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## ON THE OCCURRENCE OF JOHN DORY *ZEUS FABER* LINNAEUS, 1758 (OSTEICHTHYES: ZEIDAE) IN A PERIMEDITERRANEAN LAGOON: THE TUNIS SOUTHERN LAGOON (NORTHERN TUNISIA)

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### ABSTRACT

*As a consequence of environmental restoration, the Tunis Southern Lagoon, which adjoins the Gulf of Tunis was invaded by several teleost species, including John Dory, Zeus faber (Linnaeus, 1758), which is the first record of this species in a perimediterranean lagoon. Preliminary data about the diet and feeding habits and mass growth of Z. faber in the area are given.*

**Key words:** Osteichthyes, Zeidae, *Zeus faber*, first record, perimediterranean lagoon, Tunis Southern Lagoon

### SEGNALAZIONE DEL PESCE SAN PIETRO *ZEUS FABER* LINNEO, 1758 (OSTEICHTHYES: ZEIDAE) NELLA LAGUNA MERIDIONALE PERIMEDITERRANEA DI TUNISI (TUNISIA SETTENTRIONALE)

#### SINTESI

*Nella laguna meridionale di Tunisi, ai margini del golfo omonimo, dopo un intervento di rinnovo ambientale sono state segnalate diverse specie di pesci ossei. Tra loro anche il Pesce San Pietro Zeus faber (Linneo, 1758), individuato per la prima volta in una laguna perimediterranea. Gli autori presentano i primi dati sulla sua alimentazione e sulle sue abitudini alimentari in quest'area e sulla crescita delle sue dimensioni.*

**Parole chiave:** Osteichthyes, Zeidae, *Zeus faber*, primo dato, laguna perimediterranea, laguna meridionale di Tunisi

## INTRODUCTION

The John Dory *Zeus faber* Linnaeus, 1758 is widely distributed in the Atlantic from Norway to Madeira (Quéro, 1986) and southward from the Azores to southern Africa (Blache *et al.*, 1970; Quéro *et al.*, 1981; Séret & Opic, 1990). The species is reported throughout the Mediterranean and also in the western Black Sea (Tortonese, 1970; Quéro, 1986; Fischer *et al.*, 1987). It is commonly captured in Tunisian waters, especially in the Gulf of Tunis (Le Danois, 1925; Gruvel, 1926; Bourgois & Farina, 1961; Maurin, 1962; Ben Mustapha, 1966; Lubet & Azouz, 1969; Azouz, 1974; Bradai, 2000). During the investigations conducted since 2001 in the close Tunis Southern Lagoon, 65 fish species were collected, including *Z. faber*, recorded for the first time in a perimediterranean lagoon (*sensu* Quignard & Zaouali, 1980, 1981; Quignard (*pers. comm.*)). Several specimens recorded in the area offer an opportunity to present preliminary data on this unusual occurrence in the present article.

## MATERIAL AND METHODS

The Tunis Southern Lagoon adjoins the Gulf of Tunis and formerly covered 1,120 ha, with depths ranging from 0.15 to 1.1 m (average depth of about 0.6 m). As a consequence of an ecological restoration, the surface has been considerably reduced and now covers 720 ha, with a regular depth of about 2.10 m throughout the lagoon, except in restricted areas where it reaches 4 m maximum (Ben Souissi *et al.*, *in press*). It appears as an

elongated ellipse directed SW-NE: 36°17'53.4" and 36°47'48.0" N, and 10°12'22.2" and 10°16'41.4" E. Its northern border is the navigation channel, which is 10 km long and max. 12 m deep (see Mejri *et al.*, *this issue*).

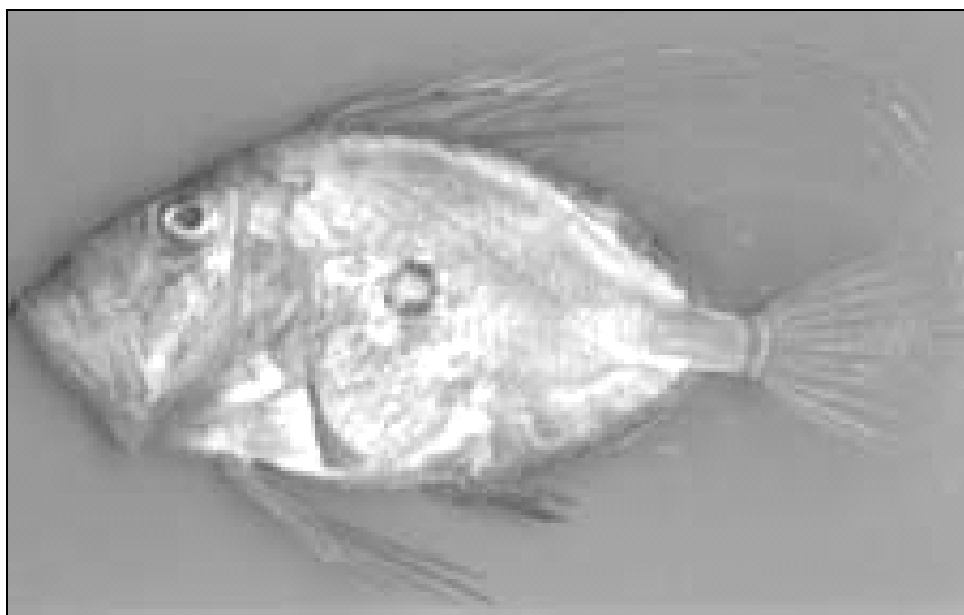
Investigations were regularly conducted between 2001 and 2004, three times at least per week, and numerous specimens of both teleost and elasmobranch species were examined soon after they were landed by fishermen (Ben Souissi *et al.*, *in press*; Mejri *et al.*, *this issue*). They were mainly caught by gill-nets and trammel nets, occasionally by cast-nets, landing-nets, anglers and diving. Fresh and sometimes alive specimens were examined.

The specimens observed were measured to the nearest millimetre and weighed to the nearest gram. Methods of measurements and counts are given following Tortonese (1970), Quéro *et al.* (1981) and Quéro (1986).

Two indices were used to provide a qualitative study of *Z. faber*:

- vacuity index (VI): number of empty stomachs divided by total number of stomachs multiplied by 100.
- frequency index (FI): number of stomachs, in which a food item was found, expressed as a percentage of total number of examined stomachs.

Tests for significance ( $p < 0.05$ ) were performed by using ANOVA, Student *t*-test and the chi-square test (Legendre & Legendre, 1979; Schwartz, 1986). Total mass vs. total length correlations were assessed by least-squares regression.



**Fig. 1:** John Dory *Zeus faber* (Linnaeus, 1758) caught in Tunis Southern Lagoon (catalogue number: ZEI-Zef-01).  
**Sl. 1:** Kovač *Zeus faber* (Linné, 1758), ujet v Tuniški južni laguni (kat. št.: ZEI-Zef-01).

## RESULTS

The first specimen of *Z. faber* was recorded in Tunis Southern Lagoon in January 2002, soon after the environmental restoration in September 2001. The specimen captured on 6 October 2004 is preserved in 5% buffered formalin solution and deposited in the Ichthyological Collection of the Institute of the National Agronomique de Tunisie, catalogue number ZEI-Zef-01 (Fig. 1).

The main morphometric measurements and counts are presented in Table 1, following Dulčić & Pallaoro (2003).

**Tab. 1: Morphometric measurements and counts of *Z. faber*.**

**Tab. 1: Morfometrični in meristični podatki pri vrsti *Z. faber*.**

Measurements (mm)	
Total length	300
Standard length	224
Head length	95
Interorbital space	12
Pre-orbital length	40
Eye diameter	21
Caudal fin height	104
Space between snout and vent	124
Pectoral fin length	42
Pectoral fin base	11
Dorsal fin length	217
Dorsal fin base	133
Pelvic fin length	96
Anal fin length	49
Anal fin base	89
Body height	109
Body depth	26
Pre-pectoral length	79
Pre-dorsal length	87
Pre-anal length	123
Pre-pelvic length	62
Distance between dorsal fin and caudal fin origin	13
Mass in grams	308
Counts	
Dorsal fin spines	10
Dorsal fin soft rays	23
Pelvic fin spines	1
Pelvic fin soft rays	7
Anal fin spines	4
Anal fin soft rays	22
Pectoral fin spines	0
Pectoral fin soft rays	13
Gill-rakers	20
Bony bucklers along base of soft dorsal fin	7
Bony bucklers along base of soft anal fin	8

The Tunisian specimen is described as follows: body oval, deep and strongly compressed; caudal peduncle as long as large; body height 2.06 times in standard length; head deep, dorsal profile convex over eye, its height 2.35 times in standard length; eye rounded rather large, 4.5 times in head height; mouth large and protractile, ending below nostrils close to eye. Pectoral fins short, pelvic fins 2.3 times as long. Body covered with small naked scales. Scutes present along belly. Colour golden grey, with a large black-edged spot on flank; membranes of spinous anal and pelvic fins black, spinous dorsal fin black.

Information provided by fishermen and our observations showed that the species is regularly caught in the area. However, it appears that, to date, captures are more abundant between January and July. They are rather rare during the summer, probably due to the warmer lagoon waters. Estimated captures per day reach 3,650 g maximum and the annual production is assessed to 800 kg.

Forty-two stomach contents of *Z. faber* were analysed with VI = 18.8%, gobids were the most abundant preys (63.8%); mugilid alevins (27.3%), *Atherina boyeri* (9.1%), *Cerastoderma glaucum* and gastropods (both 9%) were also observed. There are no data on the food and feeding habits of *Z. faber* from Tunisian waters. However, Fischer *et al.* (1987) noted that Mediterranean specimens preferentially feed on different teleost species, crustaceans and molluscs.

The relationship total mass (TM) vs. total length (TL) is plotted in figure 2. It shows the regular increase of total mass in specimens of less than 260 mm length; however, the larger specimens grew faster. This relation is:  $TM (g) = 1.531 TL (mm) - 87.592$ ;  $r = 0.88$ ;  $n = 42$ .

## DISCUSSION

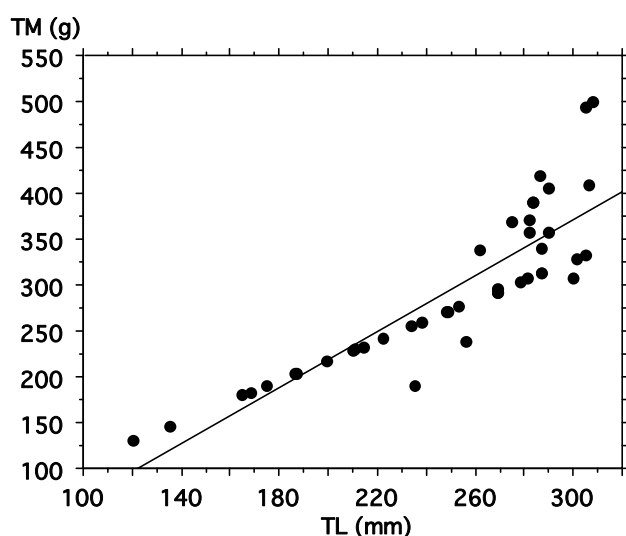
All measurements, counts, description and colour agree with Tortonese (1970), Quéro *et al.* (1981) and Quéro (1986). A literature review shows that the John Dory is mostly caught at depths ranging from 20 to 160 m, max. 400 m (Quéro *et al.*, 1981; Quéro, 1986). This may explain why the species has never been recorded in lagoons such as the Tunis Southern Lagoon, whose depth does not exceed four metres. The abundance of the species in the Gulf of Tunis is the source of *Z. faber* in Tunis Southern Lagoon, which is at present submitted to a strong marine influence. By contrast, according to Medhioub & Perthuisot (1977) and Mtimet (2004), *Z. faber* has not been recorded in the Bahret El Biban, a large hyperhaline lagoon adjoining the Gulf of Gabès, in southern Tunisia, where the species is also very abundant (Bradai, 2000).

In spite of the interspecific competition pressure for food in this restricted area with other teleost species (see Ben Souissi *et al.*, *in press*) or elasmobranch species



**Fig. 3: John Dory (*Zeus faber*) (Photo: T. Makovec).**

**Sl. 3: Kovač (*Zeus faber*) (Foto: T. Makovec).**



**Fig. 2: Relationship total mass (TM) versus total length (TL) in *Z. faber* caught in Tunis Southern Lagoon.**

**Sl. 2: Razmerje med skupno maso (TM) in celotno dolžino (TL) pri kovaču, ujetem v Tuniški južni laguni.**

(Mejri *et al.*, *this issue*), *Z. faber* feeds and develops normally. Furthermore, the irregular captures of *Z. faber* in the area, less abundant in the warm season, do not allow considering it a permanent inhabitant of the area and that a sustainable population will be established in

the area. Previously, *Z. faber* had been included among "thalassic species *sensu* Guélorget & Perthuisot (1983, 1992)". This category comprises species entering lagoons only occasionally or turning out accidentally from migratory movements. They develop and reproduce only in offshore areas. They are strictly thalassic species. However, the captures of *Z. faber* in the area are not fortuitous events. By contrast, *Z. faber* is not a sedentary small size species that would be abundantly and regularly caught all year round in lagoons. Moreover, this category of species develops and reproduces only in a confined area. It is a matter of strictly paralic species. A third category concerns species of which fry and juveniles (0+) enter lagoons to find sufficient resources and develop there. These species constitute a mid-term between thalassic and paralic species; they are "mixed species" or, rather, regular migratory species. Sufficient data are still not available to be able to include *Z. faber* in the latter category. The exact status of *Z. faber* in the Tunis Southern Lagoon remains speculative, and further investigations should be carried out in order to define it.

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## O POJAVLJANJU KOVAČA *ZEUS FABER* LINNÉ, 1758 (OSTEICHTHYES: ZEIDAE) V PERIMEDITERANSKI TUNIŠKI JUŽNI LAGUNI (SEVERNA TUNIZIJA)

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### POVZETEK

V Tuniški južni laguni, ki meji na Tuniški zaliv, so se po njeni okoljski obnovi znašle številne vrste pravih kostnic, med njimi tudi kovač *Zeus faber* (Linné, 1758), kar je prvi podatek za to vrsto v kaki perimediterranski laguni. Avtorji navajajo preliminarne podatke o prehrani in prehranjevalnih navadah kovača v tem območju in o rasti njegove mase.

**Ključne besede:** Osteichthyes, Zeidae, *Zeus faber*, prvi podatek, perimediterranska laguna, Tuniška južna laguna

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