

## SHORT COMMUNICATION

### New distribution data for two cryptobenthic gobiid fish (Gobiidae) in the Turkish coasts

Semih Engin\*, Dilruba Seyhan, Tolga Akdemir, Arif Can Keskin

Faculty of Fisheries, Izmir Katip Celebi University, Izmir, TURKEY

\*Corresponding Author: engin.semih@gmail.com

---

#### Abstract

In this study, new occurrence of two cryptobenthic goby species belonging to genus *Chromogobius* in the Sea of Marmara and Turkish coast of the Black Sea are reported. While *Chromogobius zebratus* (Kolombatovic 1891) is a new record for the Sea of Marmara and Turkish coast of the Black Sea, the other species *C. quadrivittatus* (Steindachner 1863) is the first record for Turkish coast of the Black Sea. Some morphological - ecological properties of these gobies were examined. Juvenile coloration of *C. quadrivittatus* and differences between adults and juveniles are also described for the first time in the present study.

**Keywords:** *Chromogobius zebratus*, *Chromogobius quadrivittatus*, Gobiidae, Black Sea, Sea of Marmara

---

#### Introduction

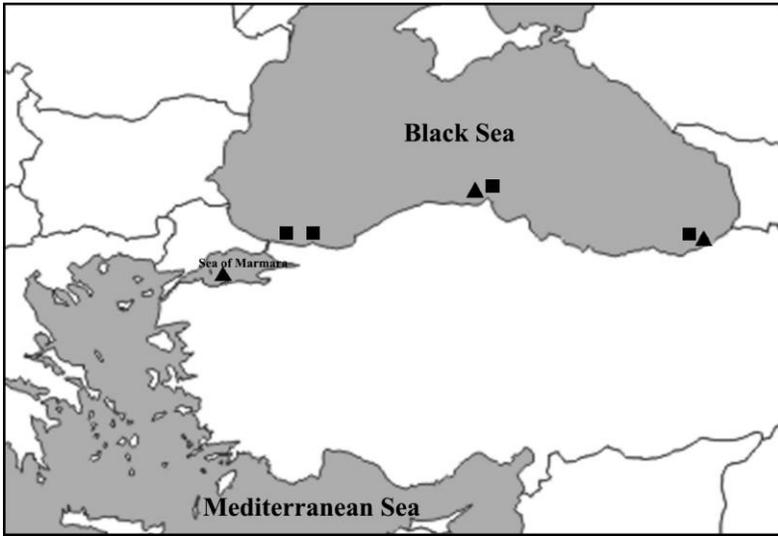
The genus *Chromogobius* (De Buen 1930) is represented by three species (Miller 1971; Van Tassell 2001): *Chromogobius quadrivittatus* (Steindachner 1863), *C. zebratus* (Kolombatovic 1891) and *C. britoi* Van Tassell 2001. Miller (1971) also mentioned two subspecies; *C. zebratus zebratus*, from the Adriatic Sea and *C. zebratus levanticus*, from the Mediterranean coast of Israel. However, additional studies have expanded the distributional range of *C. zebratus* and these studies invalidate the division two subspecies (Ahnelt 1990; Ahnelt and Patzner 1996; Van Tassell 2001; Engin and Dalgıç 2008).

The habitat preferences of *C. quadrivittatus* and *C. zebratus* are quite similar; both prefer algae-covered boulders, rocks, clefts and cavities. There is a slight difference in depth preference; *C. quadrivittatus* is generally found only in shallow intertidal areas, whereas *C. zebratus* occurs in intertidal or subtidal areas to depths of 10 m (Ahnelt 1990; Kovacic 1997; Van Tassell 2001).

According to Miller (1971; 1986), *C. quadrivittatus* occurs sparsely along the northern coasts of Black Sea, but no records are available from the Turkish shelf (Engin and Dalgıç 2008, Bilecenoglu *et al.* 2014). Likewise, discovery of the occurrence of *C. zebratus* in the Black Sea is also quite recent (Kovtun and Karpova 2014), where the species was encountered along the coasts of Ukraine. Engin and Dalgıç (2008) and Bilecenoglu *et al.* (2014) reported that there is no data about the distribution of *C. zebratus* either from the Sea of Marmara nor from the Turkish coast of the Black Sea. In this study, we present the first record of *C. zebratus* from the Sea of Marmara and Turkish coast of the Black Sea and *C. quadrivittatus* from Turkish coast of the Black Sea.

## Materials and Methods

Underwater surveys and samplings were carried out with three scuba divers between May to September 2014. One specimen of *C. zebratus* was sampled from Erdek-Horkos Island (40°31'27 "N, 27°42'27"E) in the Sea of Marmara. *C. zebratus* and *C. quadrivittatus* specimens were sampled together from Rize-Pazar (41°10'58"N- 40°52'28"E) and Sinop-Inceburun (42°05'51"N-34°56'38"E) in the Black Sea. *C. quadrivittatus* specimens were also sampled Kefken-Pembe Kayalar (41°11'18"N, 30°13'50"E) and Sile (41°10'59"N, 29°36'22"E). Sampling locations are shown in Figure 1. The specimens were sampled between July and August 2014 by using Quinaldine solution as an anesthetic. The collected samples were fixed in 4 % formalin and deposited in the fish collection of İzmir Katip Çelebi University (IKCMM-P IS-06-07-2014). During the underwater surveys live specimens were photographed (by Nikon D300s, 60mm macro lens Sea&Sea housing and double strobe) in their habitats (Figures 2B; 3B; 3C). Species identification was based solely on morphological characters following the descriptions of Miller (1971; 1986). Meristic characters and morphometric measurements were obtained under a stereomicroscope (to the nearest 0.01 mm). Meristic abbreviations: A, anal fin; C, caudal fin; D1, D2, first and second dorsal fin; P, pectoral fin; LL, scales in lateral series; TR, scales in transverse series. Morphometric abbreviations: Ab, anal fin base; Ad and Aw, body depth and width at anal fin origin; Cl, caudal fin length; CP and CPd, caudal peduncle length and depth; D1b and D2b, first and second dorsal fin base; E, eye diameter, H and Hw, head length and width; I, interorbital width; Pl, pectoral fin length; PO, postorbital length; SL, standard length; SN, snout length; SN/A and SN/AN, distance from snout to vertical of anal fin origin and anus; SN/D1 and SN/D2, distance from snout to origin of first and second dorsal fins; SN/V, distance from snout to vertical of pelvic fin origin; V/AN, Distance from pelvic fin origin to anus; Vd, body depth at pelvic fin origin; Vl, pelvic fin length. Terminology of the lateral-line system follows Sanzo (1911) and Miller (1986).



**Figure 1.** Sampling locations. ▲: *C. zebratus*, ■: *C. quadrivittatus*



**Figure 2.** *C. zebratus*, A. After fixation, B. Live specimen in the Sea of Marmara



**Figure 3.** *C. quadrivittatus*. **A.** Adult specimen after fixation **B.** Live adult specimen **C.** Live juvenile specimen in the Black Sea.

## Results

The two species of *Chromogobius* are easily distinguished on the basis of differences in scale type and number in the lateral series and markings on the anterior opercle and pectoral fins. *C. zebratus* has lower number of scales in the lateral series (41–52) as compared to *C. quadrivittatus* (56–72). Scale types differ between the species: While *C. quadrivittatus* has only cycloid scales, *C. zebratus* has both cycloid scales on the trunk and ctenoid scales on the caudal peduncle.

The color patterns of these species differ with respect to the presence or absence of a spot on the opercle and a dark bar on the anterior margin of the pectoral fin. In *C. quadrivittatus*, there is both a dark spot on the lower edge of the anterior

opercle and a dark vertical band on the anterior margin of the pectoral fin base; *C. zebratus* has no anterior opercular spot but possess a dark vertical band on the anterior margin of the pectoral fin. The dark band on the pectoral fin of *C. zebratus* differs from *C. quadrivittatus* because of a dorsal anterior projection of the bar in the former (Van Tassell 2001). Meristic characters and morphometric measurements of the sampled specimens were given in Table 1.

**Table 1.** Morphometric and meristic features of *C. quadrivittatus* and *C. zebratus* (n: sampled specimens)

	<i>Chromogobius quadrivittatus</i>		<i>Chromogobius zebratus</i>
	Black Sea (n=4)	Black Sea (n=2)	Sea of Marmara (n=1)
%SL, H	29,08	27,85	26,65
%SL, Hw	20,66	19,79	20,79
%SL, SN/D1	38,98	36,53	36,37
%SL, SN/D2	58,84	56,24	54,4
%SL, SN/AN	57,26	54,26	54,98
%SL, SN/A	60,76	58,91	59,13
%SL, SN/V	31	29,96	30,26
%SL, CP	18,51	20,25	21,62
%SL, D1b	17,4	18,27	16,91
%SL, D2b	28,69	30,22	32,19
%SL, Ab	18,59	22,05	26,18
%SL, CI	19,02	19,55	21,45
%SL, PI	22,22	22,36	18,9
%SL, VI	16,69	19,06	20,01
%SL, Vd	14,98	16,07	16
%SL, Ad	14,53	14,33	15,43
%SL, Aw	13,2	12,58	12,58
%SL, CPd	11,56	10,33	9,51
%SL, V/AN	25,14	23,21	24,44
%CP, CPd	62,45	50,98	44,01
%H, SN	31,35	30,75	27,68
%H, E	17,19	20,13	22,14
%H, PO	59,63	63,42	63,02
%H, Hw	71,06	71,06	78
%E, I	60,28	42,92	33,65
%V/AN, VI	66,4	82,13	81,89
A	I+9	I+10	I+10
D1	VI	VI	VI
D2	I+10	I+11	I+11
P	16	15	15
LL	59	46	49
TR	23	20	21

#### *Lateral Line System*

Anterior oculoscapular and preopercular canals present, with pores  $\sigma$ ,  $\lambda$ ,  $\kappa$ ,  $\omega$ ,  $\alpha$ ,  $\beta$ ,  $\rho$  and  $\gamma$ ,  $\delta$ ,  $\epsilon$ . Seven transverse rows in sub-orbital area (last one with 1 papilla) in both species (Figure 4).

In *C. zebratus*; longitudinal row *d* exists with a continuous slope. While the first three transversal rows begin away from the eyes the other three located near the eye. The fifth transversal row extends anterior part of longitudinal row *b*. Anterior nostril is longer than posterior nostril.

In *C. quadrivittatus*; longitudinal row *d* irregular and discontinuously. All transversal rows begin away from the eyes. The fifth transversal row ends under the longitudinal row *b*. Length of the anterior and posterior nostrils almost equal.



**Figure 4.** Lateral line system **A.** *C. zebratus* **B.** *C. quadrivittatus*

#### *Coloration*

In adult live specimens of *C. zebratus*, the vertical bars and head mottling were pale brown, the body has 5 pale grey saddles; fins are brownish fading to grey at

the margin. After the fixation the coloration became darker (Figure 2). Coloration of juvenile specimens is similar with adults.

*C. quadrivittatus* adults have more intensive and marked but meantime, smaller grey head mottling in comparison with *C. zebratus* adults (Figure 3A; 3B). There are no marked saddles on upper part of body in adults. The base of pectoral fins whitish with dark border. Fins are brownish to yellowish. In some specimens the margin of fins yellow to light brown, in some specimens fins grey.

Juveniles apparently differ in coloration from the adults. A triangle white blotch, which gets wider from the beginning of the lower lip to pupils and covers the interorbital area. The second white area (saddle) on the nape, remains between the pectoral fin bases. The third white saddle between the dorsal fins reaches through to flanks at the both sides. A white small saddle at the base of 4-5 unbranched rays of D2. Another white but bigger saddle at the base of 7-8 unbranched rays of D2. Pectoral fins transparent. D1, D2 and C fins brownish to reddish (Figure 3C).

#### *Habitat*

It is observed that *C. quadrivittatus* and *C. zebratus* are sympatric species in the Black Sea coastal rocky ecosystem. These species were sampled either from crevices or under algae-covered boulders. The Marmara specimen of *C. zebratus* was sampled from biogenic calcareous fragments.

#### **Discussion**

*C. quadrivittatus* and *C. zebratus* species prefer quite similar habitats and usually inhabit sheltered areas, crevices and under boulders. These habitat characteristics are similar to Miller' (1971; 1986), Patzner's (1999), Van Tassell's (2001), Alberto and Nieto's (1993) and Engin and Dalğıç's (2008) findings.

The meristic counts, morphometric measurements, the lateral-line system and numbers of sensory papillae presented herein are similar to those described by Miller (1986), Van Tassell (2001), Engin and Dalğıç (2008). Besides, the coloration of the species similar with descriptions of Miller (1971; 1986) and Van Tassell (2001). In the present study the coloration of juvenile specimens are firstly described. While the coloration of juvenile specimens of *C. zebratus* were similar with the adults, the coloration of juvenile *C. quadrivittatus* significantly differs from the adults. This study improves the known distribution range of this species in the Turkish coasts.

#### **Acknowledgements**

This study has been supported by TUBITAK 112 T 924.

# Türkiye kıyılarında iki kriptobentik kayabalığı türü için yeni dağılım verisi

## Özet

Bu çalışmada, *Chromogobius* cinsine ait iki kriptobentik kaya balığı türü Marmara Denizi ve Karadeniz'in Türkiye kıyıları ihtiyofaunası için rapor edilmektedir. *Chromogobius zebratus* (Kolombatovic 1891) hem Marmara Denizi hem de Karadeniz'in Türkiye kıyıları için yeni kayıt niteliğinde olurken, *Chromogobius quadrivittatus* (Steindachner 1863) Karadeniz'in Türkiye kıyıları için yeni kayıttır. Bahsi geçen türlerin bazı morfolojik ve ekolojik özellikleri bu çalışmada incelenirken, *C. quadrivittatus* juvenillerinin renklenme özellikleri ile ergin bireyler arasındaki farklılıkları ilk kez bu çalışmada belirtilmiştir.

## References

Ahnelt, H. (1990) *Chromogobius quadrivittatus*, *Chromogobius zebratus* und *Zebrus zebrus* (Pisces: Gobiidae): Erstnachweis für Korsika (Frankreich) und Sardinien (Italien). *Annalen des Naturhistorischen Museums. Wien.* 91: 27-41.

Ahnelt, H., Patzner, R.A. (1996) Kryptobenthische Meergrundeln von den Balearen (Westliches Mittelmeer) mit Anmerkungen zum Unterartstatus von *Chromogobius zebratus levanticus*. *Annalen des Naturhistorischen Museums. Wien.* 98B: 529-544.

Alberto, L.J., Nieto, P. (1993) Presence of *Chromogobius zebratus* (Kolombatovic, 1891) (Gobiidae) in the Atlantic. Comments on the subspecific characteristics and distribution. *Cybiium* 17: 215-221.

Bilecenoglu, M., Kaya, M., Cihangir, B., Cicek, E. (2014) An updated checklist of the marine fishes of Turkey. *Turkish Journal of Zoology* 38: 901-929.

Engin, S., Dalgıç, G. (2008) First Record of *Chromogobius zebratus* (Gobiidae) for the Mediterranean Coast of Turkey. *Turkish Journal of Zoology* 32: 197-199.

Kovacic, M. (1997) Cryptobenthic gobies (Pisces, Perciformes, Gobiidae) and clingfishes (Pisces, Gobiesociformes, Gobiesocidae) in the Kvarner area, Adriatic Sea. *Natura Croatica.* 6: 423-435.

Kovtun, O.A., Karpova, E.P. (2014) *Chromogobius zebratus* (Kolombatovic, 1891) (Actinopterygii, Perciformes, Gobiidae) from marine underwater cave of Tarhankut peninsula (western Crimea), a species new for the Black Sea. *Marine Ecological Journal* 13(1): 72.

Miller, P.J. (1971) A revision of Mediterranean gobiid genus *Chromogobius* (Teleostei-Perciformes). *Journal of Zoology* 164: 305-334.

Miller, P.J. (1986). Gobiidae. In: Fishes of the North-eastern Atlantic and the Mediterranean, Vol. III (eds., P.J.P. Whitehead, M.L. Bauchot, J.C. Hureau, J. Nielsen, E. Tortonese), UNESCO, Paris, pp. 1019-1085.

Patzner, R.A. (1999) Habitat utilization and depth distribution of small cryptobenthic fishes (Blenniidae, Gobiesocidae, Gobiidae, Tripterygiidae) in Ibiza (western Mediterranean Sea). *Environmental Biology of Fishes* 55: 207–214.

Sanzo, L. (1911) Distribuzione delle papille cutanee (organi ciatiforme) esuo valore sistematico nei Gobi. *Mitteilungen aus der Zoologischen Station zu Neapel* 20: 249- 328.

Van Tassel, J.L. (2001) *Chromogobius* (Teleostei: Gobiidae): A new species from the Eastern Atlantic. *Copeia* 4: 1073-1080.

**Received:** 24.11.2015

**Accepted:** 12.01.2016