

OTOLITH SIZE-TOTAL LENGTH RELATIONSHIP IN SPINY EEL, *Mastacembelus mastacembelus* (BANKS & SOLANDER, 1794) INHABITING IN KARAKAYA DAM LAKE (MALATYA, TURKEY)

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Abstract:

In this study, the relationships between total length and sagittal otolith size of a total 187 specimens belonging to the *Mastacembelus mastacembelus* (Banks & Solander, 1794) fish species inhabiting Karakaya Dam Lake were examined. The otolith lengths and widths were ranged between 1.44-3.82 mm and 0.8-1.71 mm, respectively. However, otolith weights were determined between 0.0003-0.0038 g. There was a stronger and positive linear relationship between the otolith size (length, width and weight) and total lengths.

Keywords: *Mastacembelus mastacembelus*, otolith size, total length

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Introduction

This species generally carries the whole characteristics of the Mastacembelidae with a thin and long body structures. On its prolonged head, there is a dangling trunk like, three leveled salient flesh on the brink of the nose. They have well-developed sharp teeth on the jaws. There are 32 to 34 separately located spines between dorsal fin and the head. Three of these spines are also seen in front of the anal fin. They have no ventral fin (Eroğlu and Şen, 2007).

The size and shape of otoliths, which are an important bony structure used for age determination in fishes are variable according to species and size of fish. By using the relationship between fish length and otolith length, it is possible to determine fish length from otolith length or vice versa. This information especially is very useful for analysis of digestive tract content of fishes feeding on the other fishes. Furthermore, it is possible to estimate size and species of eaten fishes from otoliths which are found in digestive tract of the pisivorous fishes (Aydın et al., 2004). Granadeiro and Silva (2000) had used otoliths and vertebrae in the identification and size-estimation of fish in predator-prey studies.

Determining fish age by examining otolith has been reported by many researchers (Lagler, 1956; Chugunova, 1963; Tesch, 1968; Jellyman, 1979; Özdemir and Şen, 1986; Beamish and McFarlane, 1987; Ekingen and Polat, 1987; Çelikkale, 1991; Erkoyuncu, 1995; Polat and Işık, 1995; Geldiay and Balık, 1996; Akyol et al., 1997; Metin et al., 1997; Deriso and Quinn, 1999). Fish length-otolith length relationships have also been determined by some researchers (Appelbaum and Hechte, 1978; Akyol et al., 1997; Metin et al., 1997; Harvey et al., 2000; Şen et al., 2001; Morley and Belchier, 2002; Munk and Smikrud, 2002; Strelcheck et al., 2003; Aydın et al., 2004; Uçkun et al., 2006; Yılmaz and Polat, 2008).

The present paper describes the relationship between total lengths and otolith size (length, width and weight) in *M. mastacembelus* (Banks & Solander, 1794) from Karakaya Dam Lake, Malatya, Turkey. We could not find any paper dealing with the relationship between fish lengths and otolith size of this species in Turkey or any other country for comparison. So, the findings will be very useful for the studies on subjects mentioned above and for the corresponding stud-

ies which will be carried on for the other species in Mastacembelidae family.

Materials and Methods

Karakaya Dam Lake is the third largest dam lake on the River Euphrates (in respect to the surface area of lake) right after Keban Dam Lake and Karakaya Dam Lake which is situated 166 km downstream Keban Dam, in the locality of Seki Bağları, near the country of Çüngüş of Diyarbakır province. Other than Euphrates as the main river, Sultansuyu, Tohma Brook, and other small brooks and streams join Karakaya Dam Lake (Anul, 1995).

This study was carried out between February 2002 and January 2003. During this time, 187 specimens of *M. mastacembelus* (Banks & Solander, 1794) were examined. Fish specimens were caught by gill-nets with mesh-size ranging from 22 to 36 mm. Total lengths of fish samples were measured and then their sexes were determined. Sagittal otoliths were removed, cleaned and fixed in 96% ethyl alcohol according to method given by Chugunova (1963). The lengths and widths of otoliths were measured under binocular microscope marked Olympus CX41 with Olympus DP25 monitoring system. The weights of otoliths were measured with AND-HR-200 (sens ±0.0001g). The results were separated according to sex and statistically tested with t-test and the correlation coefficient of these relations were interpreted according to Fowler and Cohen (1992).

The total length-otolith size relationships were examined by using the following equation: $y=bx+a$, where, y =otolith size, x =total length, a =intercept value, b =coefficient value.

Results and Discussion

In this study, total 187 specimens belonging to the *M. mastacembelus* have been examined. Total lengths of them were ranged between 237-806 mm. Sagittal otolith (Figure 1) lengths and widths were ranged between 1.44-3.82 mm and 0.80-1.71 mm, respectively. Otolith weights were determined between 0.0003-0.0038 g (Table).

A stronger and positive linear relationship between total length-otolith size (length, width and weight) were found in females, males and all fish (Figure 2-10). However, the effect of sex on otolith size (length, width and weight) of fish was statistically found significant ($p<0.001$).

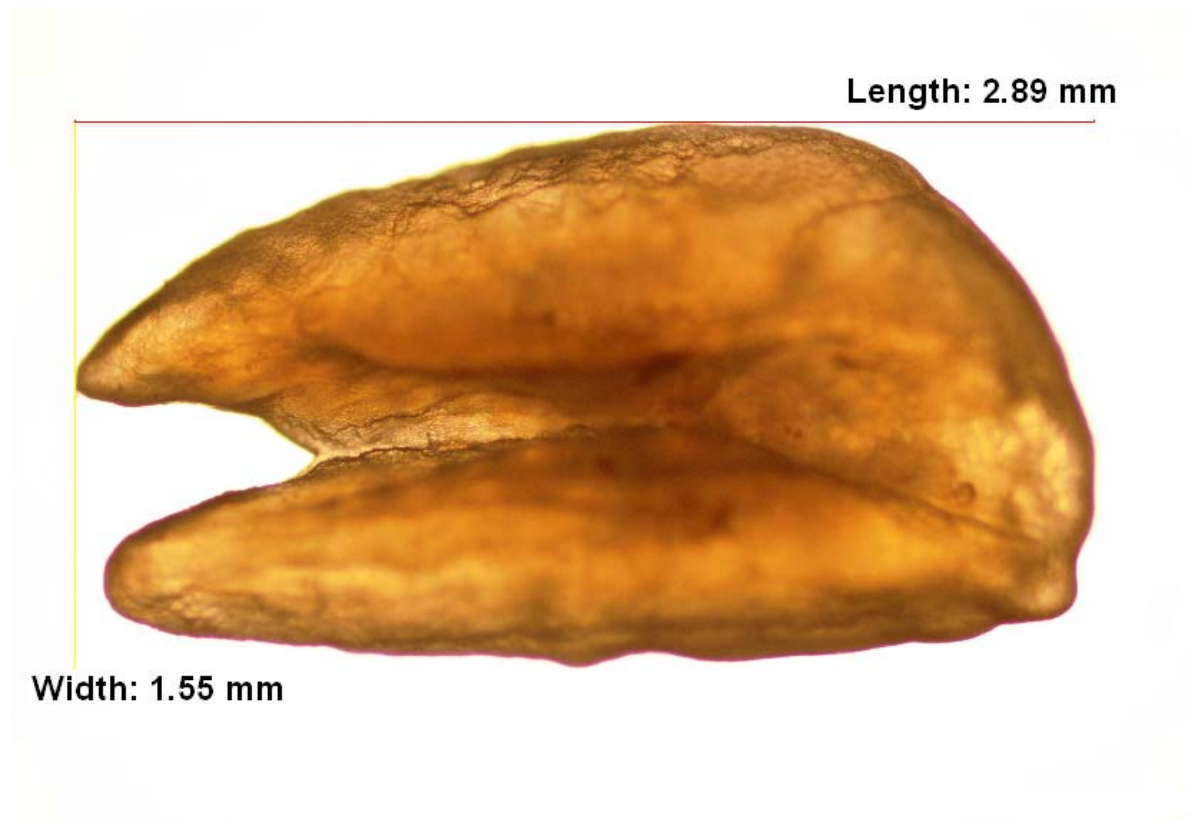


Figure 1. Sagittal otolith of *Mastacembelus mastacembelus* (x40).

Table. Measured values of otolith size [length (mm), width (mm) and weight (g)] and total lengths of *M. mastacembelus* (female, male and all fish).

	N	Min.	Max.	Mean	SD
Female					
Otolith length	88	1.44	3.19	2.27	0.44
Otolith width	88	0.81	1.68	1.21	0.21
Otolith weight	88	0.0003	0.0034	0.0015	0.00075
Total length	88	239	770	462.17	151.18
Male					
Otolith length	99	1.48	3.82	2.58	0.39
Otolith width	99	0.8	1.71	1.34	0.17
Otolith weight	99	0.0004	0.0038	0.0020	0.00062
Total length	99	237	806	598.39	119.74
All Fish					
Otolith length	187	1.44	3.82	2.43	0.44
Otolith width	187	0.8	1.71	1.28	0.20
Otolith weight	187	0.0003	0.0038	0.0017	0.00073
Total length	187	237	806	534.29	151.30

N: number of fish, Min.: minimum, Max.: maximum, SD: standart deviation, Mean: average

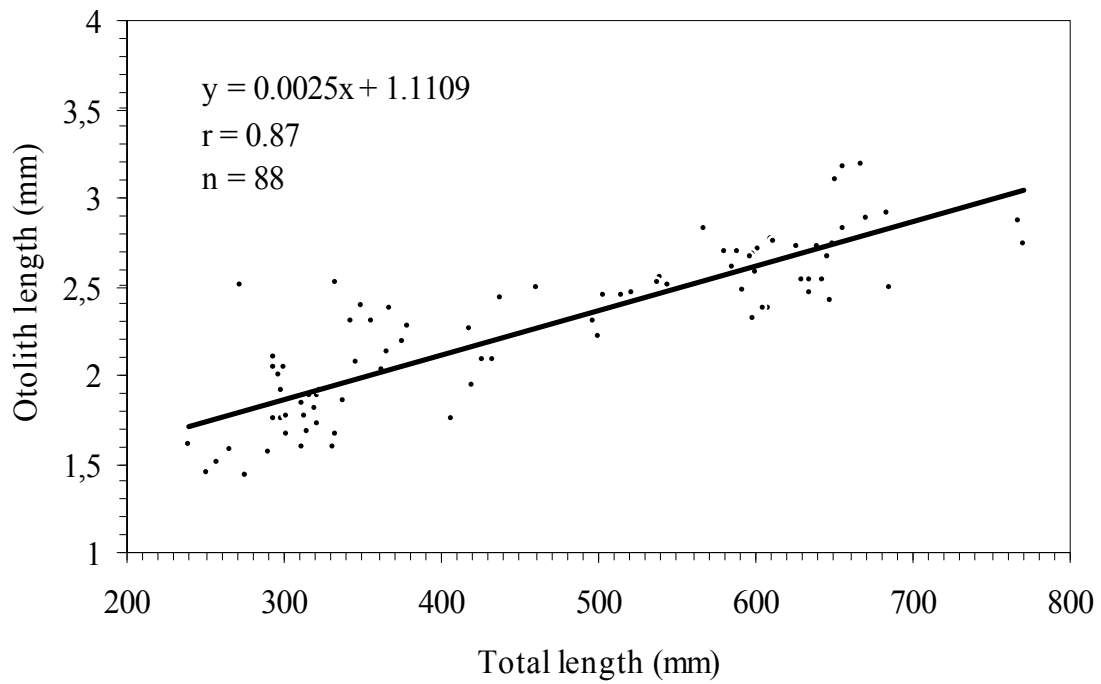


Figure 2. Total length-otolith length relationships in *M. mastacembelus* (female).

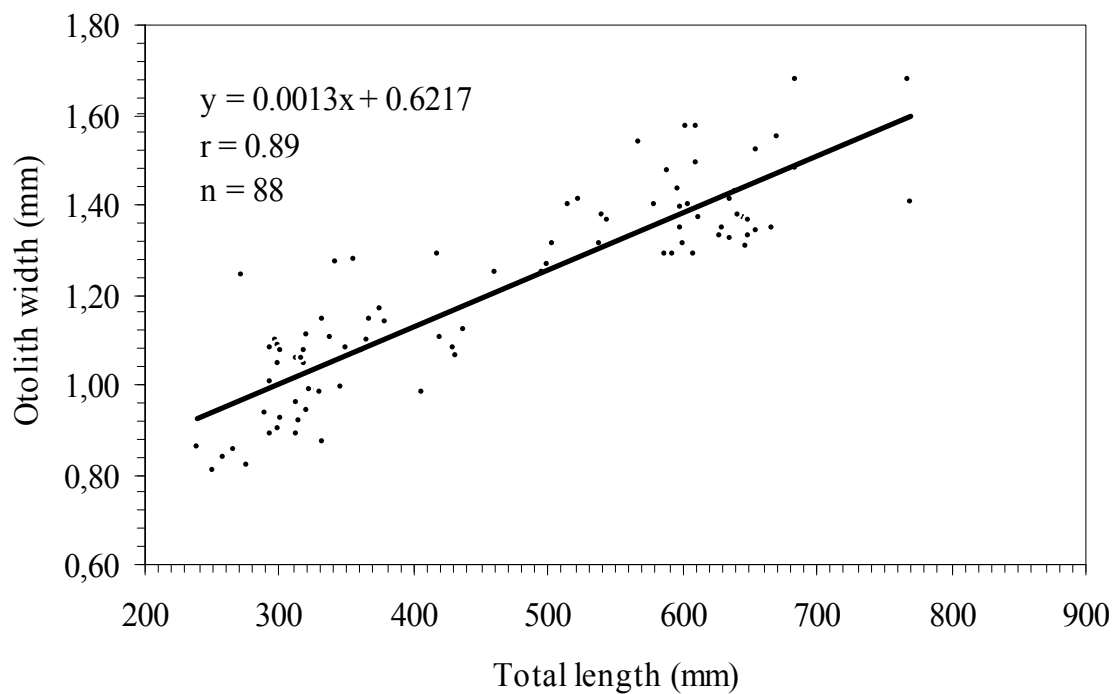


Figure 3. Total length-otolith width relationships in *M. mastacembelus* (female).

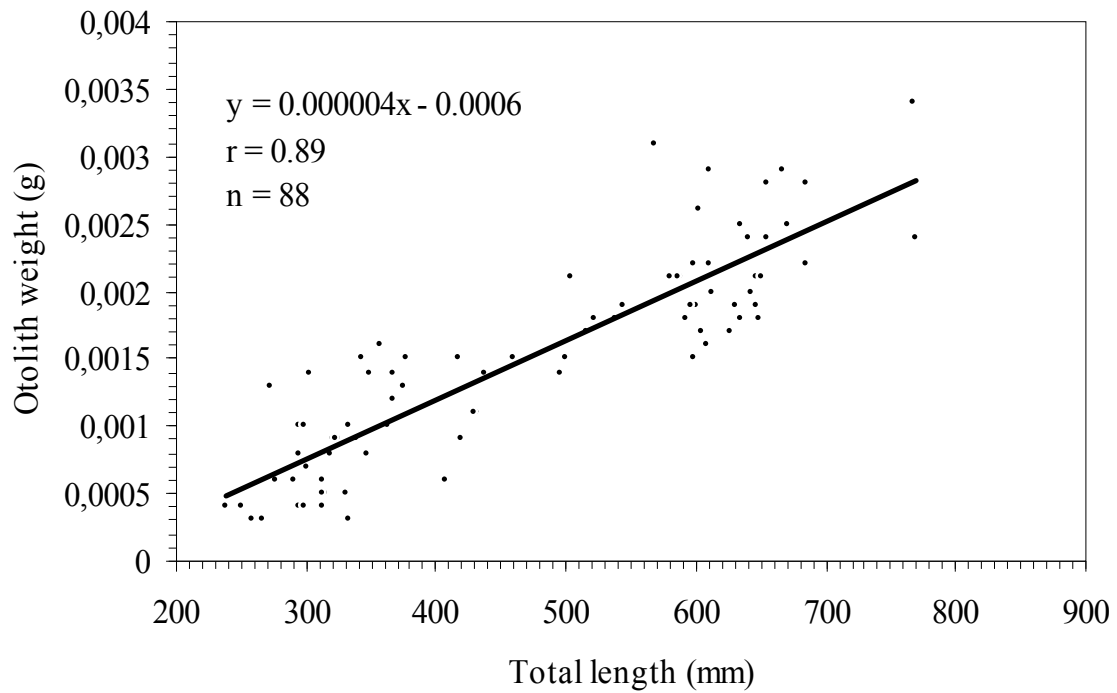


Figure 4. Total length-otolith weight relationships in *M. mastacembelus* (female).

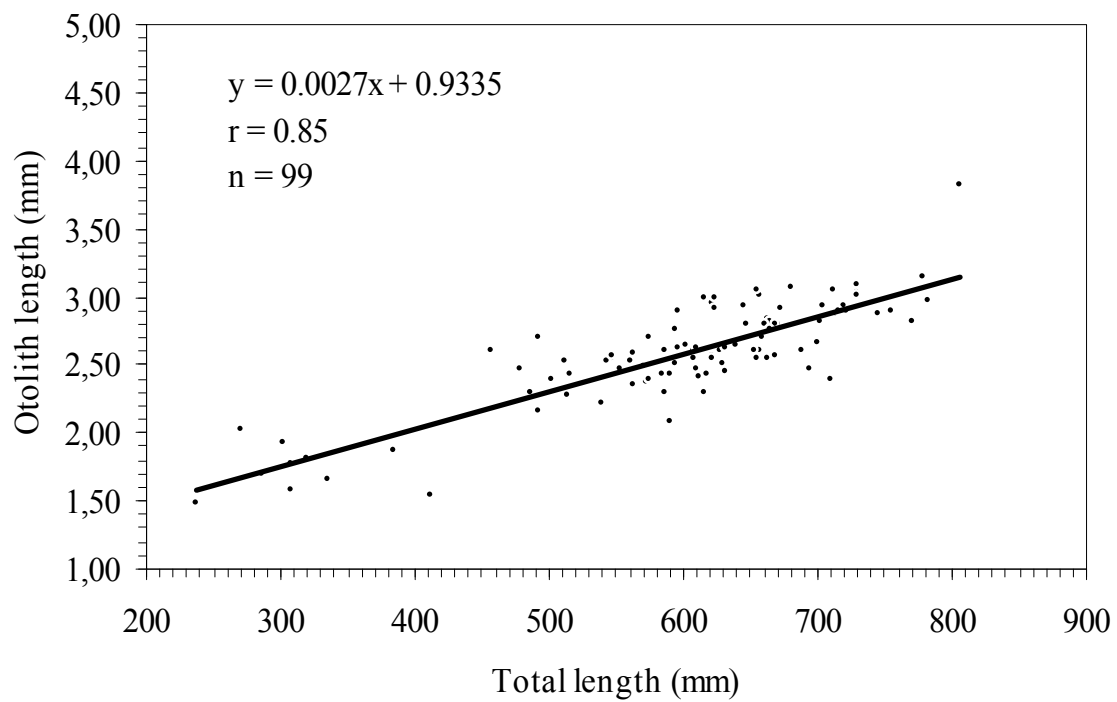


Figure 5. Total length-otolith length relationships in *M. mastacembelus* (male).

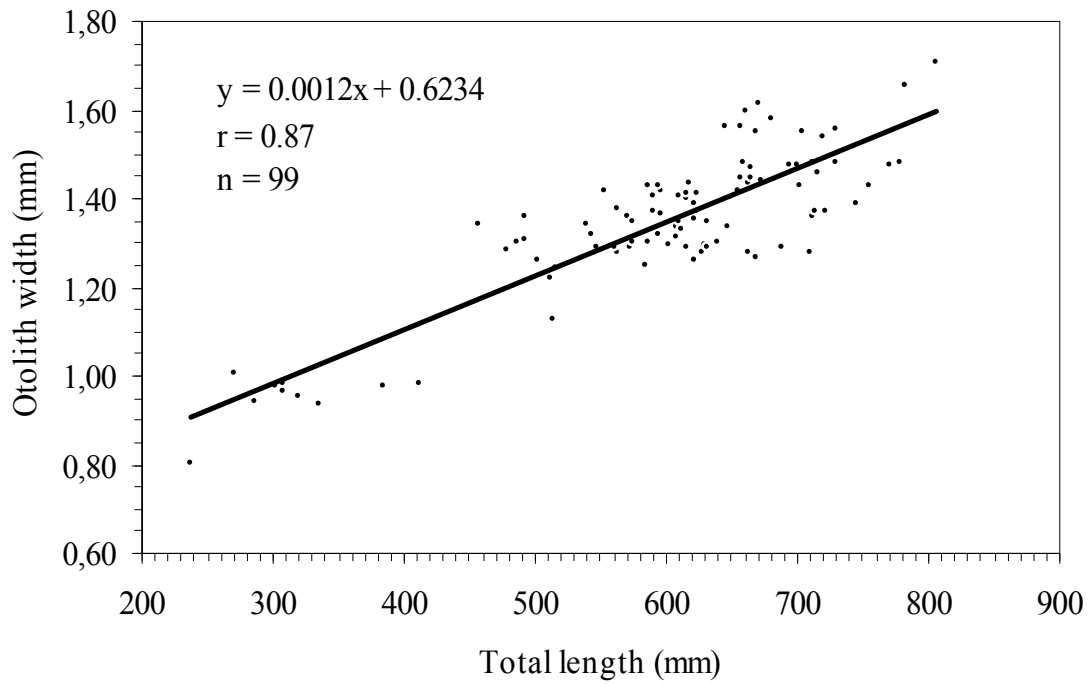


Figure 6. Total length-otolith width relationships in *M. mastacembelus* (male).

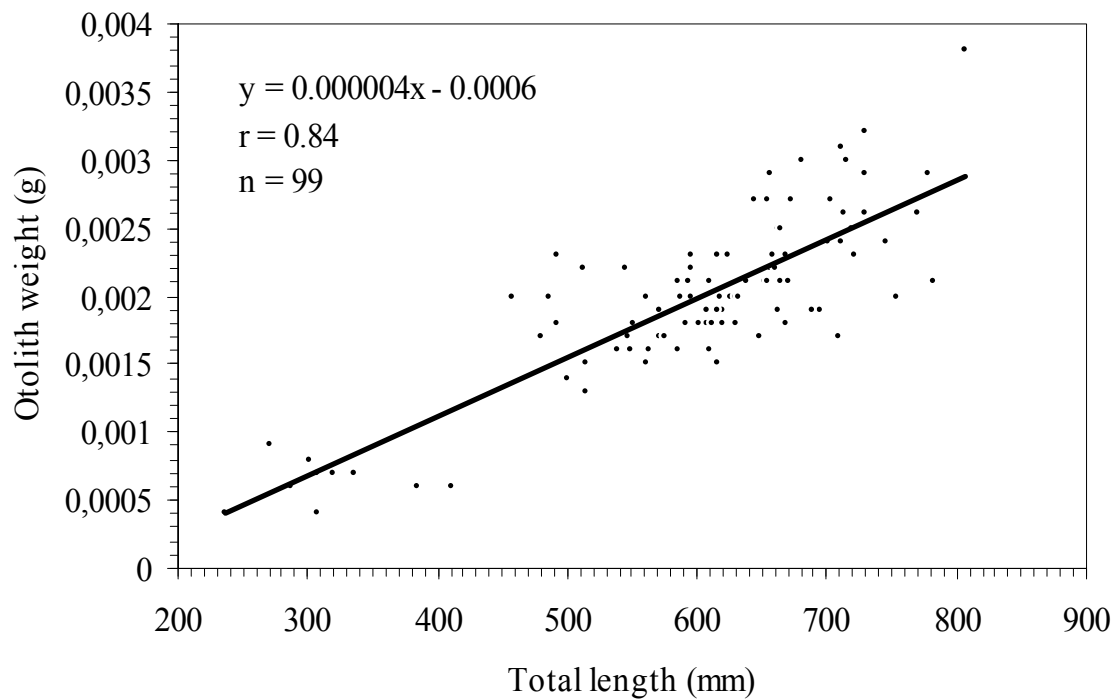


Figure 7. Total length-otolith weight relationships in *M. mastacembelus* (male).

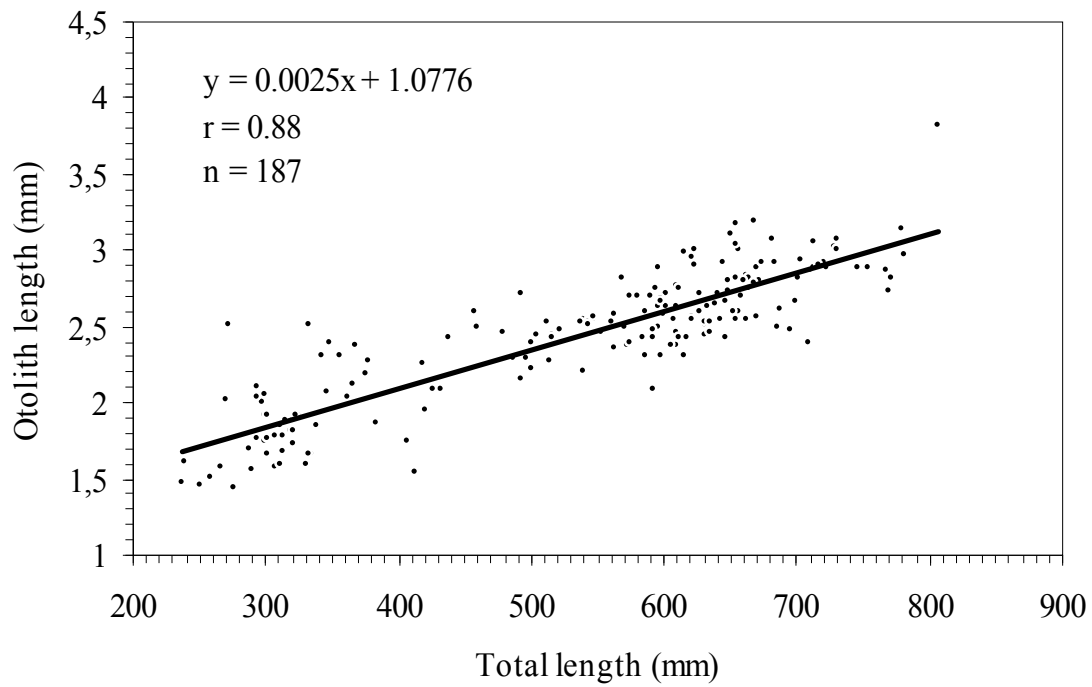


Figure 8. Total length-otolith length relationships in *M. mastacembelus* (all fish).

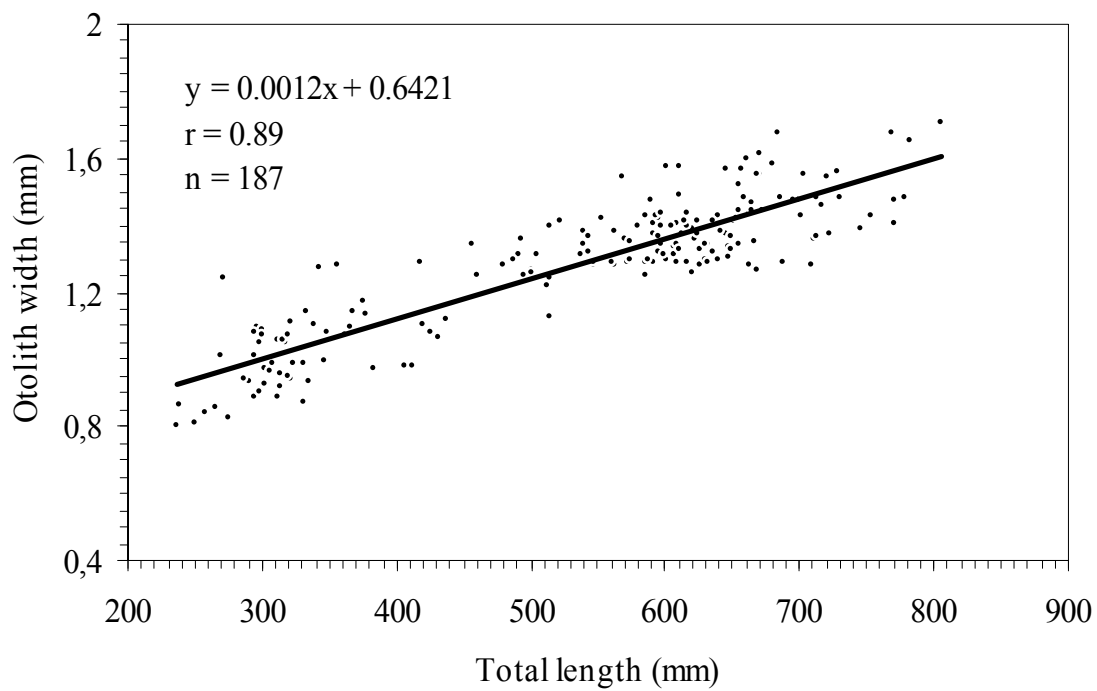


Figure 9. Total length-otolith width relationships in *M. mastacembelus* (all fish).

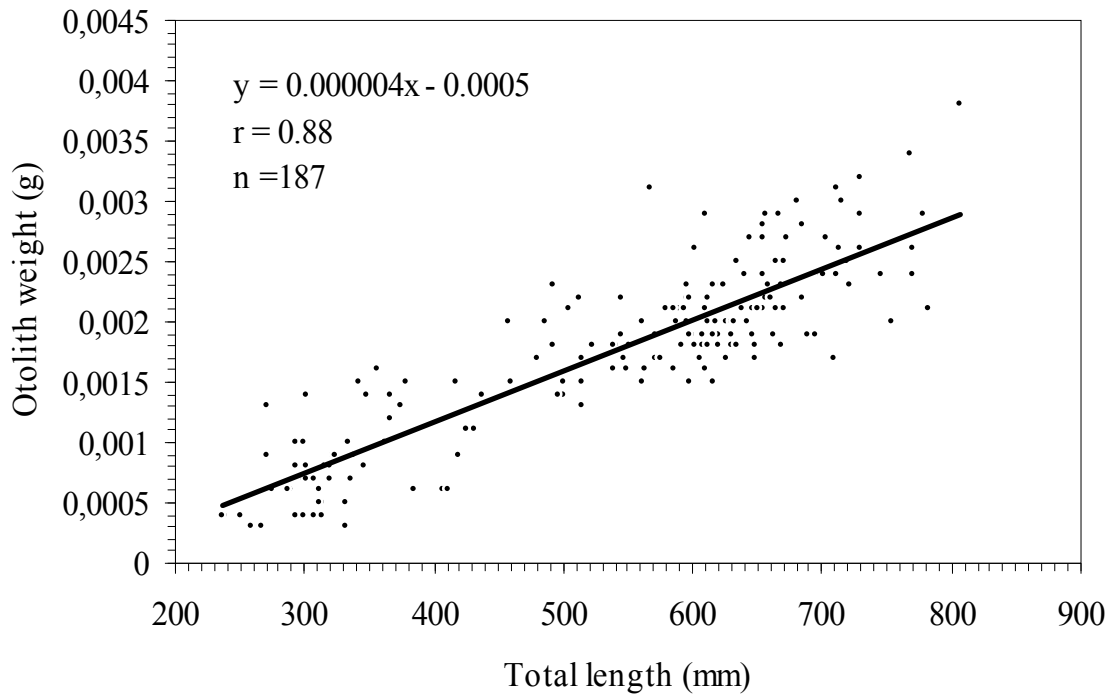


Figure 10. Total length-otolith weight relationships in *M. mastacembelus* (all fish).

Many researchers (Akyol et al., 1997; Metin et al., 1997; Granadeiro and Silva, 2000; Metin et al., 2001; Şen et al., 2001; Morley and Belchier, 2002; Munk and Smikrud, 2002; Aydın et al., 2004; Akalın et al., 2006; Ceyhan and Akyol, 2006; Samsun and Samsun, 2006; Metin and İlkyaz, 2008) have found stronger and positive linear relationships between fish length and otolith length in different fish species. However some researchers (Bostancı and Polat, 2007; Bostancı et al., 2007; Bostancı and Polat, 2008; Bostancı and Polat, 2009) have determined stronger and positive linear relationships between fish length and otolith size (length, width and weight) in different fish species that have different body form.

Conclusions

As a result, it could be pointed out that the fish that have anguilliform body shape as *Mastacembelus mastacembelus*, a positive and strong correlation between otolith size (length, width and weight) and total length were observed.

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