of the abdominal cavity, in the smaller and the larger needlefish, respectively. The longer testis (specimen 2) was also larger in diameter than that of specimen 1, indicating that the larger fish (specimen 2) was closer to sexual maturity.

The agujon needlefish found in July 1995 was a ripe female. Its gonad extended in length for 79% of the abdominal cavity; its diameter measured 3.8 cm. A small fraction of the oocytes were hydrated, their diameter ranging from 2.9 to 3.1 mm, whereas most oocytes were smaller, ranging in diameter from 0.2 to 1.3 mm. The surface of the hydrated ovarian oocytes was scattered with filaments, as is typical of the family Belonidae (D'Ancona, 1931); they were bent and adhering to the oocyte surface. The entire surface of the smaller oocytes was covered by filaments adhering to it, but they were tightly arranged to form a pattern of wavy parallel lines. The different arrangement of filaments in hydrated and non-hydrated oocytes appears to be due to the large difference in extension of the surface of the two types of oocyte (the surface area of ripe oocytes, 3 mm in diameter, is 9 times larger than that of young oocytes 1 mm in diameter).

The left side of the long abdominal cavity was almost entirely occupied by the tubular stomach, which opened into the straight and short intestine (3-5 cm long), so that the stomach and the following intestine run parallel and symmetrically to the gonad located on the right side. The stomachs of specimens nos. 1 and 2 were empty of food; the smaller needlefish had some bony fish vertebrae in the short intestine. The third needlefish contained in its stomach remains of several small bony fishes. Tapeworms were found in the stomach of all three needlefish.

Discussion

The present finding extends the distribution of *T. acus imperialis* to the Adriatic Sea. Regarding the abundance of *T. acus imperialis* in the Mediterranean, Parin (1973) states that it is "rather rare", Bauchot (1987) writes that the species is "occasionnellement à rarement présente sur les marchés", Bini (1970) refers that it is abundant in the seas of Messina and Palermo (Sicily). In fact the first description of the agujon needlefish, in pre-Linnaean times, is due to "don Antonio Cirino messinese" in *De venatione et natura animalium*, published in Palermo in 1653; afterwards, in 1743, canon A. Mongitore wrote, in *Della Sicilia ricercata nelle cose più memorabili*, that this fish is called "aguglia imperiale" (imperial garfish) because of its excellent meat (Bini, 1970).

The specimens of *T. acus imperialis* described here were considered by the local fishermen as older and hence larger

common garfish, *Belone belone*. In addition, the fishermen reported that such large needlefish, i.e. about 90 cm standard length or even larger, are caught on occasion, mainly in the summertime. Since the maximum size for *B. belone* in the Mediterranean is 90 cm standard length (Bauchot, 1987), needlefishes larger than that size are most probably *T. acus imperialis* (*B. svetovidovi* it even smaller than *B. belone*; *T. choram* is confined to the Levant Sea). Hence, it can be assumed that *T. acus imperialis* it not very rare in the south Adriatic Sea. In addition, it seems likely that the ostensible discontinuous distribution of this fish in the Mediterranean, from east to west, and beyond the Strait of Gibraltar, may be due to the lack of proper identification (i.e. *T. acus* may not readily be distinguished from the garfishes, *Belone* spp.) and that further investigations in other Mediterranean districts will further extend its distribution.

With regard to the reproduction of *T. acus imperialis*, Collette & Parin (1986) report that no data are available and Bauchot (1987) only states that this fish spawns in summer ("Ponte estivale"). D'Ancona (1931), who dealt with eggs and larvae of Synentognathi, had no opportunity to examine the eggs of *T. acus imperialis* and gave no indication about its mode and season of reproduction. Tortonese (1970) concisely refers that "Anche le uova di questo Belonide sono fornite di filamenti" [The eggs of this Belonid fish too are provided with filaments]. The capture of a ripe female off the south-western Adriatic coast in July (specimen no. 3) corroborates both the report of summer spawning of *T. acus imperialis* and Tortonese's statement that its eggs are provided with filaments, a feature typical of the family (D'Ancona, 1931). This suggests that the agujon needlefish eggs are attached to floating or submersed objects and vegetation by sticky filaments. Lastly, the presence in the ovary of oocytes at different stages of development indicates that *T. acus imperialis* is a multiple spawner (Holden & Raitt, 1974).

Acknowledgements

I am most grateful to Dr. Bruce B. Collette (NMFS Systematics Laboratory, Washington, D.C.) for critically reading a first draft of this paper and for his useful suggestions.

References

- Bauchot, M.-L., 1987.** Poissons osseux. In : *Fiches FAO d'identification des espèces pour les besoins de la pêche. (Révision 1). Méditerranée et mer Noire. Zone de pêche 37* (W. Fischer, M. Schneider & M.-L. Bauchot eds.), vol. 2, pp. 891-1422. FAO : Rome.
- Bini, G., 1970.** *Atlante dei pesci delle coste italiane*. Vol. 3. Mondo Sommerso Editrice: Roma. 229 pp.
- Collette, B.B. & N.V. Parin, 1970.** Needlefishes (Belonidae) of the Eastern Atlantic Ocean. *Atlantide Report*, 11 : 7-60.
- Collette, B.B. & N.V. Parin, 1986.** In: *Fishes of the North-eastern Atlantic and the Mediterranean* (P.J.P. Whitehead, M.-L. Bauchot, J.-C. Hureau, J. Nielsen & E. Tortonese eds.), vol. 2, pp. 604-609. Unesco: Paris.
- D'Ancona, U., 1931.** Synentognathi. In: Uova, larve e stadi giovanili di Teleostei. *Fauna e Flora del Golfo di Napoli*, 38 : 157-177; pls. VIII-XI.
- Holden, M.J. & F.S. Raitt, 1974.** Manual of fisheries science. Part 2 - Methods of resource investigation and their application. *FAO Fisheries Technical Paper*, 115 (Rev. 1) : 214 pp.
- Parin, N.V., 1973.** Belonidae. In: *Checklist of the fishes of the north-eastern Atlantic and of the Mediterranean* (J.C. Hureau & T. Monod eds.), vol. 1, pp. 258-260. Unesco: Paris.
- Soljan, T., 1975.** *I Pesci dell'Adriatico*. Arnoldo Mondadori Editore: Milano. 523 pp.
- Tortonese, E., 1970.** *Osteichthyes (Pesci Ossei). Parte prima*. Fauna d'Italia, vol. X. Edizioni Calderini: Bologna. XIII + 565 pp.