www.trjfas.org
ISSN 1303-2712
Turkish Journal of Fisheries and Aquatic Sciences 10: 263-267 (2010) DOI: 10.4194/trjfas.2010.0215

Morphologic and Habitat Characteristics of Black Sea's Endemic Goby *Neogobius platyrostris* (Gobiidae)

Semih Engin [1,*], Yusuf Bektaş[1]

[1] Rize University, Faculty of Fisheries, 53100, Rize, Turkey.

* Corresponding Author: Tel.: +90.542 7314281; Fax: +90.464 2234118;
E-mail: engin.semih@gmail.com

Received 22 December 2008
Accepted 23 February 2010

Abstract

The flat-snout goby (*Neogobius platyrostris*), which is an endemic species for the Black Sea, inhabits in marine ecosystem. The aim of the present study is to provide data on live colouration, head lateral line system, sexual dimorphism, morphometric and meristic features and habitat preferences of this goby.

Keywords: Caucasian goby, lateral line system, morphometry, flat snout goby.

Karadeniz'in Endemik Kaya Balıklarından *Neogobius platyrostris* (Gobiidae) Morfolojik ve Habitat Karakteristikleri

Özet

Karadeniz'in endemik türlerinden olan yassı-baş kaya balığı (*Neogobius platyrostris*) denizel ekosistemde yaşamaktadır. Bu çalışmada *Neogobius platyrostris'*in doğadaki renklenmesi, lateral kanal sistemleri, morfolojilerindeki eşeysel farklılıkları, morfometrik ve meristik özellikleri belirlenmiştir. Ayrıca habitat tercihleri ve derinliğe göre dağılımları da araştırılmıştır.

Anahtar Kelimeler: Kafkas kayabalığı, lateral çizgi, morfometri, düz burun kayabalığı.

Introduction

Currently 35 gobiid species have been known from the Black Sea basin (Engin *et al*., 2007; Fricke *et al*., 2007; Kovacic and Engin, 2008; 2009). There are some studies on habitat utilization and distribution gobiid species performed in Mediterranean (Ahnelt & Kovacic, 1997; Kovacic, 1997; Herler *et al*., 1999; Patzner 1999a, b; Bussotti & Guidetti, 2005; Herler & Patzner, 2005; Kovacic, 2008; Kovacic & Pijevac, 2008) however habitat data for many Black Sea gobies have been absent or scarce (Miller, 1986). During the last years, knowledge on gobiid fauna has been improved with description of new species and first records of some Mediterranean gobies in the Black Sea (Vasil'eva and Bogorodsky, 2004; Boltachev *et al.,* 2007; Engin *et al*., 2007; Freyhof and Naseka, 2007; Kovacic and Engin, 2008; 2009). Many aspects of the flat snout goby *Neogobius platyrostris* (Pallas, 1814)'s biology and ecology are still unknown. Before the present research, Pinchuk *et al*. (2003) revived information on morphology and habitat of this species, but their study was deprived of lateral line system, sexual dimorphism, live coloration and habitat preference.

Material and Method

Ten adult female and ten adult male specimens were collected by scuba diving using hand net and spear gun in the Black Sea coast of Rize (Figure. 1) and deposited in Zoological collection, Faculty of Fisheries, Rize University. Twenty two scuba dives were performed to observe live coloration and to take underwater photos. The bottom was classified in four estimated types: soft sediment bottom (<2 mm), gravel or cobles (1–15 cm), artificial habitats (break waters) (15-100 cm) and bedrock or boulders (>100 cm). To determine the vertical distribution, water depth was grouped into zones: <2 m, 2-4 m, 4-6 m, 6-8 m, 8-10 m, >10 m. Visual census was performed in each depth zone and habitat type to determine the habitat preference.

Meristic methods were used like in Miller

(1988). Meristic abbreviations: A, anal fin; D1, D2, first and second dorsal fins; P, pectoral fin; PD, predorsal scales; TR, scales in transverse series; V, pelvic disc.

Morphometrics as in Miller (1988) did were adapted for diagnostic characters of *Neogobius* species used by Miller (2003) and in the present research: Ab, anal fin base; BdA and BwA, body depth and width at anal fin origin; BdV, body depth at ventral fin origin; AMw, width of rear edge of anterior membrane; Cl, caudal fin length; CHd, cheek depth (lower border of eye to level of angle of jaws); CPl and CPd, caudal peduncle length (vertical of end of A base to origin of the middle rays of C) and depth (minimum); D1b and D2b, first and second dorsal fin base; D1h and D2h, length of longest first and second dorsal fin ray; E, eye diameter (horizontal); H, head length (snout to midline opposite upper origin of opercle); Hd, head depth (at eyes); Hw, head width (between upper origin of opercles); IOw, interorbital width (minimum); LP, lateral preorbital area (minimum between upper lip and eye); Mw, mouth 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; Ulw and Uld, upper lip width (maximum) and depth of upper lip (maximum); V/AN, distance from pelvic fin origin to anus; Vd, body depth at V origin; Vl, pelvic fin length. The terminology of lateral-line system follows Sanzo (1911) and Miller (2003).

Results

Morphology

Morphometric features are given in Table 1 and the general body shape is given in Figure 1. The body of this species was anteriorly cylindrical and posteriorly compressed. Predorsal area with obvious hump like convexity. The head was shallow, its depth was much smaller than its width, approximately half of its width. Upper lip was markedly swollen at the corner of mouth and its max depth about 0.3 its width. Snout was very shallow, its length was longer than the eye diameter (1.6 times in both sex). The interorbital distance was 0.6 times bigger than eye diameter in both sexes. Caudal peduncle is short and deep, its depth is about 0.6 times bigger than its own length in both. The numbers of scales in lateral series are between 64-69, the numbers of transversal scales are between 19-21 and the numbers of the predorsal scales are between 25-27. First dorsal fin rounded and slightly lower than second dorsal, with 6 unbranched rays. Second dorsal fin outline of latter not markedly descending posteriorly, with 1 unbranched and 16 branched rays in female and 17 in male. Pectoral fin margin rounded, with 19 branched rays. Pelvic disc short, rounded about half length pelvic disc origin to anus, lateral lobes are large and rectangular, with I/5 + 5/1 rays. Anal fin margin straight or slightly convex, with 1 unbranched ray and 12 branched rays in female and 13 in male. Caudal fin markedly rounded, with 15-16 branched rays.

Head Lateral Line System

Head with anterior and posterior oculoscapular, and preopercular canals. Anterior and posterior oculoscapular canals with pair of pores *σ;* single *λ* and *κ;* and paired *ω, α, β, ρ, θ, τ*. Preopercular canals are paired, with *γ, δ, ε*. Rows and the number of sensory papillae (Figure 2): (I) *preorbital*: snout with five rows in median preorbital series: upper row r^1 (6-10), and lower row r^2 (8-11) between pores *σ* and *λ*. Upper row s^1 (11-15) below pore *σ*, in many specimens doubled, lower s^2 (10-15) in all specimens doubled, and s^3 (12-18) as cluster above upper lip, row s^2 and in all specimens doubled. Lateral series *c* in four parts: superior c^2 below PN (9-13) in two or three longitudinal rows or as cluster; middle transversal c^1 (8-15) close to AN, single or doubled; inferior upper c_2 (13-16) longitudinal above lips, single or doubled; and lower c_1 (10-14). (II) *suborbital*: seven transverse (*1-7*) and two longitudinal rows (*b, d)* of sensory papillae on cheek. Rows *1-4* before longitudinal row *b*; rows *5* and *6* divided by *b* in superior (*5s, 6s*) and inferior sections (*5i, 6i*); row *7* near *α* (*1*: 50-59, *2*: 48-60, *3*: 36-41, *4*: 30-39, *5s*: 11-16, *5i*: 21-28, *6s*: 7-11, *6i*: 26-34, *7*: 6-8). Rows *1, 2*, *3, 4, 5, 6* and *7* begin very close to orbit, but more distant from orbit than row *1*. Row *6i* passing *d*. Longitudinal row *b* (26-34) long, extending forwards below pupil. Longitudinal row *d* long, not separated: *d* (38-44). (III)

Figure 1. *Neogobius platyrostris,* male, 123+25 mm, FFR 1022.

preoperculo-mandibular: external row *e* distinctly divided into anterior (e^1: 76-91), and posterior sections (e^2: 59-70); internal row *i* not clearly divided and doubled or tripled in frontal part (*i:* 132-155); mental row *f* clustered (45-62). (IV) *oculoscapular:* two longitudinal rows (x^1, x^2) and seven transversal rows (*z, y, q, trp*, as^1, as^2, as^3). Anterior longitudinal row x^1 (19-30) from above anterior part of pore γ to transversal row *trp;* posterior longitudinal row x^2 (9-13) above τ; row *z* (7-9) with lower end near pore γ; *q* and *trp*; row *q* (4-6) oblique, beginning near pore ρ; transversal row *trp* end of the row x^1 (4-7); transversal row *y* (6-9) behind pore τ, in some specimens oblique; transversal axillary rows as^1 (16-22), as^2 (17-23), as^3 (16-21) long. (V) *opercular*: transverse row *ot* (34-45); superior longitudinal row *os* (22-29); and inferior longitudinal row *oi* (11-20). (VI) *anterior dorsal*: transversal row *n* behind pore ω (12-16); transversal rows *o* (12-18); longitudinal row *g* (11-20) originated behind and distant from midpoint of row *o;* row *m* (11-17) below posterior part of row *g*; transversal row *h* (12-17).

Coloration

Preserved coloration: Overall colour is dark brown with many pale spots and along the flank, more or less evident pale saddles cross the back. The body has large grey-brown markings arranged in a chequer-like pattern. Belly is pale greyish. First dorsal fins with a few dark lines. Caudal and pectoral fins with many rows of narrow brown spots, almost to edge of fin.

Live coloration: Live colouration was described from underwater photos and observations (Figure 3 and 4). Adult specimens were basically greyish or brown with five milky brown saddles. Head covered many small pale spots with brown edge and black irregular blotches on the cheek. The pattern of the dorsal side of the body formed by pale blotches with small brown spots. Seven or eight dark blotches on the flank and ventral side of the body, especially breast whitish. Dorsal fins with 3-4 brown and horizontal stripes, caudal fin transparent with many vertical brown rows. Pectoral fins with whitish spots surrounding brown border, the spots become smaller at the edge of the fin. In anal fin all rays brown and between the rays greyish, the edge of the fin whitish (Figure 5).

Juvenile specimens were much darker than the adult and with five pale saddles. Also breast dark grey. Lateral side of the body cover with the pale spots. First dorsal fin with bluish blotch between the first and fourth rays, upper edge of the fin orange or reddish. Colour patterns of fins in juvenile were similar with adults, but less evident or transparent (Figure 6).

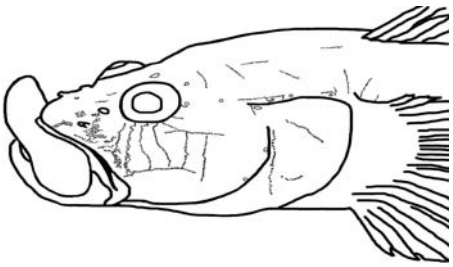

Figure 2. Head lateral line system of *Neogobius platyrostris*, male, 94+20 mm, FFR 1022.

Table 1. Morphometry of *Neogobius platyrostris* distributed in south eastern Black Sea coast

In percents of standard length	male (n=10)	female (n=10)	In percents of head length	male (n=10)	female (n=10)
SL (mm)	70.25-123.87	70.88-107.14	Cl (mm)	19.2-22.4 (20.9)	18.7-22.5 (20.9)
H	30.0-33.7 (31.6)	30.4-32.5 (31.5)	CPl	14.4-14.8 (14.6)	15.0-16.2 (15.6)
SN/D1	36.4-37.9 (37.0)	36.6-37.6 (37.0)	CPd	9.6-10.3 (9.9)	9.2-10.0 (9.8)
SN/D2	52.1-53.6 (52.7)	53.1-53.8 (53.5)	D1h	11.0-12.6 (12.1)	11.0-14.1 (12.2)
SN/A	58.9-59.8 (59.4)	56.5-60.8 (59.1)	D2h	14.4-18.4 (16.7)	13.3-15.7 (14.8)
SN/AN	53.5-55.7 (54.8)	55.4-57.3 (56.0)	SN/V	31.9-32.6 (32.3)	29.9-32.2 (31.1)
Pl	22.6-24.7 (23.4)	20.7-23.4 (21.9)	E	17.4-20.9 (19.8)	16.9-22.1 (19.3)
V/AN	21.6-23.7 (22.8)	23.8-25.0 (24.4)	Hd	42.7-45.6 (44.6)	41.1-47.0 (43.5)
BdV	20.4-22.5 (21.3)	20.0-21.8 (21.2)	Hw	77.4-83.2 (80.9)	72.1-84.7 (76.6)
BdA	17.0-18.5 (17.9)	17.8-18.7 (18.3)	Mw	39.0-41.4 (40.7)	37.5-39.1 (38.3)
BwA	11.2-12.0 (11.5)	10.0-10.8 (10.4)	IOw	10.2-16.1 (12.5)	11.1-14.6 (12.3)
Ab	25.0-28.1 (26.2)	22.5-25.1 (24.0)	PO	50.7-54.7 (52.3)	49.9-52.6 (51.3)
D1b	16.4-18.1 (17.1)	17.1-19.4 (18.3)	SN	31.2-34.0 (33.1)	30.4-33.6 (32.7)
D2b	36.2-40.2 (38.8)	37.3-38.1 (37.7)	ULw	60.9-71.2 (65.9)	62.0-70.7 (65.8)
AMw	7.6-8.3 (7.9)	7.3-7.4 (7.3)	Uld	16.7-25.2 (20.2)	19.5-24.8 (21.8)

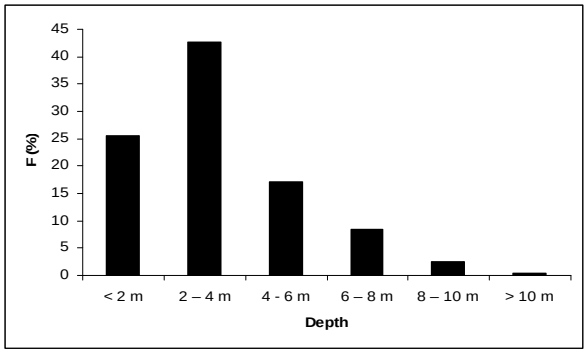

Figure 3. The occurrence frequency at different depth ranges of *Neogobius platyrostris* in the south eastern Black Sea.

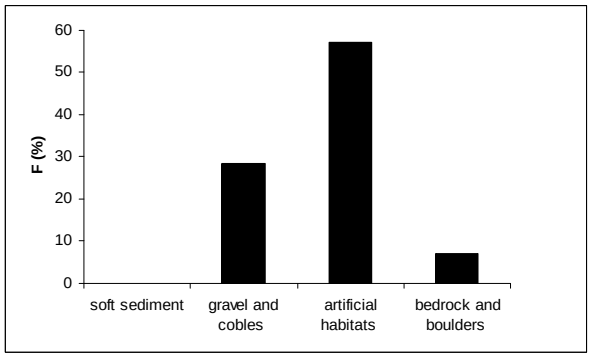

Figure 4. The occurrence frequency at different bottom types of *Neogobius platyrostris* in the south eastern Black Sea.

Figure 5. Adult *Neogobius platyrostris*, south eastern Black Sea coast (Rize), approximately 200 mm.

Figure 6. Juvenile *Neogobius platyrostris*, south eastern Black Sea coast (Rize), approximately 50 mm.

Sexual Dimorphism

Basic colour patterns are similar in both sexes but male become darker than female in reproduction season. Male are much longer and heavier than female. In male, body width at anal fin origin, length of anal fin base, width of rear edge of anterior membrane, length of longest second dorsal fin ray and mouth width are bigger than female. On the other hand, in female body depth at anal fin origin and caudal peduncle length are bigger than male (Table 1). Also there are several differences between second dorsal fin and anal fin meristics.

Habitat Preferences

The flat snout goby, *N. platyrostris,* is the most common inshore fish species in the south eastern Black Sea coast and prefers shallow water. It was observed that the flat snout goby dwelled commonly in 0.1 and 10 m depth and it was also recorded at more than 10 m depth. Adult specimens prefer to live

in deeper than 2 m, especially between 2 - 8 m depth and juveniles inhabit in less than 2 m depth (Figure 5).

This species was most frequently found in sheltered side of the breakwaters in the south eastern Black Sea coast but juveniles were also observed on gravel and cables in the area exposed to wave effects. It was rarely recorded on bedrock and boulders, but could have never been found in the soft sediments. The flat snout goby inhabits on naked rock or gravel and has rarely recorded on rocky areas covered with vegetation (Figure 6).

Discussion

The flat-snout goby *N. platyrostris* is the most frequently observed gobiid species in the south-eastern Black Sea coast, but there has been no study related with this endemic species in the area. Although *N. platyrostris* is geographically and morphologically closed to Caucasian fresh water gobies, it is easily separated from others with more depressed head and swollen upper lip (Kovacic & Engin, 2008). Also *N. platyrostris* reaches bigger body size than the others. General morphometrics and meristics are similar to previous studies. But this study shows that this species has distinct sexual dimorphism with many morphological properties. In addition to the Miller's (1986) head lateral line system description, in this study the topography of these sensory systems with the papillae meristics was redescribed. The coloration of preserved specimens is basically similar to the description in Pinchuk *et al*. (2003), but the living specimens have complicated colour pattern. And also there are ontogenic and sexual differences in coloration.

This species prefers especially sheltered side of the breakwaters like some other gobiid species in the area (Engin *et al*., 2007). Only the juveniles inhabit on gravel and cables, but previously this kind of materials was known as the typical biotopes for this goby (Pinchuk *et al*., 2003). Habitat preferences and ecology of many epibenthic fish species are still unknown in the Black Sea. The future use of diving techniques would improve the knowledge about these species.

References

Ahnelt, H. and Kovačić, M. 1997. A northern Adriatic population of *Thorogobius macrolepis* (Teleostei: Gobiidae). Cybium, 21: 149-162.

Boltachev, A.R., Vasıl'eva, E.D. and Danılyuk, O.N. 2007. The first finding of the Striped tripletooth goby *Tridentiger trigonocephalus* (Perciformes, Gobiidae) in the Black Sea (the estuary of the Chernaya River, Sevastopol Bay). Journal of Ichthyology, 47: 802-805.

Bussotti, S. and Guidetti, P. 2005. Distribution patterns of the golden goby, *Gobius auratus*, in Mediterranean sublittoral rocky cliffs. Italian Journal of Zoology, 72: 305-309.

Engin, S., Turan, D. and Kovačić, M. 2007. First record of the red-mouthed goby, *Gobius cruentatus* (Gobiidae), in the Black Sea. Cybium, 31(1): 87-88.

Herler, J., Patzner, R.A., Ahnelt, H. and Hilgers, H. 1999. Habitat selection and ecology of two speleophilic gobiid fishes (Pisces: Gobiidae) from the Mediterranean Sea. Marine Ecology, 20: 49-62.

Herler, J. and Patzner, R.A. 2005. Spatial segregation of two common *Gobius* species (Teleostei: Gobiidae) in the northern Adriatic Sea. Marine Ecology, 26: 121-129.

Fricke, R., Bilecenoglu, M. and Sarı, H.M. 2007. Annotated checklist of fish and lamprey species of Turkey, including a Red List of threatened and declining species. Stuttg. Beitr. Nat.kd., (Biol.), 706: 1-169.

Freyhof, J. and Naseka, A.M. 2007. *Proterorhinus tataricus*, a new tubenose goby from Crimea, Ukraine (Teleostei: Gobiidae). Ichthyol. Explor. Freshw., 18(4): 325-334.

Kovačić, M. and Engin, S. 2008. Two new species of *Neogobius* (Gobiidae) from northeastern Turkey. Cybium, 32(1): 73-80.

Kovačić, M. and Engin, S. 2009. First record of the zebra goby, *Zebrus zebrus* (Gobiidae), in the Black Sea, Cybium, 33(1):83-84.

Kovačić, M. and Pijevac, M.A. 2008. Habitat preferences, distribution and abundance of *Gobius vittatus* (Gobiidae) in the Kvarner area (Northern Adriatic Sea). Vie et Milieu, 58(1): 39-45.

Kovačić, M. 2008. Live colouration, morphology and habitat of *Vanneaugobius dollfusi* (Gobiidae) in the northern Adriatic Sea. Journal of Fish Biology, 73: 1019-1023.

Kovačić, M. and Engin, S. (in press). First record of zebra goby, *Zebrus zebrus* (Gobiidae), in the Black Sea. Cybium.

Kovačić, M. 1997. Cryptobenthic gobies and clingfishes in the Kvarner area, Adriatic Sea. Nat. Croat., 6: 423-435.

Miller, P.J. 1986. Gobiidae. In: P.J.P. Whitehead, M.L. Bauchot, J.C. Hureau, J. Nielsen, E. Tortonese (Eds.), Fishes of the Northeastern Atlantic and the Mediterranean. UNESCO, Paris: 1019-1085.

Miller, P.J. 1988. New species of *Corcyrogobius, Thorogobius* and *Wheelerigobius* from West Africa (Teleostei: Gobiidae). J. Nat. Hist., 22: 1245-1262.

Miller, P.J. 2003. The Freshwater Fishes of Europe, Vol. 8/I. Wiebelsheim: Aula Verlag., 404 pp.

Patzner, R.A. 1999a. 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.

Patzner, R.A. 1999b. Sea urchins as a hiding-place for juvenile benthic teleosts (Gobiidae and Gobiesocidae) in the Mediterranean Sea. Cybium, 23: 93-97.

Pinchuk, V.I., Vasil'eva, E.D., Vasil'ev, V.P. and Miller, P.J. 2003. *Neogobius platyrostris* (Pallas, 1814). In: P.J. Miller (Ed.), The Freshwater Fishes of Europe, Vol. 8/I. Wiebelsheim: Aula Verlag, 346-356.

Sanzo, L. 1911. Distribuzione delle papille cutanee (organi ciatiforme) e suo valore sistematico nei Gobi. Mitt. Zool. Stat. Neapel, 20: 249-328.

Vasil'eva, E.D. and Bogorodsky, V. 2004. Two new species of gobies (Gobiidae) in the ichthyofauna of the Black Sea. Journal of Ichthyology, 44(8): 599-606.