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SHORT COMMUNICATION KISA MAKALE

ABNORMALITIES IN THE WEDGE SOLE *Dicologlossa cuneata* (MOREAU, 1881) AND BLACK SEA TURBOT *Scophthalmus maeoticus* (PALLAS, 1814) FROM TURKISH SEAS

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Abstract:

Both color and morphological abnormalities on two different flatfish species [*Dicologlossa cuneata* (Moreau, 1881) and *Scophthalmus maeoticus* (Pallas, 1814)] have been recorded from Turkish seas. Abnormal flatfish species, *Dicologlossa cuneata* (Moreau, 1881), wedge sole, was sampled from two different localities in Aegean sea. First wedge sole from Izmir bay (Aegean sea) had three different colour abnormalities (ambicoloration; albinism and xanthochroism) on eyed and blind sides of their body. Other abnormal wedge sole specimen from Ekincik cove (Aegean sea) had ambicoloration on blind side of the body. Second abnormal flatfish species *Scophthalmus maeoticus* (Pallas, 1814), Black sea turbot, was caught from the Black sea coast of Istanbul and the specimen had totally ambicolored (blind side of the body was colored as like as eyed side) and morphological abnormalities (a fleshy piece-hook-above the head).

Keywords: *Dicologlossa cuneata*, *Scophthalmus maeoticus*, Wedge sole, Black sea turbot, Anomalies, Albanism, Turkish seas

Introduction

Flatfish, of the order Pleuronectiformes, has received much attention from biologists for more than a hundred years because of their complex behavior (Burton, 2002). Flatfishes have asymmetrical external pigmentation (Norman, 1934). The eyed side of the fish is colored while the blind side is completely white (Venezilos and Benetti, 1999). A variety of abnormalities have been noted among the flatfish specimens. These are morphological deformities (particularly the head and/or caudal regions) and pigment anomalies (Gartner, 1986).

There are two main pigmentation anomalies, a deficiency or absent of pigment cells on ocular side called as albinism and excess pigmentation on the blind side called as ambicoloration (Bolker and Hill, 2000). Another pigmentation anomalies is presence of yellow chromatophores (xanthophores) on the eye-side, called xanthochroism (De Veen, 1969). Color abnormalities have been reported for a variety of flatfish species (e.g. Cunningham, 1907; Hussakof, 1914; Norman, 1934; Gudger, 1936; Gudger and Firth, 1936; De Veen, 1969; Houde, 1971; Fujita, 1980; Gartner, 1986; Chaves et al., 2002; Quigley, 2003; Carnikian et al., 2006; Diaz de Astarloa et al., 2006; Macieira et al., 2006; Da Silva Junior et al., 2007; Akyol and Şen 2012).

As a result of unsuccessful eye migration, dorsal fin is blocked by anterior movement of the fin and this results in as a fleshy piece-hook-above the head. These flatfishes are called 'hooked' and sometimes it can also cause abnormal pigmentation (Norman, 1934). There were a few records for head anomalies in flatfishes (Gudger and Firth, 1936; Fujita, 1980; Gartner, 1986; Diaz de Astarloa et al., 2006; Macieira et al., 2006).

A record of any type of abnormality is important in environmental impact and background studies, and documentation of color anomalies may be particularly useful: As diffuse pigmentation may indicate a recent parasitic infestation--probably from localized sources, records of incidence of this anomaly may be useful in determining a population's residence time at a specific location (Gibson, 1972).

Here we report first record on colour anomalies in two species of wedge sole (*Dicologlasso cuneata)* and addition record on head and color anomalies of Black sea turbot (*Scophthalmus maeoticus)* in the eastern Mediterranean sea. We hope that findings obtained from the study will contribute to management of natural flatfish populations.

Materials and Methods

We found color anomalies on two the wedge sole, *Dicologlossa cuneata* (Moreau, 1881) specimen and one head and color anomalies on Black sea turbot (*Scophthalmus maeoticus)* from Turkish sea. First abnormal wedge sole specimen was caught by using trammel net (mesh size 30 mm nominal bar length and hanging ratio was 0.50%) from the Homa lagoon in Izmir bay (Aegean sea). (38º30′–38º35′N; 26º48′–26º53′E). Trammel net was used sovernight for a day in November 2008.

Second abnormal wedge sole specimen was caught by using the traditional type trawl net (mesh size 44 mm) from the Ekincik cove in SE Aegean Sea (36° 48′ 77″ N - 28° 33′ 317″E ; 36° 47′ 250″N - 28° 35′ 420″ E) (in December 2009). The other abnormal flatfish is *Scophthalmus maeoticus* (Pallas, 1814), Black sea turbot, caught by using gill net (mesh size 160 mm nominal bar length and hanging ratio was 0.33%) from Black sea coast of Istanbul region (41° 13′ 18″ N- 29° 06′ 16″ E) (in April 2011) (Figure 1.).

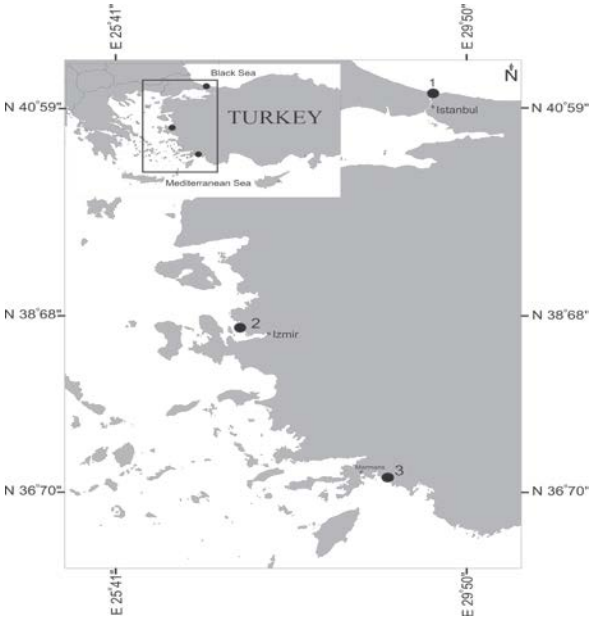

Figure 1. Sampling locations of the documented abnormal flatfish records in Turkish seas waters (1: *Scophthalmus maeoticus*; 2 and 3: *Dicologlossa cuneata*)

Results and Discussion

First color abnormal wedge sole specimen from Izmir bay was female. Total length of specimen was 18.8 cm and weighted 53.8 g. The specimen had three different types of abnormality; ambicoloration (approximately 15% coloration on the blind side). Xanthochroism (especially this characteristic was observed on two sides of the body) and albinism (ocular side of the specimen was none or less pigmented, approximately 70% of the body and also approximately 80% of the cephalic region) (Figure 2).

Second abnormal wedge sole specimen from the Ekincik cove was female. Total length of specimen was 27.0 cm and weighted 150.0 g. The specimen had ambicoloration (approximately 35% coloration on the blind side) (Figure 3).

Total length of head and color abnormal turbot was 55.5 cm and weighted 3.5 kg. The specimen was female and had totally ambicolored (whole blind side was colored as eyed side) and also had little curve (like a hook) above head region (Figure 4).

Flatfishes have typically asymetrical external pigmentation (Norman, 1934) and also the ocular surface of the fish is pigmented while the blind side is entirely white (Venizelos and Benetti, 1999). Pigmentation of teleost fishes are affected by both neural and hormonal controls (Venizelos and Benetti, 1999; Burton, 2002). Abnormalities in Pleuronectiform fish are caused by several reasons (environmental, nutritional and neurological) which are mostly caused by eye migration (Venizelos and Benetti, 1999).

Figure 2. Partial albanism and ambicolouration in *Dicologlossa cuneata* specimen from Izmir bay (**a**: Abnormal specimen-upside and normal specimen-downside; **b**: Albanism **c**: Partial ambicolouration, on the blind side **d**: Albanism on the cephalic region **x**: refers to xanthochroism on the blind and eyed sides).

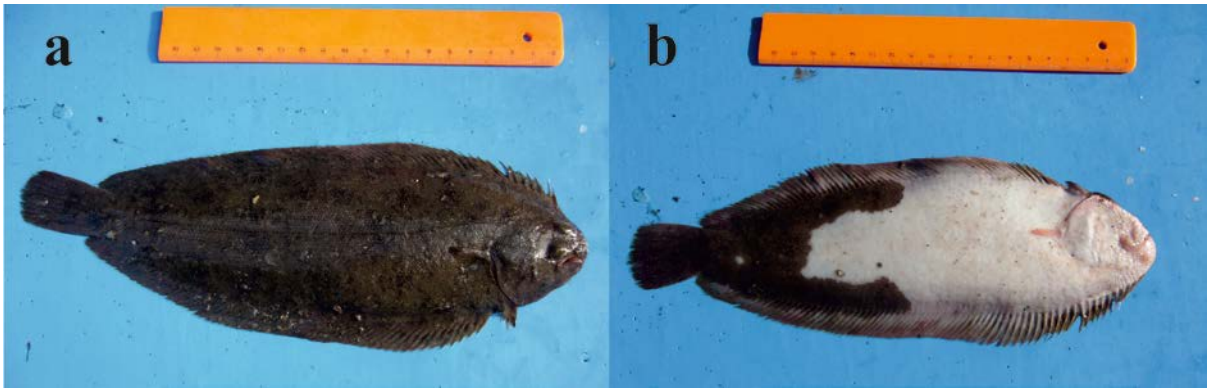

Figure 3. Partial ambicolored specimen of *Dicologlossa cuneata* from Ekincik cove (**a**: Eyed side of the body **b**: Blind side of the body).

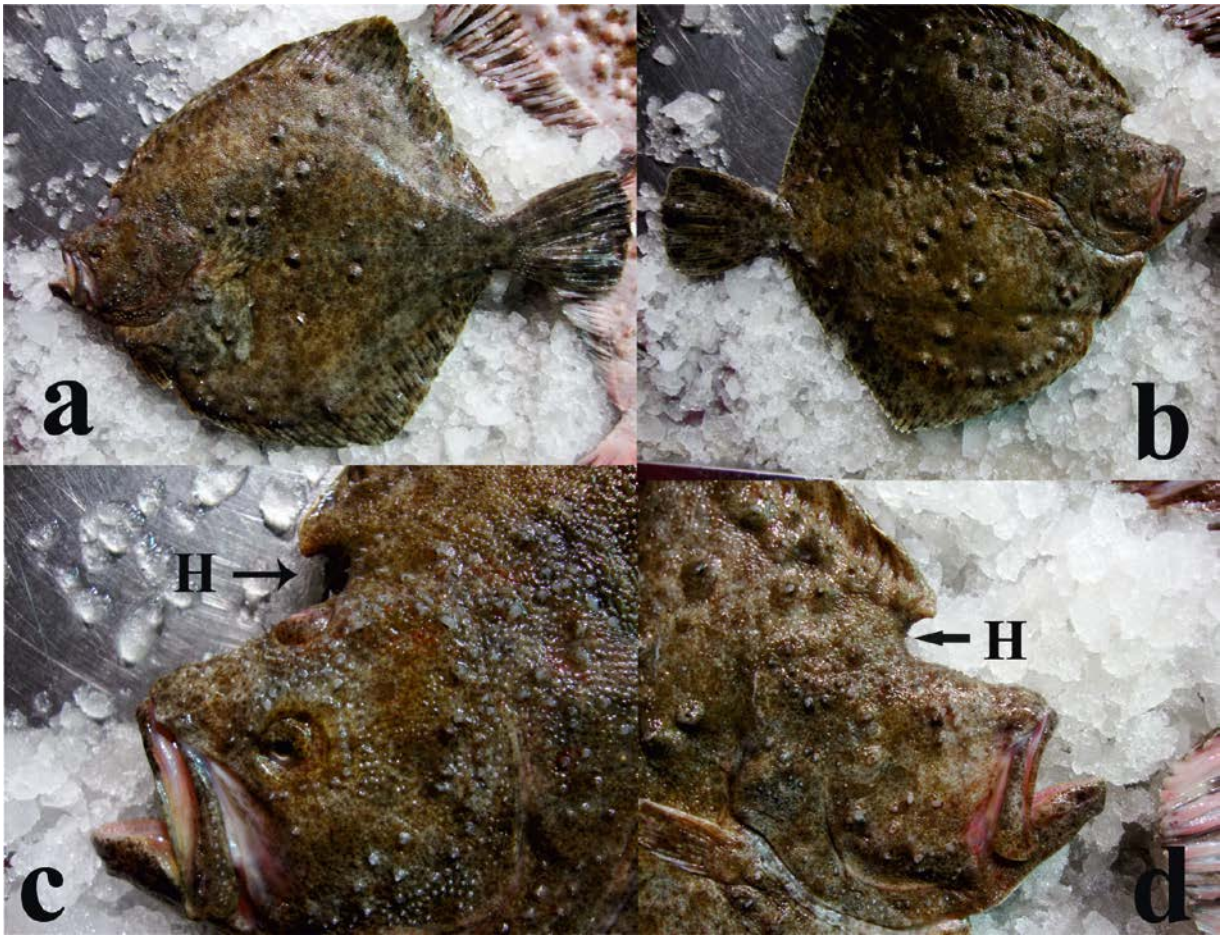

Figure 4. A totally ambicolourate (duble) specimen of *Scophthalmus maeoticus* from the Black sea (**a**: Eyed side of the specimen **b**: Blind side of the specimen **c**: Hook above the head in view of eyed side **d**: Hook above the head in view of blind side).

Pigment abnormalities are also very common in aquacultured specimens because of several reasons such as temparature, feeding protocols when they are in eye migration, etc. (Venizelos and Benetti, 1999; Bolker and Hill, 2000; Burton, 2002; Aritaki and Seikai, 2004; Tong et al., 2012). Abnormally pigmented flatfishes are very common in nature (Da Veen, 1969). For example; a study from the North Irish Seas showed that flatfish population was made out of ambicolorate European flounder (*Platichthyes flesus*, 28%), European plaice (*Pleuronectes platessa*, 8%) and common dab (*Limanda limanda*, 0.8%) individuals (Shelton and Wilon, 1973). Norman (1934) mentioned that there were several examples of abnormally pigmented flatfishes such di-

verse genera as Scophthalmus, Limanda, Platichthys, Pleuronectes and Solea.

There were some records of abnormally pigmented flatfishes in the Mediterranean Sea. First record of *Solea solea* from western Mediterranean Sea had two forms of colour abnormality (albanisim and ambicoloration) (Paris and Quingnard, 1986). The other common sole record was given from Izmir bay (Aegean Sea) which had partially ambicolorated, xanthochroistic and albanist features (Akyol and Sen, 2012). The found of abnormal colored specimen of *Dicologlossa cuneata* is the first record for wedge sole from the Mediterranean sea.

The first record of turbot (totally ambicolorate) was from Istanbul coast, which probably was *S. maeotica* (Black sea turbot) but there was not any photo or illustration (Devecian, 1915). This is additional record of *S. maeotica*, which was totally ambicolored (duble) and hooked, for the Mediterranean sea region.

Norman (1934) reported that hook above head and bony tubercules, which are developed on the blind side, are characteristic features for turbot individuals and also corresponds with our findings on the specimen from Istanbul coast.

In Norway Von Ubisch (1951) reported that, fishermen called abnormally pigment flatfish as 'Biologist Fish' (the pseudo-albinic plaice) because they were released by fisheries biologists after experiments.

Further totlly ambicolorate turbots are called "double turbot" by Turkish fisherman and French fisherman (Devecian, 1915; Paris and Quignard, 1968).

There are many reasons for color abnormalities on flatfish individuals (Norman, 1934; Venizelos and Benetti, 1999; Bolker and Hill, 2000; Aritaki and Seikai, 2004), but it still unknown (Venizelos and Benetti, 1999). Many studies have indicated that light intensity, feeding during larval stages, or neurological aspects such as hormones (i.e. endocrine system) are involved in body color patterns, while genetic factors and environmental stressors are reported as possible hypotheses to explain ambicoloration (Bolker and Hill, 2000; Tagawa and Aritaki, 2005). Moreover, environmental contamination of sediments due to anthropic and industrial activities could also contribute to the effect (Yamamoto et al., 1992).

Conclusions

So this subject needs to be studied further, and must be detailed on the subjects of frequence of occurrence in flatfish populations and genetic differences between normal and abnormal ones.

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